3GPP TSG-T (Terminals) Meeting #15
Jeju Island, Korea, 6 - 8 March, 2002

Tdoc TP-020014

Agenda Item: 5.2.3

Source: T2

Title: "Terminal Interfaces and Capabilities" Change Requests

Document for: Approval

_____

Spec	CR	Rev	Rel	Subject	Cat	Vers-Curr	Vers-New	T2 Tdoc	Workitem
07.10	A025		R97	Incorrect explanation of length indicator bit	F	6.4.0	6.5.0	T2-020093	TEI
07.10	A026		R98	Incorrect explanation of length indicator bit	A	7.1.0	7.2.0	T2-020094	TEI
27.010	007		R99	Incorrect explanation of length indicator bit	A	3.3.0	3.4.0	T2-020095	TEI
27.010	008		Rel-4	Incorrect explanation of length indicator bit	A	4.1.0	4.2.0	T2-020096	TEI4
27.007	082		R99	Alignment of UE architecture with 23.101	F	3.10.0	3.11.0	T2-020104	TEI
27.007	083		Rel-4	Alignment of UE architecture with 23.101	A	4.3.0	4.4.0	T2-020105	TI-ATC
27.007	084		Rel-5	Alignment of UE architecture with 23.101	A	5.0.0	5.1.0	T2-020098	TEI5
27.901	001		R99	Alignment of UE architecture with 23.101	F	3.0.0	3.1.0	T2-020120	TEI
27.901	002		Rel-4	Alignment of UE architecture with 23.101	A	4.0.0	4.1.0	T2-020119	TEI4
23.227	005		Rel-4	Alignment of UE architecture with 23.101	F	4.1.0	4.2.0	T2-020102	TLM
23.227	006		Rel-5	Alignment of UE architecture with 23.101	A	5.0.0	5.1.0	T2-020103	TLM5

CR-Form-v5

CHANGE REQUEST

| | ⌘ | **07.10** CR **A025** | ⌘ **rev** | **-** | ⌘ | Current version: | **6.4.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title:	⌘	Incorrect explanation of length indicator bit.
Source:	⌘	T2
Work item code: ⌘	TEI	***Date:*** ⌘ 1/2/02
Category: ⌘ **F**		***Release:*** ⌘ R97

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP <u>TR 21.900</u>.

Use one of the following releases:
2   *(GSM Phase 2)*
R96   *(Release 1996)*
R97   *(Release 1997)*
R98   *(Release 1998)*
R99   *(Release 1999)*
REL-4 *(Release 4)*
REL-5 *(Release 5)*

Reason for change:	⌘	Correction to explanation of the EA field.
Summary of change: ⌘		Change from 1 to 0 in the explanation text in the 5th paragraph in section 5.2.1.5
Consequences if not approved:	⌘	Possible misunderstanding of use of the EA field and thereby incorrect implimentation.

Clauses affected:	⌘	5.2.1.5

Other specs affected:	⌘ ☐ Other core specifications	⌘
	☐ Test specifications	
	☐ O&M Specifications	

| ***Other comments:*** | ⌘ | |

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G_Specs/CRs.htm</u>. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://ftp.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.2.1.5 Length Indicator

This field is present only in case when basic option is activated.

It has the following format:

Bit	1	2	3	4	5	6	7	8
	E/A	L1	L2	L3	L4	L5	L6	L7

Figure 1: Length field, first byte

The L1 to L7 bits indicates the length of the following data field. The default length is 31 bytes.

According to the rule of ISO/IEC 13239:1997, the range of the length field may be extended by use of the EA bit. When the EA bit is set to 1 in an octet, it is signifies that this octet is the last octet of the length field. When the EA bit is set to 0, it signifies that a second octet of the length field follows. The total length of the length field is in that case 15bits, L1-L15.

The second octet of the length field (only present when the EA field in the first byte is set to 0~~1~~) format:

Bit	1	2	3	4	5	6	7	8
	L8	L9	L10	L11	L12	L13	L14	L15

Figure 2: Length field, second byte

CHANGE REQUEST

| ⌘ | **27.901** CR **002** | ⌘ | ev | **-** | ⌘ | Current version: | **4.0.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network ☐   Core Network ☐

Title: ⌘	Alignment of UE architecture with 23.101	
Source: ⌘	T2	
Work item code: ⌘	TEI	**Date:** ⌘ 2002-02-13

Category: ⌘ **A**	Use <u>one</u> of the following categories:
	    F (correction)
	    A (corresponds to a correction in an earlier release)
	    B (addition of feature),
	    C (functional modification of feature)
	    D (editorial modification)
	Detailed explanations of the above categories can
	be found in 3GPP <u>TR 21.900</u>.
		Release: ⌘ REL-4
		Use <u>one</u> of the following releases:
		  2 (GSM Phase 2)
		  R96 (Release 1996)
		  R97 (Release 1997)
		  R98 (Release 1998)
		  R99 (Release 1999)
		  REL-4 (Release 4)
		  REL-5 (Release 5)

Reason for change: ⌘	Alignment of the UE abstract architecture with the General UMTS Architecture specification 23.101
Summary of change: ⌘	Corrections made to use the correct terms ME, MT and TA. The figure1 has been modified. The term ME has been replaced by MT/TA, when applicable.
Consequences if not approved: ⌘	Inconsistent specifications and incorrect UE architecture

Clauses affected: ⌘	4.1.1, 4.2	
Other specs Affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications	
Other comments: ⌘		

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

4.1.1 The 3GPP terminal model

The area of external and internal interfaces for 3GPP MEs have been studied and Figure 1 shows the model that has been used. The external interface, other than the radio and USIM interfaces, is the TE ME MT/TA interface. An example of an internal interface is the TA-MT interface, as illustrated.
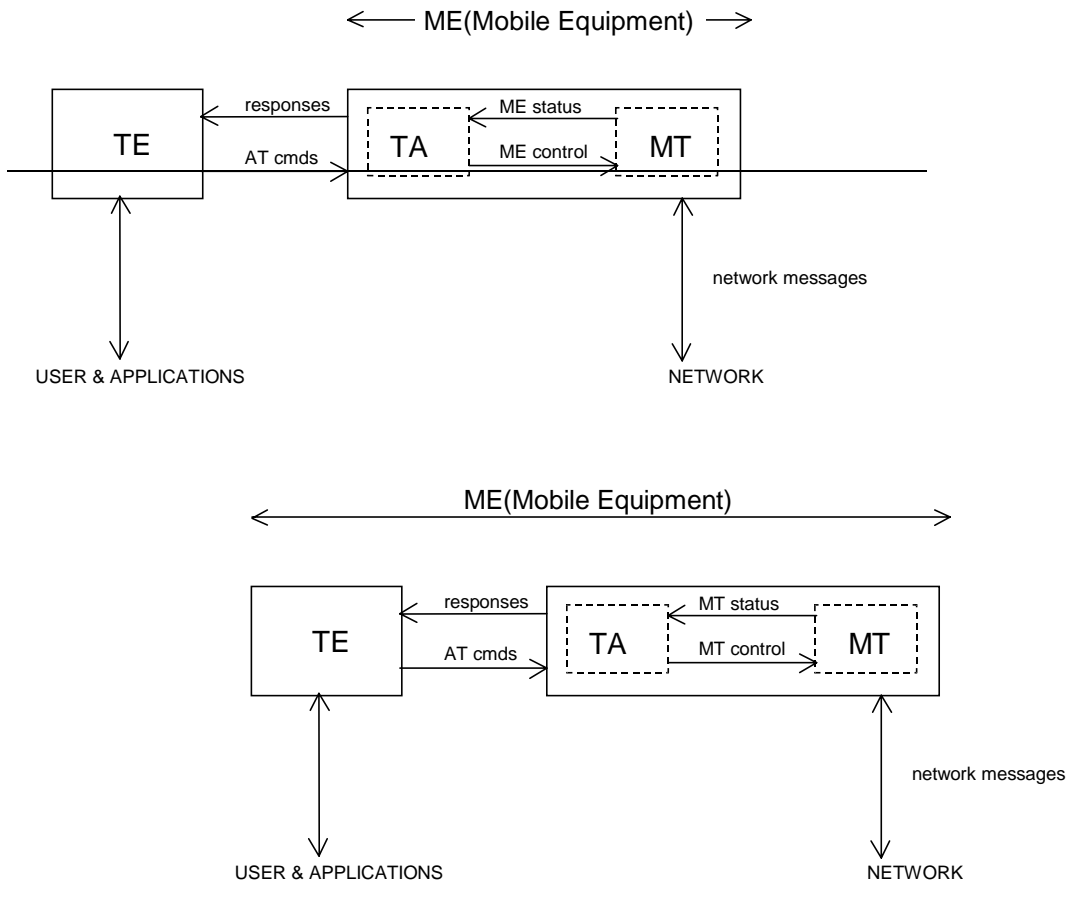

Figure 1: The 3GPP terminal model

4.2 Conclusions

It has been concluded that 3GPP should not produce any technical specifications for terminal interfaces (neither external, i.e. MT/TAE-TE, nor internal, e.g. MT-TA) other than the radio interface and the USIM interface. This includes optional as well as mandatory mechanical, electrical and logical specifications for interfaces. As an exception, optional protocols that are necessary for 3GPP terminals and that are *not defined elsewhere* could be standardized. One agreed example is AT commands.

Instead of specifying external interfaces in 3GPP, appropriate open standards should be used for external interfaces for 3GPP terminals. A list of potential examples of such interfaces is shown in Table 1. It should be noted that the list of interfaces in Table 1 is not exhaustive and that new examples are likely to be added in the future as technical development advances. It should also be noted that proprietary external interfaces may be used in the 3GPP terminals. It is then up to the manufacturer to handle the adoption to standard interfaces.

Since the terminal external interfaces (other than the radio interface, the USIM interface and AT commands), are out of scope of 3GPP, the SDOs can develop their own physical connector specification based on their market requirements. Such specifications should be optional to allow for other terminal interface options to exist on those markets.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **27.901** CR **001** | ⌘ | ev | **-** | ⌘ | Current version: | **3.0.0** | ⌘ |

For __HELP__ on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title: ⌘	Alignment of UE architecture with 23.101	
Source: ⌘	T2	
Work item code: ⌘	TEI	**Date:** ⌘ 2002-02-05
Category: ⌘	**F**	**Release:** ⌘ R99

Use one of the following categories:
 __F__ (correction)
 __A__ (corresponds to a correction in an earlier release)
 __B__ (addition of feature),
 __C__ (functional modification of feature)
 __D__ (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
 2   (GSM Phase 2)
 R96   (Release 1996)
 R97   (Release 1997)
 R98   (Release 1998)
 R99   (Release 1999)
 REL-4   (Release 4)
 REL-5   (Release 5)

Reason for change: ⌘	Alignment of the UE abstract architecture with the General UMTS Architecture specification 23.101
Summary of change: ⌘	Corrections made to use the correct terms ME, MT and TA. The figure1 has been modified. The term ME has been replaced by MT/TA, when applicable.
Consequences if not approved: ⌘	Inconsistent specifications and incorrect UE architecture

Clauses affected: ⌘	4.1.1, 4.2
Other specs Affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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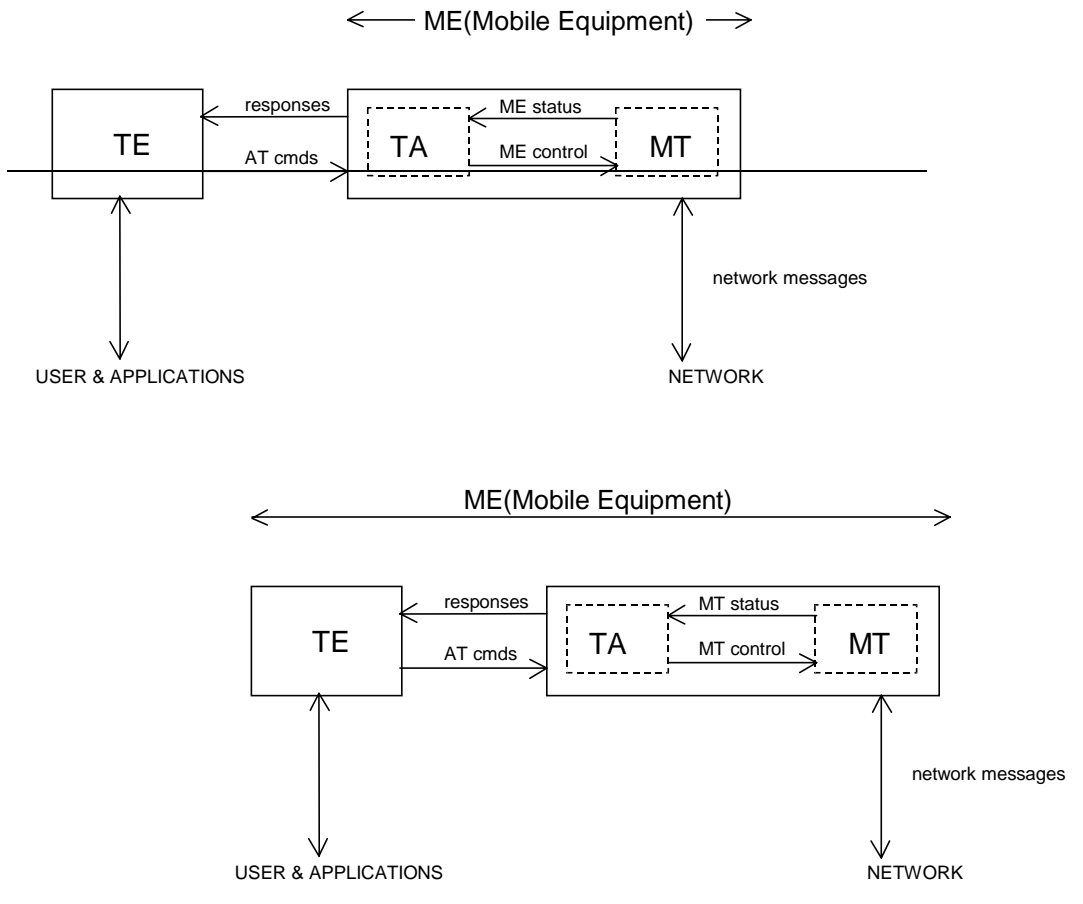

Figure 1: The 3GPP terminal model

4.2 Conclusions

It has been concluded that 3GPP should not produce any technical specifications for terminal interfaces (neither external, i.e. M T/TA~~E~~-TE, nor internal, e.g. MT-TA) other than the radio interface and the USIM interface. This includes optional as well as mandatory mechanical, electrical and logical specifications for interfaces. As an exception, optional protocols that are necessary for 3GPP terminals and that are *not defined elsewhere* could be standardized. One agreed example is AT commands.

Instead of specifying external interfaces in 3GPP, appropriate open standards should be used for external interfaces for 3GPP terminals. A list of potential examples of such interfaces is shown in Table 1. It should be noted that the list of interfaces in Table 1 is not exhaustive and that new examples are likely to be added in the future as technical development advances. It should also be noted that proprietary external interfaces may be used in the 3GPP terminals. It is then up to the manufacturer to handle the adoption to standard interfaces.

Since the terminal external interfaces (other than the radio interface, the USIM interface and AT commands), are out of scope of 3GPP, the SDOs can develop their own physical connector specification based on their market requirements. Such specifications should be optional to allow for other terminal interface options to exist on those markets.

CR-Form-v5

CHANGE REQUEST

| ⌘ | **27.010** CR **008** | ⌘**rev** | **-** | ⌘ | Current version: | **4.1.0** | ⌘ |

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title:	⌘	Incorrect explanation of length indicator bit.
Source:	⌘	T2
Work item code: ⌘	TEI	***Date:*** ⌘ 1/2/02

Category:	⌘ **A**		***Release:*** ⌘ Rel-4

Use one of the following categories:
   F *(correction)*
   A *(corresponds to a correction in an earlier release)*
   B *(addition of feature),*
   C *(functional modification of feature)*
   D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
   2   *(GSM Phase 2)*
   R96 *(Release 1996)*
   R97 *(Release 1997)*
   R98 *(Release 1998)*
   R99 *(Release 1999)*
   REL-4 *(Release 4)*
   REL-5 *(Release 5)*

Reason for change:	⌘	Correction to explanation of the EA field.
Summary of change: ⌘	Change from 1 to 0 in the explanation text in the 5th paragraph in section 5.2.1.5
Consequences if not approved:	⌘	Possible misunderstanding of use of the EA field and thereby incorrect implimentation.

Clauses affected:	⌘	5.2.1.5
Other specs affected:	⌘ ☐	Other core specifications ⌘
	☐	Test specifications
	☐	O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.2.1.5   Length Indicator

This field is present only in case when basic option is activated.

It has the following format:

Bit	1	2	3	4	5	6	7	8
	E/A	L1	L2	L3	L4	L5	L6	L7

Figure 1: Length field, first byte

The L1 to L7 bits indicates the length of the following data field. The default length is 31 bytes.

According to the rule of ISO/IEC 13239, the range of the length field may be extended by use of the EA bit. When the EA bit is set to 1 in an octet, it is signifies that this octet is the last octet of the length field. When the EA bit is set to 0, it signifies that a second octet of the length field follows. The total length of the length field is in that case 15bits, L1-L15.

The second octet of the length field (only present when the EA field in the first byte is set to ~~1~~0) format:

Bit	1	2	3	4	5	6	7	8
	L8	L9	L10	L11	L12	L13	L14	L15

Figure 2: Length field, second byte

The length field shall always be present, even if the data field is empty.

CR-Form-v5

CHANGE REQUEST

| ⌘ | **27.010** CR **007** | ⌘**rev** | **-** | ⌘ | Current version: | **3.3.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network ☐   Core Network ☐

Title:	⌘	Incorrect explanation of length indicator bit.
Source:	⌘	T2

Work item code: ⌘	TEI		***Date:*** ⌘	1/2/02

Category:	⌘	**A**		***Release:*** ⌘	R99

Use <u>one</u> of the following categories:
    F *(correction)*
    A *(corresponds to a correction in an earlier release)*
    B *(addition of feature),*
    C *(functional modification of feature)*
    D *(editorial modification)*
Detailed explanations of the above categories can
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    2   *(GSM Phase 2)*
    R96 *(Release 1996)*
    R97 *(Release 1997)*
    R98 *(Release 1998)*
    R99 *(Release 1999)*
    REL-4 *(Release 4)*
    REL-5 *(Release 5)*

Reason for change: ⌘		Correction to explanation of the EA field.
Summary of change: ⌘		Change from 1 to 0 in the explanation text in the 5th paragraph in section 5.2.1.5
Consequences if not approved:	⌘	Possible misunderstanding of use of the EA field and thereby incorrect implimentation.

Clauses affected:	⌘	5.2.1.5

Other specs affected:	⌘	☐ Other core specifications	⌘	
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://ftp.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.2.1.5   Length Indicator

This field is present only in case when basic option is activated.

It has the following format:

Bit	1	2	3	4	5	6	7	8
	E/A	L1	L2	L3	L4	L5	L6	L7

Figure 1: Length field, first byte

The L1 to L7 bits indicates the length of the following data field. The default length is 31 bytes.

According to the rule of ISO/IEC 13239:1997, the range of the length field may be extended by use of the EA bit. When the EA bit is set to 1 in an octet, it is signifies that this octet is the last octet of the length field. When the EA bit is set to 0, it signifies that a second octet of the length field follows. The total length of the length field is in that case 15bits, L1-L15.

The second octet of the length field (only present when the EA field in the first byte is set to 0~~1~~) format:

Bit	1	2	3	4	5	6	7	8
	L8	L9	L10	L11	L12	L13	L14	L15

Figure 2: Length field, second byte

The length field shall always be present, even if the data field is empty.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **27.007** CR **084** | ⌘ | ev | **-** | ⌘ | Current version: | **5.0.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title:	⌘	Alignment of UE architecture with 23.101
Source:	⌘	T2

Work item code: ⌘	TEI5		**Date:** ⌘	2002-02-05

Category:	⌘ **A**		**Release:** ⌘	REL-5

Use <u>one</u> of the following categories:
    F (correction)
    A (corresponds to a correction in an earlier release)
    B (addition of feature),
    C (functional modification of feature)
    D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP <u>TR 21.900</u>.

Use <u>one</u> of the following releases:
    2   (GSM Phase 2)
    R96   (Release 1996)
    R97   (Release 1997)
    R98   (Release 1998)
    R99   (Release 1999)
    REL-4 (Release 4)
    REL-5 (Release 5)

Reason for change: ⌘	Alignment of the abstract architecture with the General UMTS Architecture specification 23.101
Summary of change: ⌘	Corrections made to use the correct terms ME, MT, TA and UE. The term ME has been replaced by MT and MS by UE, when applicable. UE abbreviation added. Reference to 23.101 added.
Consequences if not approved: ⌘	Inconsistent specifications and incorrect UE architecture

Clauses affected: ⌘	1, 2, 3.2, 4.1, 5, 5.1- 5.7, 5.10, 6.1- 6.5, 6.7- 6.12, 6.18, 6.19, 6.21-6.23, 7, 7.1-7.9, 7.11- 7.13, 7.15- 7.19, 7.21-7.27, 8, 8.1- 8.23, 8.25-8.33, 8.35-8.43, 9, 9.1-9.3, 10.1.18, 10.1.19, 11.1.1-11.1.8, 11.2.1, 11.3.1, 11.3.2

Other specs Affected:	⌘	☐ Other core specifications	⌘	
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1 Scope

The present document specifies a profile of AT commands and recommends that this profile be used for controlling Mobile ~~Equipment~~ Termination (~~ME~~MT) functions and GSM/UMTS 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]. The present document has also the syntax details used to construct these extended GSM/UMTS 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~~MT of networks other than GSM/UMTS. ITU-T T.31 [11] and T.32 [12] fax AT commands may be used for GSM/UMTS fax transmission from TE. GSM/UMTS Short Message Service AT commands are defined in 3GPP TS 27.005 [24]. GPRS AT commands are defined in clause 10 of this specification. The present document assumes an abstract architecture comprising a TE (e.g. a computer) and a ~~ME~~MT 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~~MT and TE as three separate entities;

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

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

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

The commands described in the present document may be observed on the link between the TE and the TA. However, most of the commands retrieve information about the ~~ME~~MT, not about the TA.
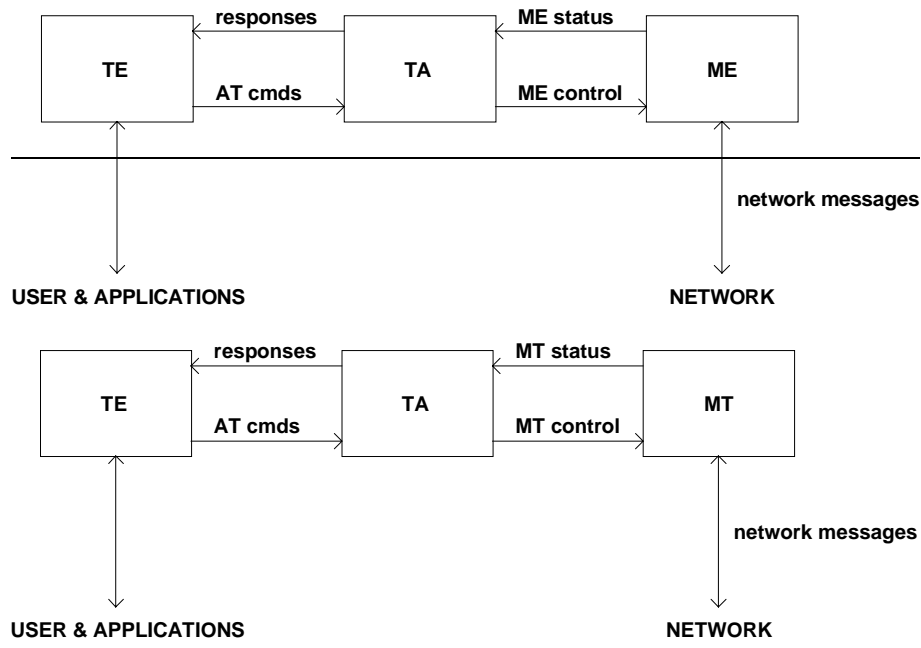
Figure 1: Setup

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~~MT is dependent on the interface in the ~~ME~~MT.

The functional blocks shown in Figure 1, using AT commands, shall follow the principles described in the interactions handling framework 3GPP TS 23.227 [63].

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1]   3GPP TS 22.002: "3rd Generation Partnership Project; Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[2]   3GPP TS 22.003: "3rd Generation Partnership Project; Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[3]   3GPP TS 22.081: "3rd Generation Partnership Project; Line identification supplementary services - Stage 1".

[4]   3GPP TS 22.082: "3rd Generation Partnership Project; Call Forwarding (CF) supplementary services - Stage 1".

[5]   3GPP TS 22.083: "3rd Generation Partnership Project; Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[6]   3GPP TS 22.088: "3rd Generation Partnership Project; Call Barring (CB) supplementary services - Stage 1".

[7]   3GPP TS 23.003: "3rd Generation Partnership Project; Numbering, addressing and identification".

[8]   3GPP TS 24.008: "3rd Generation Partnership Project; Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".

[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]   3GPP TS 24.022: "3rd Generation Partnership Project; 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]			3GPP TS 22.030: "3rd Generation Partnership Project; Man Machine Interface (MMI) of the Mobile Station (MS)".

[20]			3GPP TS 45.008: "Digital cellular telecommunication system (Phase 2+); Radio subsystem link control".

[21]			3GPP TS 22.085: "3rd Generation Partnership Project; Closed User Group (CUG) supplementary services - Stage 1".

[22]			3GPP TS 22.084: "3rd Generation Partnership Project; MultiParty (MPTY) supplementary services - Stage 1".

[23]			3GPP TS 22.090: "3rd Generation Partnership Project; Unstructured Supplementary Service Data (USSD) - Stage 1".

[24]			3GPP TS 27.005: "3rd Generation Partnership Project; Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[25]			3GPP TS 23.038: "3rd Generation Partnership Project; Alphabet and language specific information".

[26]			3GPP TS 22.024: "3rd Generation Partnership Project; Description of Charge Advice Information (CAI)".

[27]			3GPP TS 22.086: "3rd Generation Partnership Project; Advice of Charge (AoC) supplementary services - Stage 1".

[28]			3GPP TS 51.011: "Digital cellular telecommunication system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".

[29]			3GPP TS 22.034: "3rd Generation Partnership Project; High Speed Circuit Switched Data (HSCSD) - Stage 1".

[30]			3GPP TS 22.091: "3rd Generation Partnership Project; Explicit Call Transfer (ECT) supplementary service - Stage 1".

[31]			3GPP TS 22.072: "3rd Generation Partnership Project; Call Deflection (CD) supplementary service - Stage 1".

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

[33]			3GPP TS 22.022: "3rd Generation Partnership Project; Personalization of GSM Mobile Equipment (ME) Mobile functionality specification".

[34]			3GPP TS 27.060: "3rd Generation Partnership Project; 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]			3GPP TS 45.005: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".

[39]			3GPP TS 29.061: "3rd Generation Partnership Project; General Packet Radio Service (GPRS); Interworking between the Public Land Mobile Network (PLMN) supporting GPRS and Packet Data Networks (PDN)".

[40]			3GPP TS 23.081: "3rd Generation Partnership Project; Technical Specification Group Core Network; Line identification supplementary services - Stage 2".

[41]   3GPP TS 27.001: "3rd Generation Partnership Project; Technical Specification Group Core Network; General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[42]   3GPP TS 29.007: "3rd Generation Partnership Project; Technical Specification Group Core Network; General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[43]   Infrared Data Association; Specification of Ir Mobile Communications (IrMC).

[44]   IrDA Object Exchange Protocol.

[45]   3GPP TS 27.010: "3rd Generation Partnership Project; Terminal Equipment to User Equipment (TE-UE) multiplexer protocol User Equipment (UE)".

[46]   3GPP TS 23.107: "3rd Generation Partnership Project; Quality of Service, Concept and Architecture".

[47]   3GPP TS 23.060: "3rd Generation Partnership Project; General Packet Radio Service (GPRS) Service description; Stage 2".

[48]   3GPP TS 23.067: "3rd Generation Partnership Project; Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 2".

[49]   3GPP TS 43.068: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 2".

[50]   3GPP TS 43.069: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 2".

[51]   3GPP TS 24.067: "3rd Generation Partnership Project; Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 3".

[52]   3GPP TS 44.068: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 3".

[53]   3GPP TS 44.069: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 3".

[54]   3GPP TS 22.067: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 1".

[55]   3GPP TS 42.068: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 1".

[56]   3GPP TS 42.069: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 1".

[57]   void

[58]   3GPP TS 22.087: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects;User-to-User Signalling (UUS) - Stage 1"

[59]   3GPP TS 31.102: "3rd Generation Partnership Project; Technical Specification Group Terminals; Characteristics of the USIM Application".

[60]   ETSI TS 102 221 "Smart Cards; UICC-Terminal interface; Physical and logical characteristics (Release 1999)".

[61]   3GPP TS 44.065: "3rd Generation Partnership Project; General Packet Radio Service (GPRS); Mobile Station (MS) – Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)".

[62]   3GPP TS 25.323: "3rd Generation Partnership Project; Packet Data Convergence Protocol (PDCP)".

[63]   3GPP TS 23.227 "3rd Generation Partnership Project; Applications and User interaction in the UE-Principles and specific requirements".

[64]   3GPP TS 23.101: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; General UMTS Architecture "
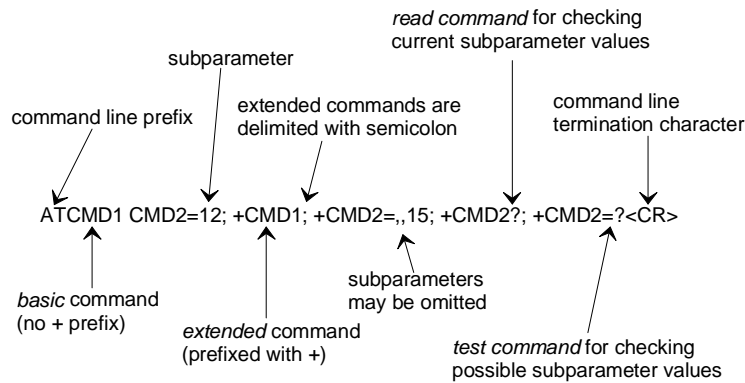
3.2   Abbreviations

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

AT	ATtention; this two-character abbreviation is always used to start a command line to be sent from TE to TA
ASCI	Advanced Speech Call Items, including VGCS, VBS and eMLPP
BCD	Binary Coded Decimal
eMLPP	Enhanced Multi-Level Precedence and Pre-emption Service
ETSI	European Telecommunications Standards Institute
FTM	Frame Tunnelling Mode (refer 3GPP TS 27.001 [41] and 3GPP TS 29.007[42])
HSCSD	High Speed Circuit Switched Data
IMEI	International Mobile station Equipment Identity
IRA	International Reference Alphabet (ITU-T T.50 [13])
IrDA	Infrared Data Association
ISO	International Standards Organization
ITU-T	International Telecommunication Union - Telecommunications Standardization Sector
ME	Mobile Equipment, e.g. a GSM phone (equal to MS; Mobile Station)
MoU	Memorandum of Understanding (GSM operator joint)
MT	Mobile Termination
PCCA	Portable Computer and Communications Association
PTT	Push to Talk
RDI	Restricted Digital Information
RLP	Radio Link Protocol
SIM	Subscriber Identity Module
TA	Terminal Adaptor, e.g. a GSM data card (equal to DCE; Data Circuit terminating Equipment)
TE	Terminal Equipment, e.g. a computer (equal to DTE; Data Terminal Equipment)
TIA	Telecommunications Industry Association
UDI	Unrestricted Digital Information
UE	User Equipment
UICC	Universal Integrated Circuit Card
USIM	Universal Subscriber Identity Module
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service

4.1   Command line

See figure 2 for general structure of a command line. Standardized *basic* commands are found only in V.25ter [14]. GSM/UMTS commands use syntax rules of *extended* commands. 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. *Parameter type* commands also have a *read command* (trailing ?) to check the current values of subparameters. *Action type* commands do not store the values of any of their possible subparameters, and therefore do not have a read command.

Figure 2: Basic structure of a command line

If verbose responses are enabled with command `V1` and all commands in a command line has been performed successfully, result code `<CR><LF>OK<CR><LF>` is sent from the TA to the TE. If numeric responses are enabled with command `V0`, result code `0<CR>` is sent instead.

If verbose responses are enabled with command `V1` and subparameter values of a command are not accepted by the TA (or command itself is invalid, or command cannot be performed for some reason), result code `<CR><LF>ERROR<CR><LF>` is sent to the TE and no subsequent commands in the command line are processed. If numeric responses are enabled with command `V0`, result code `4<CR>` is sent instead. ERROR (or 4) response may be replaced by `+CME ERROR: <err>` (refer clause 9) when command was not processed due to an error related to ~~ME~~MT operation.

5   General commands

ITU-T Recommendation V.25ter [14] includes "Generic DCE Control" commands with the prefix +G. These commands are for the identification of the TA. Four of those commands are adapted here to be the identification commands of the ~~ME~~MT. Syntax is otherwise similar but the prefix is +CG. TIA IS-99 [15] uses same commands for base station identification.

5.1   Request manufacturer identification +CGMI

Table 2: +CGMI action command syntax

Command	Possible response(s)
+CGMI	`<manufacturer>` *+CME ERROR: <err>*
+CGMI=?	

Description

Execution command causes the TA to return one or more lines of information text `<manufacturer>`, determined by the ~~ME~~MT manufacturer, which is intended to permit the user of the TA to identify the manufacturer of the ~~ME~~MT to which it is connected to. Typically, the text will consist of a single line containing the name of the manufacturer, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

`<manufacturer>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.2 Request model identification +CGMM

Table 3: +CGMM action command syntax

Command	Possible response(s)
+CGMM	`<model>`
	+CME ERROR: <err>
+CGMM=?	

Description

Execution command causes the TA to return one or more lines of information text `<model>`, determined by the ~~ME~~MT manufacturer, which is intended to permit the user of the TA to identify the specific model of the ~~ME~~MT to which it is connected to. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide more information if desired. Refer to subclause 9.2 for possible `<err>` values.

Defined values

    `<model>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.3 Request revision identification +CGMR

Table 4: +CGMR action command syntax

Command	Possible response(s)
+CGMR	`<revision>`
	+CME ERROR: <err>
+CGMR=?	

Description

Execution command causes the TA to return one or more lines of information text `<revision>`, determined by the ~~ME~~MT manufacturer, which is intended to permit the user of the TA to identify the version, revision level or date, or other pertinent information of the ~~ME~~MT to which it is connected to. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

    `<revision>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.4 Request product serial number identification +CGSN

Table 5: +CGSN action command syntax

Command	Possible response(s)
+CGSN	`<sn>`
	`+CME ERROR: <err>`
+CGSN=?	

Description

Execution command causes the TA to return one or more lines of information text `<sn>`, determined by the ~~ME~~MT manufacturer, which is intended to permit the user of the TA to identify the individual ~~ME~~MT to which it is connected to. Typically, the text will consist of a single line containing the IMEI (International Mobile station Equipment Identity; refer 3GPP TS 23.003 [7]) number of the ~~ME~~MT, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

    `<sn>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.5 Select TE character set +CSCS

Table 6: +CSCS parameter command syntax

Command	Possible response(s)
+CSCS=[`<chset>`]	
+CSCS?	+CSCS: `<chset>`
+CSCS=?	+CSCS: (list of supported `<chset>`s)

Description

Set command informs TA which character set `<chset>` is used by the TE. TA is then able to convert character strings correctly between TE and ~~ME~~MT character sets.

When TA-TE interface is set to 8-bit operation and used TE alphabet is 7-bit, the highest bit shall be set to zero.

    NOTE 1: It is manufacturer specific how the internal alphabet of ~~ME~~MT is converted to/from the TE alphabet.

Read command shows current setting and test command displays conversion schemes implemented in the TA.

Defined values

    `<chset>` (conversion schemes not listed here can be defined by manufacturers):

`"GSM"`   GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems

`"HEX"`   character strings consist only of hexadecimal numbers from 00 to FF; e.g. "032FE6" equals three 8-bit characters with decimal values 3, 47 and 230; no conversions to the original ~~ME~~MT character set shall be done.

NOTE 2: If ~~ME~~MT is using GSM 7 bit default alphabet, its characters shall be padded with 8th bit (zero) before converting them to hexadecimal numbers (i.e. no SMS-style packing of 7-bit alphabet).

<u>"IRA"</u>	international reference alphabet (ITU-T T.50 [13])
"PCCP*xxx*"	PC character set Code Page *xxx*
"PCDN"	PC Danish/Norwegian character set
"UCS2"	16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99
"8859-*n*"	ISO 8859 Latin *n* (1-6) character set
"8859-C"	ISO 8859 Latin/Cyrillic character set
"8859-A"	ISO 8859 Latin/Arabic character set
"8859-G"	ISO 8859 Latin/Greek character set
"8859-H"	ISO 8859 Latin/Hebrew character set

Implementation

Mandatory when a command using the setting of this command is implemented.

5.6 Request international mobile subscriber identity +CIMI

Table 7: +CIMI action command syntax

Command	Possible response(s)
+CIMI	<IMSI> *+CME ERROR: <err>*
+CIMI=?	

Description

Execution command causes the TA to return <IMSI>, which is intended to permit the TE to identify the individual SIM card or active application in the UICC (GSM or USIM) which is attached to ~~ME~~MT. Refer subclause 9.2 for possible <err> values.

Defined values

<IMSI>: International Mobile Subscriber Identity (string without double quotes)

Implementation

Optional.

5.7   Multiplexing mode +CMUX

Table 8: +CMUX parameter command syntax

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

Description

This command is used to enable/disable the 3GPP TS 27.010 [45] multiplexing protocol control channel. Refer to subclause 9.2 for possible <err> values. The AT command sets parameters for the Control Channel. If the parameters are left out, the default value is used.

Read command returns the current mode and the settings.

Test command returns the supported modes and parameters.

It is recommended that the ~~ME~~MT/TA/TE should autobaud to the +CMUX command up to and including an interface speed of 9600 bits/s.

The OK or +CME ERROR: <err> response is returned at the speed of the +CMUX command prior to entering <mode>.

It is recommended that whenever the multiplexer control channel is released the ~~ME~~MT/TA/TE should assume an interface rate of up to and including 9600 bits/s for auto bauding purposes irrespective of any previous higher speed having been selected.

If a +CMUX command is issued whilst in any multiplexer mode then that +CMUX command shall be ignored and the ~~ME~~MT/TA shall return an +CME ERROR: <err> response.

Defined values

<operation> (multiplexer Transparency Mechanism)

0   Basic option

1   Advanced option

<subset>:

This parameter defines the way in which the multiplexer **control channel** is set up. A virtual channel may subsequently be set up differently but in the absence of any negotiation for the settings of a virtual channel, the virtual channel shall be set up according to the control channel <subset> setting.

0   UIH frames used only

1   UI frames used only

2   I frames used only

Default value: 0

`<port_speed>` (transmission rate):

1　9 600 bit/s

2　19 200 bit/s

3　38 400 bit/s

4　57 600 bit/s

5　115 200 bit/s

6　230 400 bits/s

`<N1>` (maximum frame size):

1- 32768

default Value : 31 (64 if Advanced option is used)

`<T1>` (acknowledgement timer in units of ten milliseconds):

1-255, where 10 is default (100 ms)

`<N2>` (maximum number of re-transmissions):

0-100, where 3 is default

`<T2>` (response timer for the multiplexer control channel in units of ten milliseconds):

2-255, where 30 is default (300 ms)

NOTE:　　T2 must be longer than T1.

`<T3>` (wake up response timer in seconds):

1-255, where 10 is default

`<k>` (window size, for Advanced operation with Error Recovery options):

1-7, where 2 is default

Implementation

Mandatory, if 3GPP TS 27.010 [45] supported in the ~~ME~~MT/TA.

5.10　Informative examples

When beginning to build a communication link, a general TE application controlling a TA needs to determine the TA and the ~~ME~~MT to which it is connected. V.25ter [14] has seven commands for TA identification from which four are mandatory to be implemented in a TA. An example of this command sequence requesting manufacturer (+GMI), model (+GMM), revision (+GMR) and serial number (+GSN) information would be:

```
AT+GMI
Manufacturer ABC
OK
AT+GMM
GSM Ultimate Data Device
OK
AT+GMR
1.00
OK
AT+GSN
987612345-123
OK
```

The maximum lengths of the information responses are defined to be 2048 characters, but it is recommended that they are kept as simple as in the example. The serial number command is defined as optional. Another optional command is Global Object Identification command (`+GOI`) which should return the object identifiers of ITU-T Recommendation X.208 as numeric strings delimited by periods. The Complete Capabilities List command (`+GCAP`) should indicate the major capability areas of the TA. The support of different areas is presented in the response of +GCAP command. Each area may be presented by the selection command name of a specific capability area (e.g. `+FCLASS` for fax support) or some other predefined response. For instance, a GSM TA with fax capabilities could respond as follows:

```
AT+GCAP
+GCAP: +CGSM,+FCLASS,+W
OK
```

The first supported area in the response is presented with `+CGSM`. It is the response text to show that some or all GSM commands of the present document are supported. Second response text (`+FCLASS`) informs that some fax or voice capabilities are present, and the third text (`+W`) about the presence of wireless commands as specified by PCCA STD-101 [17]. Command +FCLASS=? (refer e.g. ITU-T T.31 [11] and T.32 [12]) should be used to query the supported fax capabilities and `+WS46=?` to query the wireless data services available:

```
AT+FCLASS=?;+WS46=?
0,1,2,2.0
(12)
OK
```

The TA of this example supports GSM data services, and fax service class 1 (TIA-578-A), 2 (manufacturer specific) and 2.0 (ITU-T T.32 [12]/ TIA-592).

The present document defines commands for ~~ME~~MT identification which are similar to those for TA identification in V.25ter [14], for an example:

```
AT+CGMI
Mobile Manufacturer XYZ
OK
AT+CGMM
GSM Phone 1234
OK
AT+CGMR
1.00
OK
AT+CGSN
123456121234561
OK
```

Manufacturer, model and version commands work similarly as for TA, except that the serial number query returns the International Mobile Station Equipment Identity (IMEI) number. IMEI is fifteen digits long and consists of a type approval code, a final assembly code, a serial number and a spare digit (refer 3GPP TS 23.003 [7]). When the TA is implemented inside ~~ME~~MT, the responses for both TA and ~~ME~~MT queries will most likely follow the responses of ~~ME~~MT identification.

6.1   Select type of address +CSTA

Table 11: +CSTA parameter command syntax

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

Description

Set command selects the type of number for further dialling commands (D) according to GSM/UMTS specifications. Test command returns values supported ~~by the TA as~~ a compound value.

Defined values

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

Implementation

Mandatory when other than default value allowed.

6.2 ITU-T V.25ter [14] dial command D

V.25ter [14] dial command `D` lists characters that may be used in a dialling string for making a call or controlling supplementary services in accordance with 3GPP TS 22.030 [19]. Their use in GSM/UMTS is listed in this subclause, as well as new dial modifiers applicable only to GSM/UMTS are introduced. For a ~~ME~~MT supporting AT commands only, it is mandatory to support the control of supplementary services in accordance with 3GPP TS 22.030 [19] through the dial command or through the specific supplementary service commands (+CCFC, +CLCK, etc.), where 3GPP TS 22.030 [19] identifies the supplementary services as mandatory.

V.25ter dialling digits

`1 2 3 4 5 6 7 8 9 0 * # + A B C` (implementation of these characters is mandatory for GSM/UMTS)

`D` (implementation of this character is optional for GSM/UMTS, and it is ignored)

V.25ter modifier characters

`,` (implementation of this character is mandatory for GSM/UMTS, but it may be ignored)

`T P` (implementation of these characters is mandatory for GSM/UMTS, but they are ignored)

`! W @` (implementation of these characters is optional for GSM/UMTS, and they are ignored)

V.25ter semicolon character

In GSM/UMTS, when semicolon character is given after dialling digits (or modifiers), a voice call originated to the given address. TA returns to command state immediately (or after possible +COLP result code; refer subclause "Connected line identification presentation +COLP"). Refer Annex G for a detailed example.

GSM/UMTS modifier characters

`>` (refer subclause "Direct dialling from phonebooks")

`I` or `i` (override the CLIR supplementary service subscription default value for this call; `I` = invocation (restrict CLI presentation) and `i` = suppression (allow CLI presentation); refer subclause "Calling line identification restriction +CLIR")

`G` or `g` (control the CUG supplementary service information for this call; uses index and info values set with command +CCUG; refer subclause "Closed user group +CCUG")

6.3 Direct dialling from phonebooks

GSM/UMTS ~~ME~~MT and SIM/UICC can contain phonebooks which have a phone number and an alphanumeric field for each phonebook entry location. The use of V.25ter [14] dialling command ensures that direct dialling from ~~ME~~MT and SIM/UICC phonebook is possible through ordinary communications software which just gives the phone number field to be filled and then use the `D` command to originate the call. Available memories may be queried with Select Phonebook Storage test command +CPBS=?, and location range for example with Read Phonebook Entries test command +CPBR=?.

Execute commands

1. D><str>[I][G][;]   originate call to phone number which corresponding alphanumeric field is <str> (if possible, all available memories should be searched for the correct entry).

2. D>*mem*<n>[I][G][;]   originate call to phone number in memory *mem* entry location <n> (available memories may be queried with Select Phonebook Storage test command +CPBS=?; *mem* could be e.g. ME).

3. D><n>[I][G][;]   originate call to phone number in entry location <n> (it is manufacturer specific which memory storage of ~~ME~~MT, SIM/UICC and TA is used; command Select Phonebook Memory Storage +CPBS setting is recommended to be used).

Semicolon character shall be added when voice call is originated. CLIR and CUG per call base modifiers may also be present.

Responses

Possible error responses include +CME ERROR: <err> when error is related to ~~ME~~MT functionality. Refer subclause 9.2 for possible error values. Otherwise TA responses can have values defined by V.25ter [14] and commands Service Reporting Control +CR and Connected Line Identification Presentation +COLP. Detailed error report of an unsuccessful originated call failed in a GSM/UMTS network error can be obtained with command Extended Error Report +CEER (if implemented).

Defined values

<str>: string type value, which should equal to an alphanumeric field in at least one phonebook entry in the searched memories; used character set should be the one selected with Select TE Character Set +CSCS

<n>: integer type memory location should be in the range of locations available in the memory used

Implementation

Mandatory when direct dialling is implemented. Also phonebook commands implementation is required.

6.4   Call mode +CMOD

Table 12: +CMOD parameter command syntax

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

Description

Set command selects the call mode of further dialling commands (D) or for next answering command (A). Mode can be either single or alternating (in the present document, terms "alternating mode" and "alternating call" refer to all GSM/UMTS bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call). When single mode is selected the call originating and hangup procedures are similar to procedures specified in ITU-T Recommendations V.25ter [14], T.31 [11] and T.32 [12]. In GSM/UMTS there can be voice followed by data (refer 3GPP TS 22.002 [1]), alternating voice/data (refer 3GPP TS 22.002 [1]) and alternating voice/fax calls (refer 3GPP TS 22.003 [2]). Refer next two subclauses for alternating call control methods.

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

NOTE: +CMOD shall be set to zero after a successfully completed alternating mode call. It shall be set to zero also after a failed answering. The power-up, factory (&F) and user resets (Z) shall also set the value to zero. This reduces the possibility that alternating mode calls are originated or answered accidentally.

Defined values

<mode>:

0   single mode

1   alternating voice/fax (teleservice 61)

2   alternating voice/data (bearer service 61)

3   voice followed by data (bearer service 81)

also all other values below 128 are reserved by the present document

Implementation

Mandatory when alternating mode calls are implemented in the TA.

6.5   Hangup call +CHUP

Table 13: +CHUP action command syntax

Command	Possible response(s)
+CHUP	
+CHUP=?	

Description

Execution command causes the TA to hangup the current GSM/UMTS call of the MEMT.

NOTE: The purpose of this command is not to replace the V.25ter [14] command H, but to give an assured procedure to terminate an alternating mode call. Refer next subclause.

Implementation

Mandatory when alternating mode calls implemented in the TA.

6.7 Select bearer service type +CBST

Table 14: +CBST parameter command syntax

Command	Possible response(s)
+CBST=[<speed>[,<name>[,<ce>]]]	
+CBST?	+CBST: <speed>,<name>,<ce>
+CBST=?	+CBST: (list of supported <speed>s),(list of supported <name>s),(list of supported <ce>s)

Description

Set command selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated (refer 3GPP TS 22.002 [1]). Values may also be used during mobile terminated data call setup, especially in case of single numbering scheme calls (refer +CSNS).

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

NOTE: The default values of the subparameters are manufacturer specific since they depend on the purpose of the device and data services provided by it. Not all combinations of these subparameters are supported by GSM/UMTS (refer 3GPP TS 22.002 [1]).

<speed>:

0	autobauding (automatic selection of the speed; this setting is possible in case of 3.1 kHz modem and non-transparent service)
1	300 bps (V.21)
2	1200 bps (V.22)
3	1200/75 bps (V.23)
4	2400 bps (V.22bis)
5	2400 bps (V.26ter)
6	4800 bps (V.32)
7	9600 bps (V.32)
12	9600 bps (V.34)
14	14400 bps (V.34)
15	19200 bps (V.34)
16	28800 bps (V.34)
17	33600 bps (V.34)
34	1200 bps (V.120)
36	2400 bps (V.120)
38	4800 bps (V.120)
39	9600 bps (V.120)
43	14400 bps (V.120)
47	19200 bps (V.120)
48	28800 bps (V.120)
49	38400 bps (V.120)
50	48000 bps (V.120)
51	56000 bps (V.120)
65	300 bps (V.110)
66	1200 bps (V.110)
68	2400 bps (V.110 or X.31 flag stuffing)
70	4800 bps (V.110 or X.31 flag stuffing)
71	9600 bps (V.110 or X.31 flag stuffing)
75	14400 bps (V.110 or X.31 flag stuffing)
79	19200 bps (V.110 or X.31 flag stuffing)
80	28800 bps (V.110 or X.31 flag stuffing)
81	38400 bps (V.110 or X.31 flag stuffing)
82	48000 bps (V.110 or X.31 flag stuffing)

83	56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM)
84	64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)
115	56000 bps (bit transparent)
116	64000 bps (bit transparent)
120	32000 bps (PIAFS32k)
121	64000 bps (PIAFS64k)
130	28800 bps (multimedia)
131	32000 bps (multimedia)
132	33600 bps (multimedia)
133	56000 bps (multimedia)
134	64000 bps (multimedia)

also all other values below 128 are reserved by the present document.

`<name>`:

0	data circuit asynchronous (UDI or 3.1 kHz modem)
1	data circuit synchronous (UDI or 3.1 kHz modem)
2	PAD Access (asynchronous) (UDI)
3	Packet Access (synchronous) (UDI)
4	data circuit asynchronous (RDI)
5	data circuit synchronous (RDI)
6	PAD Access (asynchronous) (RDI)
7	Packet Access (synchronous) (RDI)

also all other values below 128 are reserved by the present document.

`<ce>`:

0	transparent
1	non-transparent
2	both, transparent preferred
3	both, non-transparent preferred

Implementation

Mandatory when data calls implemented.

6.8   Radio link protocol +CRLP

Table 15: +CRLP parameter command syntax

Command	Possible response(s)
+CRLP=[<iws>[,<mws>[,<T1>[,<N2>[,<ver>[,<T4>]]]]]]	
+CRLP?	+CRLP: <iws>,<mws>,<T1>,<N2>[,<ver1>[,<T4>]] [<CR><LF>+CRLP: <iws>,<mws>,<T1>,<N2>[,<ver2>[,<T4>]] [...]]
+CRLP=?	+CRLP: (list of supported <iws>s),(list of supported <mws>s), (list of supported <T1>s),(list of supported <N2>s)[,<ver1> [,(list of supported <T4>s)]] [<CR><LF>+CRLP: (list of supported <iws>s),(list of supported <mws>s),(list of supported <T1>s),(list of supported <N2>s) [,<ver1>[,(list of supported <T4>s)]] [...]]

Description

Radio link protocol (RLP) parameters used when non-transparent data calls are originated may be altered with set command. Available command subparameters depend on the RLP versions implemented by the device (e.g. `<ver>` may not be available if device supports only versions 0 and 1).

NOTE 1: If radio link protocol is not used, but some other error correcting protocol (for transparent data calls), V.25ter [14] Error Control Selection test command `+ES=?` may be used to indicate the presence of the protocol.

Read command returns current settings for each supported RLP version `<verx>`. Only RLP parameters applicable to the corresponding `<verx>` are returned.

Test command returns values supported by the TA as a compound value. If MEMT/TA supports several RLP versions `<verx>`, the RLP parameter value ranges for each `<verx>` are returned in a separate line.

Defined values

`<ver>`, `<verx>`: RLP version number in integer format; when version indication is not present it shall equal 0

NOTE 2: Versions 0 and 1 share the same parameter set. Read and test commands shall return only one line for this set (where `<verx>` is not present).

`<iws>`, `<mws>`, `<T1>`, `<N2>`, `<T4>`: IWF to MS window size, MS to IWF window size, acknowledgement timer T1, retransmission attempts N2, re-sequencing period T4 in integer format (default values and value ranges depend on RLP version; refer 3GPP TS 24.022 [18]): T1 and T4 are in units of 10 ms.

Implementation

Mandatory when RLP implemented.

6.9   Service reporting control +CR

Table 16: +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/UMTS 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 [<L2P>]   GPRS
```

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 17: +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~~MT manufacturer, which should offer the user of the TA an extended report of the reason for

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

- the 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 cause information given by GSM/UMTS 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 18: +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 or notification for VBS/VGCS calls 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 [,<priority>[,<subaddr>,<satype>]]   asynchronous transparent

SYNC [,<priority>[,<subaddr>,<satype>]]   synchronous transparent

REL ASYNC [,<priority>[,<subaddr>,<satype>]]   asynchronous non-transparent

REL SYNC [,<priority>[,<subaddr>,<satype>]]   synchronous non-transparent

FAX [,<priority>[,<subaddr>,<satype>]]   facsimile (TS 62)

VOICE [,<priority>[,<subaddr>,<satype>]]   normal voice (TS 11)

VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]]   voice followed by data (BS 81) (*XXX* is ASYNC,
            SYNC, REL ASYNC or REL SYNC)

ALT VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]] alternating voice/data, voice first (BS 61)

ALT *XXX*/VOICE [,<priority>[,<subaddr>,<satype>]] alternating voice/data, data first (BS 61)

ALT VOICE/FAX [,<priority>[,<subaddr>,<satype>]]   alternating voice/fax, voice first (TS 61)

ALT FAX/VOICE [,<priority>[,<subaddr>,<satype>]]   alternating voice/fax, fax first (TS 61)

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

VGC <GCA>, <GId>, <ackflag> [,<priority>]   voice group call (TS 91)

VBC <GCA>, <GId>, <ackflag> [,<priority>]   voice broadcast call (TS 92)

The optional <priority> indicates the eMLPP priority level of the incoming call by paging, notification or setup message. The priority level values are as defined in eMLPP specification 3GPP TS 22.067 [54].

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer 3GPP TS 24.008 [8] subclause 10.5.4.8)

<PDP_type> ,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.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.

<GCA> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call area.

<GId> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call identification.The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0 no confirmation procedure is required.

Implementation

Mandatory when data or fax circuit mode calls implemented or for a ~~ME~~MT supporting AT commands only and eMLPP or VGCS or VBS is implemented.

6.12 HSCSD device parameters +CHSD

Table 19: +CHSD action command syntax

Command	Possible response(s)
+CHSD	+CHSD: <mclass>,<maxRx>,<maxTx>,<sum>,<codings>
	+CME ERROR: <err>
+CHSD=?	

Description

Execution command returns information about HSCSD features (refer 3GPP TS 22.034 [29]) supported by the ~~ME~~MT/TA. Refer subclause 9.2 for possible <err> values.

The return information is only applicable in GERAN.

Defined values

<mclass>: integer type; multislot class

<maxRx>: integer type; maximum number of receive timeslots that ~~ME~~MT can use

<maxTx>: integer type; maximum number of transmit timeslots that ~~ME~~MT can use

<sum>: integer type; total number of receive and transmit timeslots that ~~ME~~MT can use at the same time (per TDMA frame). The following applies in a HSCSD call: $1 \leq$ (receive slots) + (transmit slots) $\leq$ <sum>

<codings> is a sum of integers each representing a supported channel coding (e.g. value 5 indicates that 4,8k and 9,6k channel codings are supported):

1   4,8k full rate data traffic channel

4   9,6k full rate data traffic channel

8   14,4k full rate data traffic channel

16 28,8k full rate data traffic channel (only possible when 14.4k is supported)

32 32,0k full rate data traffic channel (only possible in a two-timeslot configuration)

64 43,2k full rate data traffic channel (only possible when 14.4k is supported)

Implementation

Mandatory when HSCSD implemented.

This command is not applicable to UTRAN single mode UE.

6.18 HSCSD non-transparent asymmetry configuration +CHSA

Table 25: +CHSA parameter command syntax

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

Description

Set command controls the preferred asymmetry bias for non-transparent ECSD calls. Downlink biased asymmetry means that 8-PSK modulation is preferred downlink and GMSK modulation uplink. Uplink based asymmetry means that 8-PSK modulation is preferred uplink and GMSK downlink. Changing of <mode> affects the current call only if <topRx> (refer +CHSN) was non-zero when call was established.

Test command returns values supported by the ~~ME~~MT/TA as compound values. The <mode> subparameter range indirectly indicates the ~~MS~~ UE Type; range (0-1) indicates ~~MS~~ UE Type A and range (0-2) indicates ~~MS~~ UE Type B.

NOTE1: ECSD is also controlled by +CHSD, +CHSN and +CHST.

NOTE2: This command is only applicable in GERAN.

Defined values

<mode>:

0 No preference

1 Downlink biased asymmetry

2 Uplink biased asymmetry

Implementation

Mandatory when non-transparent ECSD is implemented.

This command is not applicable to UTRAN single mode UE.

6.19 Single numbering scheme +CSNS

Table 1: +CSNS parameter command syntax

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

Description

Set command selects the bearer or teleservice to be used when mobile terminated single numbering scheme call is established. Parameter values set with +CBST command shall be used when <mode> equals to a data service.

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

<mode>:

0 voice

1 alternating voice/fax, voice first (TS 61)

2 fax (TS 62)

3 alternating voice/data, voice first (BS 61)

4 data

5 alternating voice/fax, fax first (TS 61)

6 alternating voice/data, data first (BS 61)

7 voice followed by data (BS 81)

Implementation

Optional.

6.21 V.120 rate adaption protocol +CV120

Table 28: +CV120 parameter command syntax

Command	Possible response(s)

`+CV120=[<rah>[,<mfm>[,`
`<mode>[,<llineg>[,`
`<assign>[,<negtype>]]]]]]`	

`+CV120?`	`+CV120: <rah>,<mfm>,<mode>,<llineg>,` `<assign>,<negtype>`
`+CV120=?`	`+CV120:` (list of supported `<rah>`s),(list of supported `<mfm>`s),(list of supported `<mode>`s),(list of supported `<llineg>`s),(list of supported `<assign>`s),(list of supported `<negtype>`s)

Description

Set command sets the values of the V.120 protocol parameters (defined in CCITT V.120) that are carried in the GSM BC and/or LLC information elements.

Read command returns current settings for the V.120 parameters.

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

Defined values

`<rah>`

0 rate adaption header not included

1 rate adaption header included (mandatory for protocol sensitive modes).

`<mfm>`

0 multiple frame establishment not supported, only UI frames allowed

1 multiple frame establishment supported, both I and UI frames allowed.

`<mode>`

0 bit transparent mode of operation

1 protocol sensitive mode of operation.

`<llineg>`

0 no negotiation, LLI = 256 only

1 negotiation allowed. Note - <negtype> indicates the connection over which the negotiation is performed.

`<assign>`

0 message originator is "default assignee"

1 message originator is "assignor only".

`<negtype>`

0 negotiation is done using logical link zero

1 negotiation is done with USER INFORMATION messages on a temporary signalling connection.

GSM/UMTS does not support all the possible modes of V.120 operation. However, in order to accommodate possible future additions, the complete set of parameters is included in the command.

The permitted values are: 1, 1 or 0, 1, 0, 0, 0.

A recommended set of default values is: 1, 1, 1, 0, 0, 0.

Implementation

Mandatory, if the ~~ME~~MT supports V.120 interworking.

6.22 Settings date format +CSDF

Table 29: +CSDF parameter command syntax

Command	Possible response(s)
+CSDF=[[<mode>] [,<auxmode>]]	*+CME ERROR: <err>*
+CSDF?	+CSDF:<mode>[,<auxmode>] *+CME ERROR: <err>*
+CSDF=?	+CSDF:(list of supported <mode>s) [,(list of supported <auxmode>s)] *+CME ERROR: <err>*

Description

This command sets the date format via MMI of the date information presented to the user, which is specified by use of the <mode> parameter. The <mode> affects the date format on the phone display and doesn't affect the date format of the AT command serial interface. The command also sets the date format of the TE-TA interface, which is specified by use of the <auxmode> parameter (e.g. the <auxmode> affects the <time> of +CCLK and +CALA). If the parameter is omitted ("+CSDF =","+CSDF =<mode>","+CSDF=,<auxmode>"),then this sets the default value.

Defined values

`<mode>`:

NOTE: It is manufacturer specific which modes that are supported.

1 DD-MMM-YYYY

NOTE: Presentation of MMM is language dependent.

2 DD-MM-YY

3 MM/DD/YY

4 DD/MM/YY

5   DD.MM.YY

6   YYMMDD

7   YY-MM-DD

8-255   Manufacturer specific

<auxmode>:

1   yy/MM/dd (default)

2   yyyy/MM/dd

also all other values are reserved by the present document

NOTE: The <time> format of +CCLK and +CALA "yy/MM/dd,hh:mm:ss±zz" when <auxmode>=1 and it is
"yyyy/MM/dd,hh:mm:ss±zz" when <auxmode>=2. If the ~~ME~~MT does not support time zone information
then the three last characters may be omitted (see +CCLK command).

Implementation

Optional

6.23   Silence Command +CSIL

Table 30: +CSIL parameter command syntax

Command	Possible response(s)
+CSIL=[<mode>]	*+CME ERROR: <err>*
+CSIL?	+CSIL:<mode>
	+CME ERROR: <err>
+CSIL=?	+CSIL:(list of supported <mode>s)
	+CME ERROR: <err>

Description

Set command enables/disables the silent mode. When the phone is in silent mode, all sounds from ~~MS~~ MT are
suppressed except voice.

Read command reads the current setting.

Test command lists the supported modes.

Defined values

<mode>:

0   Silent mode off

1   Silent mode on

Implementation

Optional

7   Network service related commands

This clause describes GSM/UMTS network related commands, which are not covered in call control clause of the
present document. Commands include GSM/UMTS supplementary service handling, MSISDN query, ~~ME~~MT and
network facility locking, and network registration information query.

7.1 Subscriber number +CNUM

Table 34: +CNUM action command syntax

Command	Possible response(s)
+CNUM	+CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]] [<CR><LF>+CNUM: [<alpha2>],<number2>,<type2>[,<speed>,<service> [,<itc>]] [...]] *+CME ERROR: <err>*
+CNUM=?	

Description

Action command returns the MSISDNs related to the subscriber (this information can be stored in the SIM/UICC or in the ~~ME~~MT). When storing information in the SIM/UICC, if a SIM card is present or if a UICC with an active GSM application is present, the information is stored in the EF$_{MSISDN}$ under DF$_{Telecom}$. If a UICC with an active USIM application is present, the information is stored in the EF$_{MSISDN}$ under ADF$_{USIM}$). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line. Refer subclause 9.2 for possible <err> values.

Defined values

<alpha*x*>: optional alphanumeric string associated with <number*x*>; used character set should be the one selected with command Select TE Character Set +CSCS

<number*x*>: string type phone number of format specified by <type*x*>

<type*x*>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<speed>: as defined in subclause 6.7

<service> (service related to the phone number):

0 asynchronous modem

1 synchronous modem

2 PAD Access (asynchronous)

3 Packet Access (synchronous)

4 voice

5 fax

also all other values below 128 are reserved by the present document

<itc> (information transfer capability):

0 3,1 kHz

1 UDI

Implementation

Optional.

7.2 Network registration +CREG

Table 35: +CREG parameter command syntax

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

Description

Set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the ~~ME~~MT network registration status, or code +CREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

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 ~~ME~~MT. Location information elements <lac> and <ci> are returned only when <n>=2 and ~~ME~~MT is registered in the network. Refer subclause 9.2 for possible <err> values.

Defined values

<n>:

0 disable network registration unsolicited result code

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

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

<stat>:

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

1 registered, home network

2 not registered, but ~~ME~~MT 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.

7.3 PLMN selection +COPS

Table 36: +COPS parameter command syntax

Command	Possible response(s)
+COPS=[<mode>[,<format> [,<oper>[,< AcT>]]]]	*+CME ERROR: <err>*
+COPS?	+COPS: <mode>[,<format>,<oper>[,< AcT>]] *+CME ERROR: <err>*
+COPS=?	+COPS: [list of supported (<stat>,long alphanumeric <oper> ,short alphanumeric <oper>,numeric <oper>[,< AcT>])s] [,,(list of supported <mode>s),(list of supported <format>s)] *+CME ERROR: <err>*

Description

Set command forces an attempt to select and register the GSM/UMTS network operator. <mode> is used to select whether the selection is done automatically by the ~~ME~~MT or is forced by this command to operator <oper> (it shall be given in format <format>) to a certain access technology, indicated in <AcT>. If the selected operator is not available, no other operator shall be selected (except <mode>=4). The selected operator name format shall apply to further read commands (+COPS?) also. <mode>=2 forces an attempt to deregister from the network. The selected mode affects to all further network registration (e.g. after <mode>=2, ~~ME~~MT shall be unregistered until <mode>=0 or 1 is selected). Refer subclause 9.2 for possible <err> values. This command should be abortable when registration/deregistration attempt is made.

Read command returns the current mode, the currently selected operator and the current Access Technology. If no operator is selected, <format>, <oper> and < AcT> are omitted.

Test command returns a set of five parameters, each representing an operator present in the network. A set consists of an integer indicating the availability of the operator <stat>, long and short alphanumeric format of the name of the operator, numeric format representation of the operator and access technology. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in order: home network, networks referenced in SIM or active application in the UICC (GSM or USIM) in the following order: HPLMN selector, User controlled PLMN selector, Operator controlled PLMN selector and PLMN selector (in the SIM or GSM application), and other networks.

It is recommended (although optional) that after the operator list TA returns lists of supported <mode>s and <format>s. These lists shall be delimited from the operator list by two commas.

NOTE: The access technology selected paramters, <AcT>, should only be used in terminals capable to register to more than one access technology.

Defined values

<mode>:

<u>0</u> automatic (<oper> field is ignored)

1 manual (<oper> field shall be present, and <AcT> optionally)

2 deregister from network

3 set only <format> (for read command +COPS?), do not attempt registration/deregistration (<oper> and < AcT> fields are ignored); this value is not applicable in read command response

4 manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered

<format>:

<u>0</u> long format alphanumeric <oper>

1   short format alphanumeric `<oper>`

2   numeric `<oper>`

`<oper>`: string type; `<format>` indicates if the format is alphanumeric or numeric; long alphanumeric format can be upto 16 characters long and short format up to 8 characters (refer GSM MoU SE.13 [9]); numeric format is the GSM Location Area Identification number (refer TS 24.008 [8] subclause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A [10], plus a two BCD digit network code, which is administration specific; returned `<oper>` shall not be in BCD format, but in IRA characters converted from BCD; hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1)

`<stat>`:

0   unknown

1   available

2   current

3   forbidden

`<AcT>` access technology selected:

<u>0</u>   GSM

1   GSM Compact

2   UTRAN

Implementation

Optional.

7.4   Facility lock +CLCK

Table 37: +CLCK action command syntax

Command	Possible response(s)
+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	*+CME ERROR: <err>* **when <mode>=2 and command successful:** +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>,<class2> [...]]
+CLCK=?	+CLCK: (list of supported <fac>s) *+CME ERROR: <err>*

Description

Execute command is used to lock, unlock or interrogate a ~~ME~~MT or a network facility `<fac>`. Password is normally needed to do such actions. When querying the status of a network service (`<mode>`=2) the response line for 'not active' case (`<status>`=0) should be returned only if service is not active for any `<class>`. Refer subclause 9.2 for possible `<err>` values. This command should be abortable when network facilities are set or interrogated.

Call barring facilities are based on GSM/UMTS supplementary services (refer 3GPP TS 22.088 [6]). The interaction of these with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standard.

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

Defined values

`<fac>` values reserved by the present document:

"CS"   CNTRL (lock CoNTRoL surface (e.g. phone keyboard))

"PS"   PH-SIM (lock PHone to SIM/UICC card) (~~ME~~MT asks password when other than current SIM/UICC card inserted; ~~ME~~MT may remember certain amount of previously used cards thus not requiring password when they are inserted)

"PF"   lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PH-FSIM) (~~ME~~MT asks password when other than the first SIM/UICC card is inserted)

"SC"   SIM (lock SIM/UICC card) (SIM/UICC asks password in ~~ME~~MT power-up and when this lock command issued)

"AO"   BAOC (Barr All Outgoing Calls) (refer 3GPP TS 22.088 [6] clause 1)

"OI"   BOIC (Barr Outgoing International Calls) (refer 3GPP TS 22.088 [6] clause 1)

"OX"   BOIC-exHC (Barr Outgoing International Calls except to Home Country) (refer 3GPP TS 22.088 [6] clause 1)

"AI"   BAIC (Barr All Incoming Calls) (refer 3GPP TS 22.088 [6] clause 2)

"IR"   BIC-Roam (Barr Incoming Calls when Roaming outside the home country) (refer 3GPP TS 22.088 [6] clause 2)

"NT"   barr incoming calls from numbers Not stored to TA memory

"NM"   barr incoming calls from numbers Not stored to ~~ME~~MT memory

"NS"   barr incoming calls from numbers Not stored to SIM/UICC memory

"NA"   barr incoming calls from numbers Not stored in Any memory

"AB"   All Barring services (refer 3GPP TS 22.030 [19]) (applicable only for `<mode>`=0)

"AG"   All outGoing barring services (refer 3GPP TS 22.030 [19]) (applicable only for `<mode>`=0)

"AC"   All inComing barring services (refer 3GPP TS 22.030 [19]) (applicable only for `<mode>`=0)

"FD"   SIM card or active application in the UICC (GSM or USIM) fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as `<passwd>`)

"PN"   Network Personalization (refer 3GPP TS 22.022 [33])

"PU"   network sUbset Personalization (refer 3GPP TS 22.022 [33])

"PP"   service Provider Personalization (refer 3GPP TS 22.022 [33])

"PC"   Corporate Personalization (refer 3GPP TS 22.022 [33])

`<mode>`:

0   unlock

1   lock

2   query status

`<status>`:

0   not active

1   active

<passwd>: string type; shall be the same as password specified for the facility from the ~~ME~~MT user interface or with command Change Password +CPWD

<classx> is a sum of integers each representing a class of information (default 7):

1   voice (telephony)

2   data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4   fax (facsimile services)

8   short message service

16 data circuit sync

32 data circuit async

64 dedicated packet access

128   dedicated PAD access

Implementation

The call barring supplementary service control is mandatory for ~~ME~~MT supporting AT commands only and not supporting the control through dial command D.

7.5   Change password +CPWD

Table 38: +CPWD action command syntax

Command	Possible response(s)
+CPWD=<fac>,<oldpwd>,<newpwd>	*+CME ERROR: <err>*
+CPWD=?	+CPWD: list of supported (<fac>,<pwdlength>)s
	+CME ERROR: <err>

Description

Action command sets a new password for the facility lock function defined by command Facility Lock +CLCK. Refer subclause 9.2 for possible <err> values.

Test command returns a list of pairs which present the available facilities and the maximum length of their password.

Defined values

<fac>:

"P2"   SIM PIN2

refer Facility Lock +CLCK for other values

<oldpwd>, <newpwd>: string type; <oldpwd> shall be the same as password specified for the facility from the ~~ME~~MT user interface or with command Change Password +CPWD and <newpwd> is the new password; maximum length of password can be determined with <pwdlength>

<pwdlength>: integer type maximum length of the password for the facility

Implementation
Optional.

7.6 Calling line identification presentation +CLIP

Table 39: +CLIP parameter command syntax

Command	Possible response(s)
+CLIP=[<n>]	
+CLIP?	+CLIP: <n>,<m>
+CLIP=?	+CLIP: (list of supported <n>s)

Description

This command refers to the GSM/UMTS supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. Set command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

When the presentation of the CLI at the TE is enabled (and calling subscriber allows), +CLIP: <number>,<type>[,<subaddr>,<satype>[,[<alpha>][,<CLI validity>]]] response is returned after every RING (or +CRING: <type>; refer subclause "Cellular result codes +CRC") result code sent from TA to TE. It is manufacturer specific if this response is used when normal voice call is answered.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the CLIP service according 3GPP TS 22.081 [3] (given in <m>).Test command returns values supported ~~by the TA~~ as a compound value.

Defined values

<n> (parameter sets/shows the result code presentation status ~~in~~ to the TE~~A~~):

0 disable

1 enable

<m> (parameter shows the subscriber CLIP service status in the network):

0 CLIP not provisioned

1 CLIP provisioned

2 unknown (e.g. no network, etc.)

<number>: string type phone number of format specified by <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

<alpha>: optional string type alphanumeric representation of <number> corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

<CLI validity>:

0 CLI valid

1 CLI has been withheld by the originator.

2 CLI is not available due to interworking problems or limitations of originating network.

When CLI is not available (<CLI validity>=2), <number> shall be an empty string ("") and <type> value will not be significant. Nevertheless, TA may return the recommended value **128** for <type> ((TON/NPI unknown in accordance with TS 24.008 [8] subclause 10.5.4.7).

When CLI has been withheld by the originator, (<CLI validity>=1) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081[3] and 3GPP TS 23.081[40]), <number> and <type> is provided. Otherwise, TA shall return the same setting for <number> and <type> as if the CLI was not available.

Implementation

Optional.

7.7   Calling line identification restriction +CLIR

Table 40: +CLIR parameter command syntax

Command	Possible response(s)
+CLIR=[<n>]	
+CLIR?	+CLIR: <n>,<m>
+CLIR=?	+CLIR: (list of supported <n>s)

Description

This command refers to CLIR-service according to 3GPP TS 22.081 [3] that allows a calling subscriber to enable or disable the presentation of the CLI to the called party when originating a call.

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. This adjustment can be revoked by using the opposite command.. If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according 3GPP TS 22.081 [3].

Read command gives the default adjustment for all outgoing calls (given in <n>), and also triggers an interrogation of the provision status of the CLIR service (given in <m>). Test command returns values supported by the TA as a compound value.

NOTE: On a per call base CLIR functionality is explained in subclause "ITU-T V.25ter [14] dial command".

Defined values

<n> (parameter sets the adjustment for outgoing calls):

0   presentation indicator is used according to the subscription of the CLIR service

1   CLIR invocation

2   CLIR suppression

<m> (parameter shows the subscriber CLIR service status in the network):

0   CLIR not provisioned

1   CLIR provisioned in permanent mode

2   unknown (e.g. no network, etc.)

3   CLIR temporary mode presentation restricted

4   CLIR temporary mode presentation allowed

Implementation

Optional.

7.8 Connected line identification presentation +COLP

Table 41: +COLP parameter command syntax

Command	Possible response(s)
+COLP=[<n>]	
+COLP?	+COLP: <n>,<m>
+COLP=?	+COLP: (list of supported <n>s)

Description

This command refers to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

When enabled (and called subscriber allows), +COLP: <number>,<type>[,<subaddr>,<satype> [,<alpha>]] intermediate result code is returned from TA to TE before any +CR or V.25ter [14] responses. It is manufacturer specific if this response is used when normal voice call is established.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the COLP service according 3GPP TS 22.081 [3] (given in <m>).

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

Defined values

<n> (parameter sets/shows the result code presentation status ~~in~~ to the TE~~TA~~):

0 disable

1 enable

<m> (parameter shows the subscriber COLP service status in the network):

0 COLP not provisioned

1 COLP provisioned

2 unknown (e.g. no network, etc.)

<number>, <type>, <subaddr>, <satype>, <alpha>: refer +CLIP

Implementation

Optional.

7.9 Called line identification presentation +CDIP

Table 42: +CDIP parameter command syntax

Command	Possible response(s)
+CDIP=[<n>]	
+CDIP?	+CDIP: <n>,<m>
+CDIP=?	+CDIP: (list of supported <n>s)

Description

This command related to a network service that provides "multiple called numbers (called line identifications) service" to an MT. This command enables a called subscriber to get the called line identification of the called party when receiving a mobile terminated call. Set command enables or disables the presentation of the called line identifications at the TE.

When the presentation of the called line identification at the TE is enabled, `+CDIP:<number>,<type>[,<subaddr>,<satype>]` response is returned after every RING (or `+CRING: <type>`; refer subclause "Cellular result codes +CRC") result code sent from TA to TE. It is manufacturer specific if this response is used when normal voice call is answered.

Read command gives the status of `<n>`, and also triggers an interrogation of the provision status of the "multiple called numbers" service. Test command returns values supported ~~by the TA~~ as a compound value.

Defined values

> `<n>` (parameter sets/shows the result code presentation status ~~in~~ to the TE~~TA~~):

0 disable

1 enable

> `<m>` (parameter shows the subscriber "multiple called numbers" service status in the network):

0 "multiple called numbers service" is not provisioned

1 "multiple called numbers service" is provisioned

2 unknown (e.g. no network, etc.)

> `<number>`: string type phone number of format specified by `<type>`

> `<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

> `<subaddr>`: string type subaddress of format specified by `<satype>`

> `<satype>`: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

Implementation

Optional.

7.11 Call forwarding number and conditions +CCFC

Table 44: +CCFC action command syntax

Command	Possible response(s)

`+CCFC=<reason>,<mode>`
`[,<number>[,<type>`
`[,<class>`
`[,<subaddr>[,<satype>`
`[,<time>]]]]]]`
	`+CME ERROR: <err>`
	when `<mode>`=2 and command successful:
	`+CCFC: <status>,<class1>[,<number>,<type>`
	`[,<subaddr>,<satype>[,<time>]]][`
	`<CR><LF>+CCFC: <status>,<class2>[,<number>,<type>`
	`[,<subaddr>,<satype>[,<time>]]]`
	`[...]]`

`+CCFC=?`	`+CCFC: (list of supported <reason>s)`

Description

This command allows control of the call forwarding supplementary service according to 3GPP TS 22.082 [4]. Registration, erasure, activation, deactivation, and status query are supported. When querying the status of a network service (`<mode>`=2) the response line for 'not active' case (`<status>`=0) should be returned only if service is not active for any `<class>`.

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

Defined values

<reason>:

0 unconditional

1 mobile busy

2 no reply

3 not reachable

4 all call forwarding (refer 3GPP TS 22.030 [19])

5 all conditional call forwarding (refer 3GPP TS 22.030 [19])

<mode>:

0 disable

1 enable

2 query status

3 registration

4 erasure

<number>: string type phone number of forwarding address in format specified by <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8); default 128

<class$x$> is a sum of integers each representing a class of information (default 7):

1 voice (telephony)

2 data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4 fax (facsimile services)

8 short message service

16 data circuit sync

32 data circuit async

64 dedicated packet access

128 dedicated PAD access

<time>:

1...30 when "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded, default value 20

<status>:

0 not active

1 active

Implementation

Mandatory for ~~ME~~MT supporting AT commands only and not supporting the control through dial command D.

7.12   Call waiting +CCWA

Table 45: +CCWA parameter command syntax

Command	Possible response(s)
+CCWA=[<n>[,<mode>[,<class>]]]	*+CME ERROR: <err>* **when <mode>=2 and command successful** +CCWA: <status>,<class1> [<CR><LF>+CCWA: <status>,<class2> [...]]
+CCWA?	+CCWA: <n>
+CCWA=?	+CCWA: (list of supported <n>s)

Description

This command allows control of the Call Waiting supplementary service according to 3GPP TS 22.083 [5]. Activation, deactivation and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable/enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>[,<subaddr>,<satype> [,<priority>]]] to the TE when call waiting service is enabled. Command should be abortable when network is interrogated.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

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

Defined values

<n> (sets/shows the result code presentation status ~~in~~ to the TE~~TA~~):

0   disable

1   enable

<mode> (when <mode> parameter is not given, network is not interrogated):

0   disable

1   enable

2   query status

<class*x*> is a sum of integers each representing a class of information (default 7):

1   voice (telephony)

2   data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4   fax (facsimile services)

8   short message service

16 data circuit sync

32 data circuit async

64　dedicated packet access

128　dedicated PAD access

`<status>`:

0　not active

1　active

`<number>`: string type phone number of calling address in format specified by `<type>`

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

`<alpha>`: optional string type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

`<CLI validity>`:

0　CLI valid

1　CLI has been withheld by the originator.

2　CLI is not available due to interworking problems or limitations of originating network.

When CLI is not available (`<CLI validity>`=2), `<number>` shall be an empty string ("") and `<type>` value will not be significant. Nevertheless, TA may return the recommended value **128** for <type> ((TON/NPI unknown in accordance with TS 24.008 [8] subclause 10.5.4.7).

When CLI has been withheld by the originator, (`<CLI validity>`=1) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081[3] and 3GPP TS 23.081[40]), <number> and <type> is provided. Otherwise, TA shall return the same setting for <number> and <type> as if the CLI was not available.

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

<priority>: optional digit type parameter indicating that the eMLPP priority level of the incoming call. The priority level values are as defined in eMLPP specification 3GPP TS 22.067 [54].

Implementation

Optional.

7.13　Call related supplementary services +CHLD

Table 46: +CHLD action command syntax

Command	Possible response(s)
+CHLD=[`<n>`]	*+CME ERROR: <err>*
+CHLD=?	[+CHLD:　(list of supported　`<n>`s)]

Description

This command allows the control of the following call related services:

- a call can be temporarily disconnected from the ~~ME~~MT but the connection is retained by the network;

- multiparty conversation (conference calls);

- the served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

3GPP

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030 [19]. Refer subclause 9.2 for possible `<err>` values.

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; refer 3GPP TS 22.083 [5] clause 2), MPTY (MultiParty; refer 3GPP TS 22.084 [22]) and ECT (Explicit Call Transfer; refer 3GPP TS 22.091 [29]). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

NOTE: Call Hold, MultiParty and Explicit Call Transfer are only applicable to teleservice 11.

It is recommended (although optional) that test command returns a list of operations which are supported. The call number required by some operations shall be denoted by "x" (e.g. `+CHLD: (0,1,1x,2,2x,3)`).

Defined values

`<n>`: integer type; equals to numbers entered before SEND button in 3GPP TS 22.030 [19] subclause 4.5.5.1

NOTE: The "directory number" case shall be handled with dial command `D`, and the END case with hangup command `H` (or `+CHUP`). The 4*"directory number" case is handled with `+CTFR` command.

Implementation

Optional.

7.15 Unstructured supplementary service data +CUSD

Table 48: +CUSD parameter command syntax

Command	Possible response(s)
`+CUSD=[<n>[,<str>[,<dcs>]]]`	*+CME ERROR: <err>*
`+CUSD?`	`+CUSD: <n>`
`+CUSD=?`	`+CUSD: (list of supported <n>s)`

Description

This command allows control of the Unstuctured Supplementary Service Data (USSD) according to 3GPP TS 22.090 [23]. Both network and mobile initiated operations are supported. Parameter `<n>` is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) `+CUSD: <m>[,<str>,<dcs>]` to the TE. In addition, value `<n>`=2 is used to cancel an ongoing USSD session.

When `<str>` is given, a mobile initiated USSD-string or a response USSD-string to a network initiated operation is sent to the network. The response USSD-string from the network is returned in a subsequent unsolicited `+CUSD` result code.

NOTE: In case of successful mobile initiated operation, TA implemented according to a version prior to 6 of this standard, waits the USSD response from the network and sends it to the TE before the final result code. This will block the AT command interface for the period of the operation. Such TA does not support `<n>` value 2.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

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

Defined values

`<n>`:

0 disable the result code presentation ~~in~~ to the TE~~TA~~

1 enable the result code presentation to~~in~~ the TE~~TA~~

2 cancel session (not applicable to read command response)

<str>: string type USSD-string (when <str> parameter is not given, network is not interrogated):

- if <dcs> indicates that 3GPP TS 23.038 [25] 7 bit default alphabet is used:

    - if TE character set other than "HEX" (refer command Select TE Character Set +CSCS): ~~ME~~MT/TA converts GSM alphabet into current TE character set according to rules of 3GPP TS 27.005 [24] Annex A

    - if TE character set is "HEX": ~~ME~~MT/TA converts each 7-bit character of GSM alphabet into two IRA character long hexadecimal number (e.g. character Π (GSM 23) is presented as 17 (IRA 49 and 55))

- if <dcs> indicates that 8-bit data coding scheme is used: ~~ME~~MT/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65))

<dcs>: 3GPP TS 23.038 [25] Cell Broadcast Data Coding Scheme in integer format (default 0)

<m>:

0 no further user action required (network initiated USSD-Notify, or no further information needed after mobile initiated operation)

1 further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation)

2 USSD terminated by network

3 other local client has responded

4 operation not supported

5 network time out

Implementation

Optional.

7.16 Advice of Charge +CAOC

Table 49: +CAOC parameter command syntax

Command	Possible response(s)
+CAOC[=<mode>]	[+CAOC: <ccm>]
	+CME ERROR: <err>
+CAOC?	+CAOC: <mode>
+CAOC=?	[+CAOC: (list of supported <mode>s]

Description

This refers to Advice of Charge supplementary service (3GPP TS 22.024 [26] and 3GPP TS 22.086 [27]) that enables subscriber to get information about the cost of calls. With <mode>=0, the execute command returns the current call meter value from the ~~ME~~MT.

The command also includes the possibility to enable an unsolicited event reporting of the CCM information. The unsolicited result code +CCM: <ccm> is sent when the CCM value changes, but not more that every 10 seconds. Deactivation of the unsolicited event reporting is made with the same command.

Refer subclause 9.2 for possible <err> values.

NOTE: Advice of Charge values stored in the SIM card or in the active application in the UICC (GSM or USIM) (ACM, ACMmax, PUCT) can be accessed with generic or restricted SIM access command (+CSIM or +CRSM)).Those values can be more readily accessed with commands +CACM, +CAMM and +CPUC.

The Read command indicates whether the unsolicited reporting is activated or not. Read command is available when the unsolicited result code is supported.

It is recommended (although optional) that the test command returns the supported mode values.

Defined values

`<mode>`:

0 query CCM value

1 deactivate the unsolicited reporting of CCM value

2 activate the unsolicited reporting of CCM value

`<ccm>`: string type; three bytes of the current call meter value in hexadecimal format (e.g. "00001E" indicates decimal value 30); value is in home units and bytes are similarly coded as ACMmax value in the SIM card or in the active application in the UICC (GSM or USIM)

Implementation

Optional.

7.17 Supplementary service notifications +CSSN

Table 50: +CSSN parameter command syntax

Command	Possible response(s)
+CSSN=[<n>[,<m>]]	
+CSSN?	+CSSN: <n>,<m>
+CSSN=?	+CSSN: (list of supported <n>s),(list of supported <m>s)

Description

This command refers to supplementary service related network initiated notifications. The set command enables/disables the presentation of notification result codes from TA to TE.

When `<n>`=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code +CSSI: `<code1>[,<index>]` is sent to TE before any other MO call setup result codes presented in the present document or in V.25ter [14]. When several different `<code1>`s are received from the network, each of them shall have its own +CSSI result code.

When `<m>`=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code +CSSU: `<code2>[,<index>[,<number>,<type>[,<subaddr>,<satype>]]]` is sent to TE. In case of MT call setup, result code is sent after every +CLIP result code (refer command "Calling line identification presentation +CLIP") and when several different `<code2>`s are received from the network, each of them shall have its own +CSSU result code.

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

Defined values

`<n>` (parameter sets/shows the +CSSI result code presentation status ~~in~~ to the TE~~TA~~):

0 disable

1 enable

<m> (parameter sets/shows the +CSSU result code presentation status into the TETA):

0   disable

1   enable

<code1> (it is manufacturer specific, which of these codes are supported):

0   unconditional call forwarding is active

1   some of the conditional call forwardings are active

2   call has been forwarded

3   call is waiting

4   this is a CUG call (also <index> present)

5   outgoing calls are barred

6   incoming calls are barred

7   CLIR suppression rejected

8   call has been deflected

<index>: refer "Closed user group +CCUG"

<code2> (it is manufacturer specific, which of these codes are supported):

0   this is a forwarded call (MT call setup)

1   this is a CUG call (also <index> present) (MT call setup)

2   call has been put on hold (during a voice call)

3   call has been retrieved (during a voice call)

4   multiparty call entered (during a voice call)

5   call on hold has been released (this is not a SS notification) (during a voice call)

6   forward check SS message received (can be received whenever)

7   call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call)

8   call has been connected with the other remote party in explicit call transfer operation (also number and subaddress parameters may be present) (during a voice call or MT call setup)

9   this is a deflected call (MT call setup)

10 sdditional incoming call forwarded

<number>: string type phone number of format specified by <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

Implementation

Optional.

7.18   List current calls +CLCC

Table 51:+CLCC action command syntax

Command	Possible response(s)

`+CLCC`	`[+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>[,`
	`<number>,<type>[,<alpha>[,<priority>]]]`
	`[<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty>[,`
	`<number>,<type>[,<alpha>[,<priority>]]]`
	`[...]]]`
	`+CME ERROR: <err>`

`+CLCC=?`	

Description

Returns list of current calls of ~~ME~~MT. If command succeeds but no calls are available, no information response is sent to TE. Refer subclause 9.2 for possible `<err>` values.

Defined values

<id*x*>: integer type; call identification number as described in 3GPP TS 22.030 [19] subclause 4.5.5.1; this number can be used in `+CHLD` command operations

`<dir>`:

0   mobile originated (MO) call

1   mobile terminated (MT) call

`<stat>` (state of the call):

0   active

1   held

2   dialing (MO call)

3   alerting (MO call)

4   incoming (MT call)

5   waiting (MT call)

`<mode>` (bearer/teleservice):

0   voice

1   data

2   fax

3   voice followed by data, voice mode

4   alternating voice/data, voice mode

5   alternating voice/fax, voice mode

6   voice followed by data, data mode

7   alternating voice/data, data mode

8   alternating voice/fax, fax mode

9   unknown

`<mpty>`:

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

1   call is one of multiparty (conference) call parties

`<number>`: string type phone number in format specified by `<type>`

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

`<alpha>`: string type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

`<priority>`: optional digit type parameter indicating the eMLPP priority level of the call, values specified in 3GPP TS 22.067 [54]

Implementation

Optional. Recommended when +CHLD command is implemented.

7.19   Preferred PLMN list +CPOL

Table 52:+CPOL parameter command syntax

Command	Possible response(s)

`+CPOL=[<index>][,`
`<format>[,<oper>[,<GS`
`M_AcT>,<GSM_Compact_A`
`cT>,<UTRAN_AcT>]]]`
	+CME ERROR: <err>

`+CPOL?`	`+CPOL:`
	`<index1>,<format>,<oper1>[,<GSM_AcT1>,<GSM_Com`
	`pact_AcT1>,<UTRAN_AcT1>]`
	`[<CR><LF>+CPOL:`
	`<index2>,<format>,<oper2>[,<GSM_AcT2>,<GSM_Com`
	`pact_AcT2>,<UTRAN_AcT2>]`
	`[...]]`
	+CME ERROR: <err>

`+CPOL=?`	`+CPOL:` (list of supported `<index>`s),(list of supported `<format>`s) *+CME ERROR: <err>*

Description

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

Execute command writes an entry in the SIM/USIM list of preferred PLMNs, previously selected by the command +CPLS. If no list has been previously selected, the User controlled PLMN selector with Access Technology, $EF_{PLMNwAcT,}$ is the one accessed by default. If `<index>` is given but `<oper>` is left out, entry is deleted. If `<oper>` is given but `<index>` is left out, `<oper>` is put in the next free location. If only `<format>` is given, the format of the `<oper>` in the read command is changed. The Access Technology selection parameters, `<GSM_AcT>`, `<GSM_Compact_AcT>` and `<UTRAN_AcT>`, are required when writing User controlled PLMN selector with Access Technology, EF $EF_{PLMNwAcT}$, Operator controlled PLMN selector with Access Technology $EF_{OPLMNwAcT}$ and HPLMN selector with Access Technology $EF_{HPLMNwAcT}$, see TS 31.102. Refer subclause 9.2 for possible `<err>` values.

NOTE1:   ~~ME~~MT may also update the User controlled PLMN selector with Access Technology, $EF_{PLMNwAcT}$, automatically when new networks are selected.

NOTE2:   The Operator controlled PLMN selector with Access Technology $EF_{OPLMNwAcT}$, can only be written if the write access condition in the SIM/USIM has been previously verified.

Read command returns all used entries from the SIM/USIM list of preferred PLMNs, previously selected by the command +CPLS, with the Access Technologies for each PLMN in the list.

Test command returns the whole index range supported by the SIM.

Defined values

<index*n*>: integer type; the order number of operator in the SIM/USIM preferred operator list

<format>:

0   long format alphanumeric <oper>

1   short format alphanumeric <oper>

2   numeric <oper>

<oper*n*>: string type; <format> indicates if the format is alphanumeric or numeric (see +COPS)

<GSM_AcT*n*>: GSM access technology:

0   access technology not selected

1   access technology selected

<GSM_Compact_AcT*n*>: GSM compact access technology:

0   access technology not selected

1   access technology selected

<UTRA_AcT*n*>: UTRA access technology:

0   access technology not selected

1   access technology selected

Implementation

Optional.

7.21   Read operator names +COPN

Table 2:+COPN action command syntax

Command	Possible response(s)
+COPN	+COPN: <numeric1>,<alpha1> [<CR><LF>+COPN: <numeric2>,<alpha2> [...]] *+CME ERROR: <err>*
+COPN=?	

Description

Execute command returns the list of operator names from the ~~ME~~MT. Each operator code <numeric*n*> that has an alphanumeric equivalent <alpha*n*> in the ~~ME~~MT memory shall be returned. Refer subclause 9.2 for possible <err> values.

Defined values

<numeric*n*>: string type; operator in numeric format (see +COPS)

<alpha*n*>: string type; operator in long alphanumeric format (see +COPS)

Implementation

Optional.

7.22 eMLPP Priority Registration and Interrogation +CAEMLPP

Table 55: CAEMLPP parameter command syntax

Command	Possible Response(s)
+CAEMLPP=<priority>	*+CME ERROR: <err>*
+CAEMLPP?	+CAEMLPP: <default_priority>,<max_priority> *+CME ERROR: <err>*
+CAEMLPP=?	

Description

The execute command is used to change the default priority level of the user in the network. The requested priority level is checked against the eMLPP subscription of the user stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$. If the user doesn't have subscription for the requested priority level an ERROR or +CMEE ERROR result code is returned.

The read command triggers an interrogation of the provision of the maximum priority level which the service subscriber is allowed to use and default priority level activated by the user.

If the service is not provisioned, a result code including the SS-Status (?) parameter is returned.

Defined Values

<priority>: integer type parameter which identifies the default priority level to be activated in the network, values specified in 3GPP TS 22.067 [54]

<default_priority>: integer type parameter which identifies the default priority level which is activated in the network, values specified in 3GPP TS 22.067 [54]

<max_priority>: integer type parameter which identifies the maximum priority level for which the service subscriber has a subscription in the network, values specified in 3GPP TS 22.067 [54]

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and supplemantery service eMLPP is implemented.

7.23 eMLPP subscriptions +CPPS

Table 56: +CPPS action command syntax

Command	Possible response(s)
+CPPS	+CPPS: <priority>[,<priority> [...]] *+CME ERROR: <err>*
+CPPS=?	

Description

This command returns all eMLPP priority subscriptions of the user stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$. If no explicit priority level subscription is stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$ the result code OK is returned.

Defined values

<priority>: integer type, eMLPP subscription to priority level {0,1,..,4} as defined in 3GPP TS 22.067 [45].

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and eMLPP is implemented.

7.24 Fast call setup conditions +CFCS

Table 57: +CFCS action command syntax

Command	Possible response(s)
+CFCS=<priority>,<status>	*+CME ERROR: <err>*
+CFCS?	+CFCS: <priority>[,<priority> [...]] *+CME ERROR: <err>*
+CFCS=?	+CFCS: (list of supported <priority>,<status>)

Description

The set command is used to edit the status of the priority level for fast call set-up stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$. If the user has no subscription to the priority level status he wants to edit, an ERROR or +CME ERROR result code is returned.

The read command returns all enabled priority levels for fast call set-up stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP.}$ If no priority level is enabled for fast call set-up, the result code OK is returned.

Defined values

<priority>: integer type, eMLPP fast call set-up priority level {0,1,..,4} as defined in 3GPP TS 22.067 [45]

<status>: integer type

    0   disable <priority> for fast call set-up

    1   enable <priority> for fast call set-up

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and eMLPP is implemented.

7.25 Automatic answer for eMLPP Service +CAAP

Table 58: +CAAP action command syntax

Command	Possible response(s)
+CAAP=<priority>,<status>	*+CME ERROR: <err>*
+CAAP?	+CAAP: <priority>[,<priority> [...]] *+CME ERROR: <err>*
+CAAP=?	+CAAP: (list of supported <priority>,<status>)

Description

The set command is used to edit the status of the priority level for automatic answering for eMLPP stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{AAeM}$. If the user has no subscription to the priority level status he wants to edit, an ERROR or +CME ERROR result code is returned.

The read command returns all enabled priority levels for automatic answering for eMLPP stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{AAeM.}$ If no priority level is enabled for automatic answering for eMLPP, the result code OK is returned.

Defined values

<priority>: eMLPP automatic answer priority level value {A,B,0,1,..,4} as defined in 3GPP TS 22.067 [45]

<status>: integer type

> 0   disable eMLPP <priority> for automatic answering
>
> 1   enable eMLPP <priority> for automatic answering

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and eMLPP is implemented.

7.26   User to User Signalling Service 1 +CUUS1

Table 59: +CUUS1 action command syntax

Command	Possible response(s)
+ CUUS1 =[<n>[,<m>[,<message>[,<UUIE> [,<message>[,<UUIE>[,...]]]]]]]	*+CME ERROR: <err>*
+ CUUS1?	+ CUUS1: <n>,<m>[,<message>,<UUIE> [,<message>,<UUIE>[,...]]]
+ CUUS1=?	+ CUUS1: (list of supported <n>s), (list of supported <m>s), (list of supported <message>s), (list of supported <messageI>s),(list of supported <messageU>s)

Description

This command allows control of the User-to-User Signalling Supplementary Service 1 (UUS1) according to 3G 22.087 [58].

Parameters <message> and <UUIE> are used to activate/deactivate the implicit request of the User-to-User Signalling Supplementary Service 1.
When <message> and <UUIE> are both present the string specified in <UUIE> is included as the value part of the User-to-User Information Element (as defined in 3G 24.008) into all subsequent messages of type <message>. If parameter <message> is present but parameter <UUIE> is not present then the User-to-User Information Element shall not be present in subsequent messages of type <message>.

Parameters <n> and <m> are used to enable/disable the presentation of incoming User-to-User Information Elements.
When <n> = 1 and a User-to-User Information is received after a mobile originated call setup or after hanging up a call, intermediate result code +CUUS1I: <messageI>,<UUIE> is sent to the TE.
When <m> = 1 and a User-to-User Information is received during a mobile terminated call setup or during a remote party call hangup, unsolicited result code +CUUS1U: <messageU>,<UUIE> is sent to the TE.

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

The interaction of this command with other commands based on other supplementary services is described in the 3G standard.

Defined values

    <n> (parameter sets/shows the +CUUS1I result code presentation status in the TA)

0 disable.

1 enable.

    <m> (parameter sets/shows the +CUUS1U result code presentation status in the TA)

0 disable.

1 enable.

    `<message>` (type of message containing the outgoing User-to-User Information Element)

0 ANY

1 SETUP

2 ALERT

3 CONNECT

4 DISCONNECT

5 RELEASE

6 RELEASE_COMPLETE

    `<messageI>` (type of message containing the intermediate User-to-User Information Element)

0 ANY

1 ALERT

2 PROGRESS

3 CONNECT (sent after +COLP if enabled)

4 RELEASE

    `<messageU>` (type of message containing the unsollicited User-to-User Information Element)

0 ANY

1 SETUP (returned after +CLIP if presented, otherwise after every RING or +CRING)

2 DISCONNECT

3 RELEASE_COMPLETE

    < UUIE>: the User-user Information Element (as defined in 3G 24.008) in hexadecimal character format (for hexadecimal format, refer +`CSCS`).

NOTE: If the TA does not distinguish the type of message containing the User-to-user Information Element, it can use the value for ANY message.

Implementation

Optional.

7.27 Informative examples

This subclause includes all the GSM/UMTS supplementary service related commands, additional commands to lock ~~ME~~MT and SIM/UICC capabilities, and commands to check the network registration status.

An example where MSISDNs of a ~~ME~~MT are queried, calls are forwarded to different numbers when mobile is busy (CFB) or when it does not answer (CFNRy). The status of CFNRy is read:

```
AT+CNUM
+CNUM: ,"+358501234567",145,,4          (voice number)
OK
AT+CCFC=1,1,"931123456"                  (enable CFB)
OK
AT+CCFC=2,1,"921654321"                  (enable CFNRy)
OK
AT+CCFC=1,2                              (query CFNRy)
+CCFC: 1,7,"+35821654321",145,,,20       (forward after 20 seconds)
OK
```

An example of Call Waiting (+CCWA), Call Related Supplementary Services (+CHLD), and Connected Line Identification Presentation (+COLP) usage:

```
AT+CCWA=1,1;+COLP=1               (enable call waiting and COLP result codes)
OK
ATD9311234567;                    (originate a voice call)
+COLP: "+358311234567",145
OK
...conversation...
+CCWA: "+358317654321",145        (another call is waiting)
AT+CHLD=2                         (put first call on hold and answer the second one)
OK
...conversation...
AT+CHLD=1                         (release the second (active) call and recover the first (held) call)
OK
ATH                               (release the first call)
OK
```

Call barring supplementary services are combined in one command, Facility Lock (+CLCK), which is also used to restrict ~~ME~~MT and SIM/UICC functionality Some of the facilities require a password when enabled or disabled. An additional command, Change Password (+CPWD), is defined for changing the password of different barring and restriction facilities. An example where locking status of outgoing international calls is interrogated and then barred, and the password of the SIM/UICC card lock (Personal Identity Number, PIN) is changed:

```
AT+CLCK="OI",2
+CLCK: 0,7
OK
AT+CLCK="OI",1,"1234"
OK
AT+CPWD="SC","4321","1234"
OK
```

Operator Selection (+COPS) command is used for querying the status of all GSM/UMTS operators detected in the area, and switching between operators.

Following example illustrates a network selection sequence in Finland. Two operators are found, the status of Tele is unknown and Radiolinja is currently selected. Read command shows that automatic selection mode is on and that Radiolinja is selected. Then an attempt is made to access Tele, but it is denied (shown by +CME ERROR).

```
AT+COPS=?
+COPS: (2,"RADIOLINJA","RL","24405"),(0,"TELE","TELE","24491")
OK
AT+COPS?
+COPS: 0,0,"RADIOLINJA"
OK
AT+COPS=1,0,"TELE"
+CME ERROR: 3
```

When a terminal wanders between countries (i.e. networks), an application may follow this e.g. with the following scenario:

```
AT+CREG=1                         (enable +CREG: <stat> unsolicited result code)
```

```
OK
AT+CREG?
+CREG: 1,1                       (MEMT is registered in home PLMN)
OK
AT+COPS=3,2;+COPS?;+COPS=3,0;+COPS?
+COPS: 0,2,"24405"               (get the country...
+COPS: 0,0,"RADIOLINJA"          ...and operator name)
OK
...user wanders to another PLMN...
+CREG: 2                         (deregistered, roaming ongoing)
+CREG: 5                         (registered again, not home PLMN)
AT+COPS=3,2;+COPS?;+COPS=3,0;+COPS?
+COPS: 0,2,"24001"               (get the country...
+COPS: 0,0,"TELIA MOBITEL"       ...and operator name)
OK
...user loses connection, no other PLMNs around...
+CREG: 0
```

An example of eMLPP Supplementary Service usage for a ptp voice call:

```
ATD*752#+436644101453;          (originate a voice call with the priority level 2, see for priority level definitions GSM 02.30)
OK                              (call setup was successful)
```

8 Mobile ~~Equipment~~ Termination control and status commands

This clause includes commands for MEMT power, keypad, display and indicator handling. Also commands for selecting, reading and writing of phonebooks, and setting real-time clock facilities are specified. Two commands are specified for accessing SIM/UICC database records in a general way.

Figure 7 illustrates the effect of these commands. Command Phone Activity Status +CPAS indicates the current general activity status of the MEMT. Command Set Phone Functionality +CFUN is used to set the MEMT to different power consumption states. Command Enter PIN +CPIN is used to enter MEMT passwords which are needed before any other functionality of the MEMT can be used (e.g. SIM PIN, PUK). Commands Generic SIM Access +CSIM and Restricted SIM Access +CRSM can be used to access all data in SIM/UICC. Commands Battery Charge +CBC and Signal Quality +CSQ are same as in TIA IS-135 [16] and they are used to query the battery charge of the MEMT and the current RSSI of the MEMT. Command Mobile ~~Equipment~~ Termination Control Mode +CMEC is used to select the controlling unit of MEMT keypad, display and indicators. Controlling commands for the TE are Keypad Emulation +CKPD, Display Control +CDIS and Indicator Control +CIND. If corresponding event reporting is enabled with command Mobile ~~Equipment~~ Termination Event Reporting +CMER, +CKEV is the result code of a keypad event, +CDEV is the result code of a display event, and +CIEV is the result code of an indicator event. Phonebook commands are Select Phonebook Memory Storage +CPBS, Read Phonebook Entries +CPBR, Find Phonebook Entries +CPBF and Write Phonebook Entry +CPBW. Additional command Clock +CCLK can be used to control the real-time clock of the MEMT if available. Command Alarm +CALA sets possible alarm clock facilities of the MEMT.
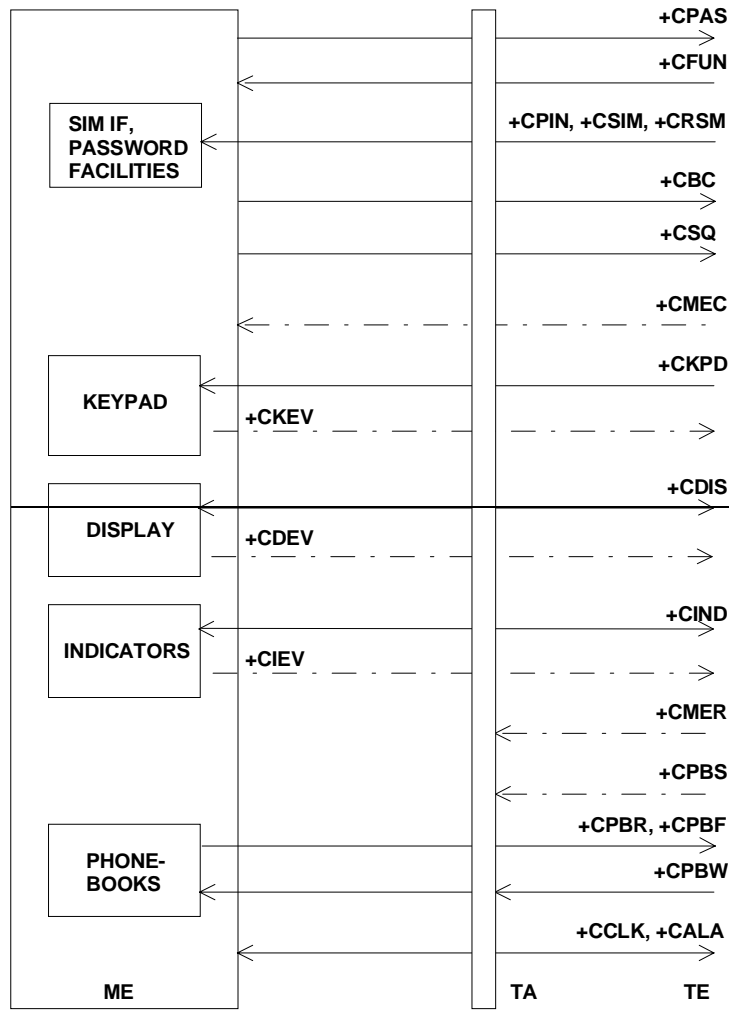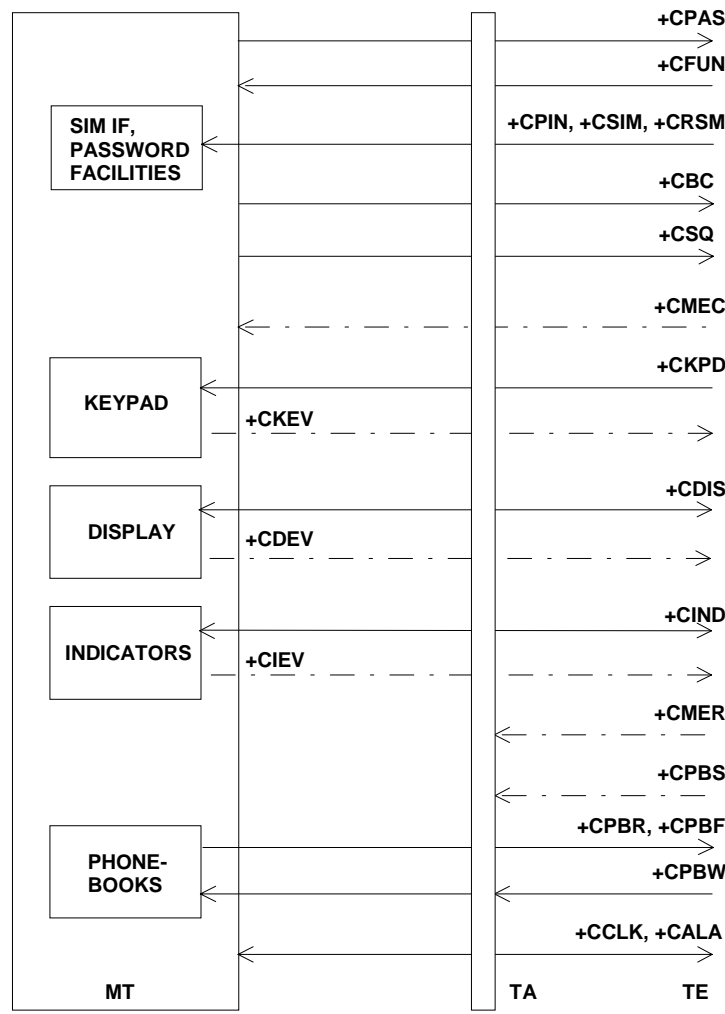
```
                                                    +CPAS

                                                    +CFUN

  SIM IF,                          +CPIN, +CSIM, +CRSM
  PASSWORD
  FACILITIES
                                                    +CBC

                                                    +CSQ

                                                    +CMEC

                                                    +CKPD
  KEYPAD
            +CKEV

                                                    +CDIS
  DISPLAY
            +CDEV

                                                    +CIND
  INDICATORS
            +CIEV

                                                    +CMER

                                                    +CPBS

  PHONE-                                   +CPBR, +CPBF
  BOOKS
                                                    +CPBW

                                           +CCLK, +CALA
       ME                        TA        TE
```

Figure 7: Mobile ~~equipment~~ termination control and status commands

8.1 Phone activity status +CPAS

Table 60: +CPAS action command syntax

Command	Possible response(s)
+CPAS	+CPAS: <pas>
	+CME ERROR: <err>
+CPAS=?	+CPAS: (list of supported <pas>s)
	+CME ERROR: <err>

Description

Execution command returns the activity status <pas> of the ~~ME~~MT. It can be used to interrogate the ~~ME~~MT before requesting action from the phone. Refer subclause 9.2 for possible <err> values.

Test command returns values supported by the ~~ME~~MT as a compound value.

Defined values

<pas>:

0 ready (~~ME~~MT allows commands from TA/TE)

1 unavailable (~~ME~~MT does not allow commands from TA/TE)

2   unknown (~~ME~~MT is not guaranteed to respond to instructions)

3   ringing (~~ME~~MT is ready for commands from TA/TE, but the ringer is active)

4   call in progress (~~ME~~MT is ready for commands from TA/TE, but a call is in progress)

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

also all other values below 128 are reserved by the present document.

Implementation

Mandatory when ~~ME~~MT can be operated from TE (refer subclause "Mobile ~~Equipment~~ Termination control mode +CMEC").

8.2   Set phone functionality +CFUN

Table 61: +CFUN parameter command syntax

Command	Possible response(s)
+CFUN=[<fun>[,<rst>]]	*+CME ERROR: <err>*
+CFUN?	+CFUN: <fun>
	+CME ERROR: <err>
+CFUN=?	+CFUN: (list of supported <fun>s), (list of supported <rst>s)
	+CME ERROR: <err>

Description

Set command selects the level of functionality <fun> in the ~~ME~~MT. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn. Level of functionality between these may also be specified by manufacturers. When supported by manufacturers, ~~ME~~MT resetting with <rst> parameter may be utilized. Refer subclause 9.2 for possible <err> values.

NOTE: It is manufacturer specific does this command affect network registration. Command Operator Selection +COPS is used to force registration/deregistration.

Test command returns values supported by the ~~ME~~MT as a compound value.

Defined values

<fun>:

0   minimum functionality

1   full functionality

2   disable phone transmit RF circuits only

3   disable phone receive RF circuits only

4   disable phone both transmit and receive RF circuits

5...127 reserved for manufacturers as intermediate states between full and minimum functionality

<rst>:

0   do not reset the ~~ME~~MT before setting it to <fun> power level

NOTE: This shall be always default when <rst> is not given.

1   reset the ~~ME~~MT before setting it to <fun> power level

Implementation

Optional.

8.3 Enter PIN +CPIN

Table 62: +CPIN parameter command syntax

Command	Possible response(s)
+CPIN=<pin>[,<newpin>]	*+CME ERROR: <err>*
+CPIN?	+CPIN: <code>
	+CME ERROR: <err>
+CPIN=?	

Description

Set command sends to the ~~ME~~MT a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH-SIM PIN, etc.). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken towards ~~ME~~MT and an error message, +CME ERROR, is returned to TE. Refer subclause 9.2 for possible <err> values.

If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM.

NOTE: Commands which interact with ~~ME~~MT that are accepted when ~~ME~~MT is pending SIM PIN, SIM PUK, or PH-SIM are: +CGMI, +CGMM, +CGMR, +CGSN, D112; (emergency call), +CPAS, +CFUN, +CPIN, +CDIS (read and test command only), and +CIND (read and test command only).

Read command returns an alphanumeric string indicating whether some password is required or not.

Defined values

<pin>, <newpin>: string type values

<code> values reserved by the present document:

READY ~~ME~~MT is not pending for any password

SIM PIN ~~ME~~MT is waiting SIM PIN to be given

SIM PUK ~~ME~~MT is waiting SIM PUK to be given

PH-SIM PIN ~~ME~~MT is waiting phone-to-SIM card password to be given

PH-FSIM PIN ~~ME~~MT is waiting phone-to-very first SIM card password to be given

PH-FSIM PUK ~~ME~~MT is waiting phone-to-very first SIM card unblocking password to be given

SIM PIN2 ~~ME~~MT is waiting SIM PIN2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered right after the failure, it is recommended that ~~ME~~MT does not block its operation)

SIM PUK2 ~~ME~~MT is waiting SIM PUK2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered right after the failure, it is recommended that ~~ME~~MT does not block its operation)

PH-NET PIN ~~ME~~MT is waiting network personalization password to be given

PH-NET PUK ~~ME~~MT is waiting network personalization unblocking password to be given

PH-NETSUB PIN ~~ME~~MT is waiting network subset personalization password to be given

PH-NETSUB PUK ~~ME~~MT is waiting network subset personalization unblocking password to be given

PH-SP PIN   ~~ME~~MT is waiting service provider personalization password to be given

PH-SP PUK   ~~ME~~MT is waiting service provider personalization unblocking password to be given

PH-CORP PIN   ~~ME~~MT is waiting corporate personalization password to be given

PH-CORP PUK   ~~ME~~MT is waiting corporate personalization unblocking password to be given

Implementation

Mandatory for ~~ME~~MT not supporting the +CKPD command and supporting AT commands only.

8.4   Battery charge +CBC

Table 63: +CBC action command syntax

Command	Possible response(s)
+CBC	+CBC: <bcs>,<bcl>
	+CME ERROR: <err>
+CBC=?	+CBC: (list of supported <bcs>s),(list of supported <bcl>s)

Description

Execution command returns battery connection status <bcs> and battery charge level <bcl> of the ~~ME~~MT. Refer subclause 9.2 for possible <err> values.

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

<bcs>:

0   ~~ME~~MT is powered by the battery

1   ~~ME~~MT has a battery connected, but is not powered by it

2   ~~ME~~MT does not have a battery connected

3   Recognized power fault, calls inhibited

<bcl>:

0   battery is exhausted, or ~~ME~~MT does not have a battery connected

1...100 battery has 1-100 percent of capacity remaining

Implementation

Optional.

8.5   Signal quality +CSQ

Table 64: +CSQ action command syntax

Command	Possible response(s)
+CSQ	+CSQ: <rssi>,<ber>
	+CME ERROR: <err>

+CSQ=?	+CSQ: (list of supported <rssi>s),(list of supported <ber>s)

Description

Execution command returns received signal strength indication <rssi> and channel bit error rate <ber> from the ~~ME~~MT. Refer subclause 9.2 for possible <err> values.

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

<rssi>:

0   -113 dBm or less

1   -111 dBm

2...30 -109... -53 dBm

31 -51 dBm or greater

99 not known or not detectable

<ber> (in percent):

0...7   as RXQUAL values in the table in TS 45.008 [20] subclause 8.2.4

99 not known or not detectable

Implementation

Optional.

8.6   Mobile ~~Equipment~~ Termination control mode +CMEC

Table 65: +CMEC parameter command syntax

Command	Possible response(s)
+CMEC=[<keyp>[,<disp>[,<ind>]]]	*+CME ERROR: <err>*
+CMEC?	+CMEC: <keyp>,<disp>,<ind>
+CMEC=?	+CMEC: (list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s)

Description

Set command selects the equipment, which operates ~~ME~~MT keypad, writes to ~~ME~~MT display and sets ~~ME~~MT indicators. If operation mode is not allowed by the ~~ME~~MT, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the modes supported ~~by the TA~~ as compound values.

Defined values

<keyp>:

0 ~~ME~~MT can be operated only through its keypad (execute command of +CKPD cannot be used)

1 ~~ME~~MT can be operated only from TE (with command +CKPD)

2 ~~ME~~MT can be operated from both ~~ME~~MT keypad and TE

<disp>:

0 only ~~ME~~MT can write to its display (command +CDIS can only be used to read the display)

1 only TE can write to ~~ME~~MT display (with command +CDIS)

2 ~~ME~~MT display can be written by both ~~ME~~MT and TE

<ind>:

0 only ~~ME~~MT can set the status of its indicators (command +CIND can only be used to read the indicators)

1 only TE can set the status of ~~ME~~MT indicators (with command +CIND)

2 ~~ME~~MT indicators can be set by both ~~ME~~MT and TE

Implementation

Mandatory when any of keypad, display or indicator commands is implemented.

8.7 Keypad control +CKPD

Table 66: +CKPD action command syntax

Command	Possible response(s)
+CKPD=<keys>[,<time>[,<pause>]]	*+CME ERROR: <err>*
+CKPD=?	

Description

Execution command emulates ~~ME~~MT keypad by giving each keystroke as a character in a string <keys>. <time>*0.1 seconds is the time to stroke each key and <pause>*0.1 seconds is the length of pause between two strokes. If emulating fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. This command should be accepted (OK returned) before actually starting to press the keys. Thus unsolicited result codes of key pressings and display events can be returned (refer subclause "Mobile ~~Equipment~~ Termination event reporting +CMER").

Defined values

<keys>: string of characters representing keys as listed in the following table (based on PCCA STD-101 Annex table I-3). Colon character (IRA 58) followed by one character can be used to indicate a manufacturer specific key not listed here. All characters from a semicolon character (IRA 59) to the next single semicolon character are treated as alpha entries and are not converted to key equivalents. All semicolon characters inside alpha entries should be duplicated in the TE and stripped to one before entering to the ~~ME~~MT. Pause character (IRA 87 or 119) can be used to pause between key pressings for a time specified by <pause>. All IRA values not listed here are reserved.

Table 67: Character codes

Char	IRA (dec)	Comment (+ some known key symbols)
#	35	hash (number sign)
%	37	percent sign (P)
*	42	star (*)
0... 9	48... 57	number keys
:	58	escape character for manufacturer specific keys
;	59	escape character for string entering
<	60	left arrow
>	62	right arrow
@	64	alpha key (α/ABC)
A/a	65/97	channel A (A)
B/b	66/98	channel B (B)

Char	IRA (dec)	Comment (+ some known key symbols)
C/c	67/99	clear display (C/CLR)
D/d	68/100	volume down
E/e	69/101	connection end (END)
F/f	70/102	function (FCN)
L/l	76/108	phone lock (LOCK)
M/m	77/109	menu (MENU)
P/p	80/112	power (PWR)
Q/q	81/113	quiet/mute (MUTE)
R/r	82/114	recall last number (R/RCL/MR)
S/s	83/115	connection start (SEND)
T/t	84/116	store/ memory (STO/M/M+)
U/u	85/117	volume up
V/v	86/118	down arrow
W/w	87/119	pause character
X/x	88/120	auxiliary (AUX)
Y/y	89/121	delete last character (C)
[	91	soft key 1
]	93	soft key 2
^	94	up arrow

`<time>, <pause>:`

0...255   0... 25.5 seconds (default values are manufacturer specific, but should be so long that a normal ~~ME~~MT can handle keystrokes correctly)

Implementation

Mandatory for ~~ME~~MT not supporting the +CPIN command and supporting AT commands only.

8.8   Display control +CDIS

Table 68: +CDIS parameter command syntax

Command	Possible response(s)
`+CDIS=[<text>[,<text>[,...]]]`	*+CME ERROR: <err>*
`+CDIS?`	`+CDIS: <text>[,<text>[,...]]` *+CME ERROR: <err>*
`+CDIS=?`	`+CDIS: <length>[,<length>[,...]]` *+CME ERROR: <err>*

Description

Set command is used to write the contents of ~~ME~~MT text type display elements. An element can consist of one character or several characters. The order of element parameters `<text>` should follow the rule: first is the element in upper left corner, second is the next element to the right and so on. The last element is the element in lower right corner. The number of elements is ~~ME~~MT specific. If ~~ME~~MT does not allow writing to its display or ~~ME~~MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. If certain element is not writable, setting of it should be ignored. If element parameter is empty field, element shall remain in the previous value.

NOTE 1:   This command cannot be used to write to a display which sum of element lengths exceed the length of the command line buffer of the TA.

Read command returns the contents of ~~ME~~MT display elements. If `<text>` field is empty (not empty string), ~~ME~~MT does not allow the reading of corresponding element. If ~~ME~~MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns maximum length of each display element. If ~~ME~~MT does not offer the length of elements, `<length>` fields should be empty. If ~~ME~~MT is not currently reachable, `+CME ERROR: <err>` is returned. Refer subclause 9.2 for `<err>` values.

NOTE 2: ~~ME~~MT manufacturer should offer the order and maximum length of elements.

Defined values

`<text>`: string type parameter using character set specified by command Select TE Character Set +CSCS

`<length>`: integer type parameter giving the maximum length of corresponding `<text>` parameter

Implementation

Optional.

8.9 Indicator control +CIND

Table 69: +CIND parameter command syntax

Command	Possible response(s)
+CIND=[<ind>[,<ind>[,...]]]	*+CME ERROR: <err>*
+CIND?	+CIND: <ind>[,<ind>[,...]]
	+CME ERROR: <err>
+CIND=?	+CIND: (<descr>,(list of supported <ind>s)) [,(<descr>,(list of supported <ind>s))[,...]]
	+CME ERROR: <err>

Description

Set command is used to set the values of ~~ME~~MT indicators. `<ind>` value 0 means that the indicator is off (or in state which can be identified as "off"-state), 1 means that indicator is on (or in a state which is more substantial than "off"-state), 2 is more substantial than 1, and so on. If the indicator is a simple on/off style element, it has values 0 and 1. The number of elements is ~~ME~~MT specific. If ~~ME~~MT does not allow setting of indicators or ~~ME~~MT is not currently reachable, `+CME ERROR: <err>` is returned. Refer subclause 9.2 for `<err>` values. If certain indicator is not writable, setting of it should be ignored. If parameter is empty field, indicator shall remain in the previous value.

Read command returns the status of ~~ME~~MT indicators. If ~~ME~~MT is not currently reachable, `+CME ERROR: <err>` is returned. Refer subclause 9.2 for `<err>` values.

Test command returns pairs, where string value `<descr>` is a maximum 16 character description of the indicator and compound value is the allowed values for the indicator. If ~~ME~~MT is not currently reachable, `+CME ERROR: <err>` is returned. Refer subclause 9.2 for `<err>` values.

NOTE: ~~ME~~MT manufacturer should offer the description of supported indicators not listed here and their value ranges and default values.

Defined values

`<ind>`: integer type value, which shall be in range of corresponding `<descr>`

`<descr>` values reserved by the present document and their `<ind>` ranges:

`"battchg"` battery charge level (0-5)

`"signal"` signal quality (0-5)

`"service"` service availability (0-1)

`"sounder"` sounder activity (0-1)

"message"   message received (0-1)

"call"   call in progress (0-1)

"vox"   transmit activated by voice activity (0-1)

"roam"   roaming indicator (0-1)

"smsfull"   a short message memory storage in the MT has become full (1), or memory locations are available (0); i.e. the range is (0-1)

Implementation

Optional.

8.10   Mobile ~~Equipment~~ Termination event reporting +CMER

Table 70: +CMER parameter command syntax

Command	Possible response(s)
+CMER=[<mode>[,<keyp>[,<disp> [,<ind>[,<bfr>]]]]]	*+CME ERROR: <err>*
+CMER?	+CMER: <mode>,<keyp>,<disp>,<ind>,<bfr>
+CMER=?	+CMER: (list of supported <mode>s),(list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s),(list of supported <bfr>s)

Description

Set command enables or disables sending of unsolicited result codes from TA to TE in the case of key pressings, display changes, and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1, 2 or 3 is entered. If setting is not supported by the ~~ME~~MT, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the modes supported ~~by the TA~~ as compound values.

Defined values

<mode>:

0   buffer unsolicited result codes in the TA; if TA result code buffer is full, codes can be buffered in some other place or the oldest ones can be discarded

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

3   forward unsolicited result codes directly to the TE; TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<keyp>:

0   no keypad event reporting

1   keypad event reporting using result code +CKEV: <key>,<press>. <key> indicates the key (refer IRA values defined in table in subclause "Keypad control +CKPD") and <press> if the key is pressed or released (1 for pressing and 0 for releasing). Only those key pressings, which are not caused by +CKPD shall be indicated by the TA to the TE.

NOTE 1: When this mode is enabled, corresponding result codes of all keys currently pressed should be flushed to the TA regardless of `<bfr>` setting.

2 keypad event reporting using result code +CKEV: `<key>`,`<press>`. All key pressings shall be directed from TA to TE.

NOTE 2: When this mode is enabled, corresponding result codes of all keys currently pressed should be flushed to the TA regardless of `<bfr>` setting.

`<disp>`:

<u>0</u> no display event reporting

1 display event reporting using result code +CDEV: `<elem>`,`<text>`. `<elem>` indicates the element order number (as specified for +CDIS) and `<text>` is the new value of text element. Only those display events, which are not caused by +CDIS shall be indicated by the TA to the TE. Character set used in `<text>` is as specified by command Select TE Character Set +CSCS

2 display event reporting using result code +CDEV: `<elem>`,`<text>`. All display events shall be directed from TA to TE. Character set used in `<text>` is as specified by command Select TE Character Set +CSCS

`<ind>`:

<u>0</u> no indicator event reporting

1 indicator event reporting using result code +CIEV: `<ind>`,`<value>`. `<ind>` indicates the indicator order number (as specified for +CIND) and `<value>` is the new value of indicator. Only those indicator events, which are not caused by +CIND shall be indicated by the TA to the TE

2 indicator event reporting using result code +CIEV: `<ind>`,`<value>`. All indicator events shall be directed from TA to TE

`<bfr>`:

<u>0</u> TA buffer of unsolicited result codes defined within this command is cleared when `<mode>` 1...3 is entered

1 TA buffer of unsolicited result codes defined within this command is flushed to the TE when `<mode>` 1...3 is entered (OK response shall be given before flushing the codes)

Implementation

Mandatory when any of the keypad, display, or indicator result codes is implemented.

8.11 Select phonebook memory storage +CPBS

Table 3: +CPBS parameter command syntax

Command	Possible response(s)
+CPBS=`<storage>` [,`<password>`]	*+CME ERROR: `<err>`*
+CPBS?	+CPBS: `<storage>`[,`<used>`,`<total>`]
	+CME ERROR: `<err>`
+CPBS=?	+CPBS: (list of supported `<storage>`s)

Description

Set command selects phonebook memory storage `<storage>`, which is used by other phonebook commands. If setting fails in an ~~ME~~MT error, +CME ERROR: `<err>` is returned. Refer subclause 9.2 for `<err>` values.

Read command returns currently selected memory, and when supported by manufacturer, number of used locations and total number of locations in the memory.

Test command returns supported storages as compound value.

Defined values

<storage> values reserved by the present document:

"DC" ~~ME~~MT dialled calls list (+CPBW may not be applicable for this storage)

"EN" SIM/USIM (or ~~ME~~MT) emergency number (+CPBW is not be applicable for this storage)

"FD" SIM/USIM fixdialling-phonebook. If a SIM card is present or if a UICC with an active GSM application is present, the information in EF_{FDN} under $DF_{Telecom}$ is selected. If a UICC with an active USIM application is present, the information in EF_{FDN} under ADF_{USIM} is selected.

"LD" SIM/UICC last-dialling-phonebook

"MC" ~~ME~~MT missed (unanswered received) calls list (+CPBW may not be applicable for this storage)

"ME" ~~ME~~MT phonebook

"MT" combined ~~ME~~MT and SIM/USIM phonebook

"ON" SIM (or ~~ME~~MT) own numbers (MSISDNs) list (reading of this storage may be available through +CNUM also). When storing information in the SIM/UICC, if a SIM card is present or if a UICC with an active GSM application is present, the information in EF_{MSISDN} under $DF_{Telecom}$ is selected. If a UICC with an active USIM application is present, the information in EF_{MSISDN} under ADF_{USIM} is selected.

"RC" ~~ME~~MT received calls list (+CPBW may not be applicable for this storage)

"SM" SIM/UICC phonebook. If a SIM card is present or if a UICC with an active GSM application is present, the EF_{ADN} under $DF_{Telecom}$ is selected. If a UICC with an active USIM application is present, the global phonebook, $DF_{PHONEBOOK}$ under $DF_{Telecom}$ is selected.

"TA" TA phonebook

"AP" Selected application phonebook. If a UICC with an active USIM application is present, the application phonebook, $DF_{PHONEBOOK}$ under ADF_{USIM} is selected.

<password>: string type value representing the PIN2-code required when selecting PIN2-code locked <storage>s above, e.g. "FD" or the hidden key to be verified in order to access to the hidden phonebook entries in the UICC/USIM or any other phonebook with hidden entries.

If the combined phonebook is selected, "MT", the <password> will correspond to the hidden key of the USIM phonebook.

<used>: integer type value indicating the number of used locations in selected memory

<total>: integer type value indicating the total number of locations in selected memory

Implementation

Mandatory when phonebook read, find or write command, or direct dialling (refer subclause "Direct dialling from phonebooks") is implemented.

8.12 Read phonebook entries +CPBR

Table 72: +CPBR action command syntax

Command	Possible response(s)
+CPBR=<index1> [,<index2>]	[+CPBR: <index1>,<number>,<type>,<text>[,<hidden>][[...]] <CR><LF>+CPBR: <index2>,<number>,<type>,<text>[,<hidden>]]] *+CME ERROR: <err>*

| +CPBR=? | +CPBR: (list of supported <index>s),[<nlength>],[<tlength>] |
| | *+CME ERROR: <err>* |

Description

Execution command returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned. Entry fields returned are location number <index*n*>, phone number stored there <number> (of format <type>), text <text> associated with the number and , if the selected phonebook supports hidden entries, <hidden> indicating if the entry is hidden. If all queried locations are empty (but available), no information text lines may be returned. If listing fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns location range supported by the current storage as a compound value and the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If ~~ME~~MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Defined values

<index1>, <index2>, <index>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

<hidden>: indicates if the entry is hidden or not

<u>0</u>: phonebook entry not hidden

1: phonebook entry hidden

Implementation

Optional.

8.13 Find phonebook entries +CPBF

Table 73: +CPBF action command syntax

Command	Possible response(s)
+CPBF=<findtext>	[+CPBF: <index1>,<number>,<type>,<text>[,<hidden>][[...] <CR><LF>+CBPF: <index2>,<number>,<type>,<text>[,<hidden>]]]
	+CME ERROR: <err>
+CPBF=?	+CPBF: [<nlength>],[<tlength>]
	+CME ERROR: <err>

Description

Execution command returns phonebook entries (from the current phonebook memory storage selected with +CPBS) which alphanumeric field start with string <findtext>. Entry fields returned are location number <index*n*>, phone number stored there <number> (of format <type>), text <text> associated with the number and, if the selected

phonebook supports hidden entries, <hidden> indicating if the entry is hidden. If listing fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If ~~ME~~MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Defined values

<index1>, <index2>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<findtext>, <text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

<hidden>: indicates if the entry is hidden or not

0: phonebook entry not hidden

1: phonebook entry hidden

Implementation

Optional.

8.14 Write phonebook entry +CPBW

Table 74: +CPBW action command syntax

Command	Possible response(s)
+CPBW=[<index>][,<number> [,<type>[,<text>[,<hidden>]]]]	*+CME ERROR: <err>*
+CPBW=?	+CPBW: (list of supported <index>s),[<nlength>], (list of supported <type>s),[<tlength>] *+CME ERROR: <err>*

Description

Execution command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS. Entry fields written are phone number <number> (in the format <type>), text <text> associated with the number and, if the selected phonebook supports hidden entries, <hidden> parameter, which indicates if the entry is hidden or not. If those fields are omitted, phonebook entry is deleted. If <index> is left out, but <number> is given, entry is written to the first free location in the phonebook (the implementation of this feature is manufacturer specific). If writing fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns location range supported by the current storage as a compound value, the maximum length of <number> field, supported number formats of the storage, and the maximum length of <text> field. In case of SIM storage, the lengths may not be available. If ~~ME~~MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. If storage does not offer format information, the format list should be empty parenthesis

Defined values

<index>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7) ; default 145 when dialling string includes international access code character "+", otherwise 129

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

<hidden>: indicates if the entry is hidden or not

 <u>0</u>: phonebook entry not hidden

 1: phonebook entry hidden

Implementation

Optional.

8.15 Clock +CCLK

Table 75: +CCLK parameter command syntax

Command	Possible response(s)
+CCLK=<time>	*+CME ERROR: <err>*

+CCLK?	+CCLK: <time>
	+CME ERROR: <err>
+CCLK=?	

Description

Set command sets the real-time clock of the ~~ME~~MT. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current setting of the clock.

Defined values

<time>: string type value; format is "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48). E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to "94/05/06,22:10:00+08"

NOTE: If ~~ME~~MT does not support time zone information then the three last characters of <time> are not returned by +CCLK?. The format of <time> is specified by use of the +CSDF command.

Implementation

Optional.

8.16 Alarm +CALA

Table 76: +CALA parameter command syntax

Command	Possible response(s)
+CALA=<time>[,<n>[,<type>[,<text>[,<recurr>[,<silent>]]]]]	*+CME ERROR: <err>*
+CALA?	[+CALA: <time>,<n1>,<type>,[<text>],[<recurr>],<silent> [<CR><LF>+CALA: <time>,<n2>,<type>,[<text>],[<recurr>],<silent> [...]]] *+CME ERROR: <err>*
+CALA=?	+CALA: (list of supported <n>s),(list of supported <type>s),<tlength>,<rlength>,(list of supported <silent>s) *+CME ERROR: <err>*

Description

Set command sets an alarm time in the ~~ME~~MT. There can be an array of different types of alarms, and each alarm may cause different text to be displayed in the ~~ME~~MT display. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

To set up a recurrent alarm for one or more days in the week, the <recurr>-parameter may be used.

When an alarm is timed out and executed, the unsolicited result code +CALV: <n> is always returned, even if the alarm is set up to be silent.

Read command returns the list of current active alarm settings in the ~~ME~~MT.

Test command returns supported array index values, alarm types, and maximum length of the text to be displayed.

Defined values

<time>: refer +CCLK,+CSDF

NOTE: If the <recurr>-parameter is used, the <time>-parameter must not contain a date.

<n>, <n1>, <n2>: integer type value indicating the index of the alarm; default is manufacturer specific

<type>: integer type value indicating the type of the alarm (e.g. sound, volume, LED); values and default are manufacturer specific

<text>: string type value indicating the text to be displayed when alarm time is reached; maximum length <tlength>

<tlength>: integer type value indicating the maximum length of <text>

<recurr>: string type value indicating day of week for the alarm in one of the following formats:

"<1..7>[,<1..7>[…]]" – Sets a recurrent alarm for one or more days in the week. The digits 1 to 7 corresponds to the days in the week, Monday (1), …, Sunday (7).
Example: The string "1,2,3,4,5" may be used to set an alarm for all weekdays.

"0" – Sets a recurrent alarm for all days in the week.

<rlength>: integer type value indicating the maximum length of <recurr>

<silent>: Integer type value indicating if the alarm is silent or not. If set to 1 the alarm will be silent and the only result from the alarm is the unsolicited result code +CALV. If set to 0 the alarm will not be silent.

Implementation

Optional.

8.17   Generic SIM access +CSIM

Table 77: +CSIM action command syntax

Command	Possible response(s)
+CSIM=<length>,<command>	+CSIM: <length>,<response> *+CME ERROR: <err>*
+CSIM=?	

Description

Set command transmits to the ~~ME~~MT the <command> it then shall send as it is to the SIM. In the same manner the SIM <response> shall be sent back by the ~~ME~~MT to the TA as it is. Refer subclause 9.2 for <err> values.

This command allows a direct control of the SIM by an distant application on the TE. The TE shall then take care of processing SIM information within the frame specified by GSM/UMTS.

NOTE: Compared to Restricted SIM Access command +CRSM, the definition of +CSIM allows TE to take more control over the SIM ~~ME~~MT interface. The locking and unlocking of the interface may be done by a special <command> value or automatically by TA/~~ME~~MT (by interpreting <command> parameter). In case that TE application does not use the unlock command (or does not send a <command> causing automatic unlock) in a certain timeout value, ~~ME~~MT may release the locking.

Defined values

<length> : integer type; length of the characters that are sent to TE in <command> or <response> (two times the actual length of the command or response)

<command> : command passed on by the ~~ME~~MT to the SIM in the format as described in GSM 51.011 [28] (hexadecimal character format; refer +CSCS)

<response> : response to the command passed on by the SIM to the ~~ME~~MT in the format as described in GSM 51.011 [28] (hexadecimal character format; refer +CSCS)

Implementation

Optional.

8.18 Restricted SIM access +CRSM

Table 78: +CRSM action command syntax

Command	Possible response(s)
+CRSM=<command>[,<fileid> [,<P1>,<P2>,<P3>[,<data>]]]	+CRSM: <sw1>,<sw2>[,<response>] *+CME ERROR: <err>*
+CRSM=?	

Description

By using this command instead of Generic SIM Access +CSIM TE application has easier but more limited access to the SIM database. Set command transmits to the ~~ME~~MT the SIM <command> and its required parameters. ~~ME~~MT handles internally all SIM-~~ME~~MT interface locking and file selection routines. As response to the command, ~~ME~~MT sends the actual SIM information parameters and response data. ~~ME~~MT error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters. Refer to subclause 9.2 for <err> values.

Coordination of command requests to SIM and the ones issued by GSM/UMTS application inside the ~~ME~~MT is implementation dependent. However the TE should be aware of the precedence of the GSM/UMTS application commands to the TE commands.

Defined values

<command> (command passed on by the ~~ME~~MT to the SIM; refer GSM 51.011 [28]):

176   READ BINARY

178   READ RECORD

192   GET RESPONSE

214   UPDATE BINARY

220   UPDATE RECORD

242   STATUS

all other values are reserved

NOTE 1: The ~~ME~~MT internally executes all commands necessary for selecting the desired file, before performing the actual command.

<fileid>: integer type; this is the identifier of a elementary datafile on SIM. Mandatory for every command except STATUS

NOTE 2: The range of valid file identifiers depends on the actual SIM and is defined in GSM 51.011 [28]. Optional files may not be present at all.

<P1>, <P2>, <P3>: integer type; parameters passed on by the ~~ME~~MT to the SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in GSM 51.011 [28]

<data>: information which shall be written to the SIM (hexadecimal character format; refer +CSCS)

<sw1>, <sw2>: integer type; information from the SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command

<response>: response of a successful completion of the command previously issued (hexadecimal character format; refer +CSCS). STATUS and GET RESPONSE return data, which gives information about the current elementary datafield. This information includes the type of file and its size (refer GSM 51.011 [28]). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command

Implementation

Optional.

8.19   Secure control command +CSCC

Table 79: +CSCC parameter command syntax

Command	Possible response(s)
+CSCC=<mode>[,<cmd_set>[,<token>]]	+CSCC: <challenge> *+CME ERROR: <err>*
+CSCC?	+CSCC: <mode>,<cmd_set1> [<CR><LF>+CSCC: <mode>,<cmd_set2> [...]] *+CME ERROR: <err>*
+CSCC=?	+CSCC: (list of supported <mode>s),(list of supported <cmd_set>s)

Description

This command is used to enable/disable access to commands protected by security mechanism. This enables/disables access to command sets designated as "secure" such as programming of ~~ME~~MT. Refer subclause 9.2 for possible <err> values.

The TE asks for a <challenge> with <mode>=1 and one specific command set (<cmd_set>), the ~~ME~~MT replies with the <challenge>, which should be inserted into the identification algorithm in both entities (TE and ~~ME~~MT). The algorithm output <token> is sent to the ~~ME~~MT with <mode>=2 to enable the specified command set. <mode>=3 is used to disable the command set.

The read command returns the status (<mode> 2 or 3) of each supported command set.

Defined values

<mode>:

1   request challenge token to enable access to specified command set

2   enable access to specified command set (<token> required)

3   disable access to specified command set

<cmd_set>, <cmd_set1>, <cmd_set2>:

0   ~~MS~~ MT/TA code re-programming command set.

other values below 128 are reserved by the present document

<token>: string type; a variable length bit string represented with IRA characters 0 - 9 and A - F, each character representing a nibble; e.g. bit string "0110 1100 1001 1010" is represented by the IRA string "6C9A". The length of the required bit string varies depending on the value of <cmd_set>.

<challenge>: same format as token

Implementation

Optional.

8.20 Alert sound mode +CALM

Table 80: +CALM parameter command syntax

Command	Possible response(s)
+CALM=<mode>	*+CME ERROR: <err>*
+CALM?	+CALM: <mode>
	+CME ERROR: <err>
+CALM=?	+CALM: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to select the general alert sound mode of the ~~ME~~MT. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

<mode>:

<u>0</u> normal mode

1 silent mode (all sounds from ~~ME~~MT are prevented)

2… manufacturer specific

Implementation

Optional.

8.21 Ringer sound level +CRSL

Table 81: +CRSL parameter command syntax

Command	Possible response(s)
+CRSL=<level>	*+CME ERROR: <err>*
+CRSL?	+CRSL: <level>
	+CME ERROR: <err>
+CRSL=?	+CRSL: (list of supported <level>s)
	+CME ERROR: <err>

Description

This command is used to select the incoming call ringer sound level of the ~~ME~~MT. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

<level>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

Implementation

Optional.

8.22 Vibrator mode +CVIB

Table 82: +CVIB parameter command syntax

Command	Possible response(s)
+CVIB=<mode>	*+CME ERROR: <err>*
+CVIB?	+CVIB: <mode>
	+CME ERROR: <err>
+CVIB=?	+CVIB: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to enable and disable the vibrator alert feature of the ~~ME~~MT. It is manufacturer specific how this interacts with +CALM command. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

 <mode>:

0 disable

1 enable

...15 reserved by the present document

16… manufacturer specific

Implementation

Optional.

8.23 Loudspeaker volume level +CLVL

Table 83: +CLVL parameter command syntax

Command	Possible response(s)
+CLVL=<level>	*+CME ERROR: <err>*
+CLVL?	+CLVL: <level>
	+CME ERROR: <err>
+CLVL=?	+CLVL: (list of supported <level>s)
	+CME ERROR: <err>

Description

This command is used to select the volume of the internal loudspeaker of the ~~ME~~MT. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

 <level>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

Implementation

Optional.

8.25 Accumulated call meter +CACM

Table 85: +CACM parameter command syntax

Command	Possible response(s)
+CACM=[<passwd>]	*+CME ERROR: <err>*
+CACM?	+CACM: <acm>
	+CME ERROR: <err>
+CACM=?	

Description

Set command resets the Advice of Charge related accumulated call meter value in SIM card or in the active application in the UICC (GSM or USIM) file EF_ACM. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current value of ACM.

Defined values

<passwd>: string type; SIM PIN2

<acm>: string type; accumulated call meter value similarly coded as <ccm> under +CAOC

Implementation

Optional.

8.26 Accumulated call meter maximum +CAMM

Table 86: +CAMM parameter command syntax

Command	Possible response(s)
+CAMM=[<acmmax>[,<passwd>]]	*+CME ERROR: <err>*
+CAMM?	+CAMM: <acmmax>
	+CME ERROR: <err>
+CAMM=?	

Description

Set command sets the Advice of Charge related accumulated call meter maximum value in SIM card or in the active application in the UICC (GSM or USIM) file EF_ACMmax. ACMmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM (refer +CACM) reaches ACMmax calls are prohibited (see also 3GPP TS 22.024 [26]). SIM PIN2 is usually required to set the value. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current value of ACMmax.

Defined values

<acmmax>: string type; accumulated call meter maximum value similarly coded as <ccm> under +CAOC; value zero disables ACMmax feature

<passwd>: string type; SIM PIN2

Implementation

Optional.

8.27 Price per unit and currency table +CPUC

Table 87: +CPUC parameter command syntax

Command	Possible response(s)
+CPUC=<currency>,<ppu>[,<passwd>]	*+CME ERROR: <err>*
+CPUC?	+CPUC: <currency>,<ppu>
	+CME ERROR: <err>
+CPUC=?	

Description

Set command sets the parameters of Advice of Charge related price per unit and currency table in SIM card or in the active application in the UICC (GSM or USIM) file EF$_{PUCT}$. PUCT information can be used to convert the home units (as used in +CAOC, +CACM and +CAMM) into currency units. SIM PIN2 is usually required to set the parameters. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current parameters of PUCT.

Defined values

<currency>: string type; three-character currency code (e.g. "GBP", "DEM"); character set as specified by command Select TE Character Set +CSCS

<ppu>: string type; price per unit; dot is used as a decimal separator (e.g. "2.66")

<passwd>: string type; SIM PIN2

Implementation

Optional.

8.28 Call Meter maximum event +CCWE

Table 88: +CCWE parameter command syntax

Command	Possible response(s)
+CCWE=<mode>	*+CME ERROR: <err>*
+CCWE?	+CCWE: <mode>
	+CME ERROR: <err>
+CCWE=?	+CCWE: (list of supported <mode>s)
	+CME ERROR: <err>

Description

Shortly before the ACM (Accumulated Call Meter) maximum value is reached, an unsolicited result code +CCWV will be sent, if enabled by this command. The warning is issued approximately when 30 seconds call time remains. It is also issued when starting a call if less than 30 s call time remains. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current setting.

Test command returns supported settings.

Defined values

<mode>:

0   Disable the call meter warning event

1   Enable the call meter warning event

Implementation

Optional.

8.29   Power class +CPWC

Table 89: +CPWC parameter command syntax

Command	Possible response(s)
+CPWC=[<class>[,<band>]]	*+CME ERROR: <err>*
+CPWC?	+CPWC: <curr_class1>,<def_class1>,<band1>[,<curr_class2>,<def_class2>,<band2>[...]] *+CME ERROR: <err>*
+CPWC=?	+CPWC: list of supported (<band>,(list of <class>s)) pairs *+CME ERROR: <err>*

Description

This command is used to set the preferred ~~ME~~MT power class for each GSM frequency band supported. The interaction of this setting with the selected bearer service (+CBST and HSCSD commands) is manufacturer specific (for example, selecting a multislot operation might reduce the power class automatically). If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the currently selected output power class and default output power class for each supported frequency band (as defined by ~~ME~~MT manufacturer). Parameter <band1> and its associated power class parameters refer to the currently used frequency band. For example, +CPWC: 2,1,1,5,4,0 in case of a dual-band ~~ME~~MT currently using band GSM1800, for which the power class is currently set to 2, the default being class 1, and for which the currently set power class value for GSM900 is class 5 the default being class 4.

Test command returns supported bands and their power classes. For example,

+CPWC: (0,(0,4,5)),(1,(0-2)) in case of a dual-band handheld ~~ME~~MT.

Defined values

   <class>, <curr_class*n*>s, <def_class*n*>s:

0   default (not applicable to <curr_class>s or <def_class*n*>s)

1…   ~~MS~~ MT output power class as in GSM 45.005 [38]

   <band>, <band*n*>s:

0   GSM900

1   GSM1800

2   reserved for GSM1900

3   GSM 400

Implementation

Optional.

8.30 Set Language +CLAN

Table 90: +CLAN parameter command syntax

Command	Possible response(s)
+CLAN=<code>	*+CME ERROR: <err>*
+CLAN?	+CLAN: <code>
	+CME ERROR: <err>
+CLAN=?	+CLAN:(list of supported <code>s)
	+CME ERROR: <err>

Description

This command sets the language in the ~~ME~~MT. The set-command must confirm the selected language with the MMI-module in the ~~ME~~MT. If setting fails, a ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

The <code>-parameter is a two-letter abbreviation of the language. The language codes, as defined in ISO 639, consists of two characters, e.g. "sv", "en" etc.

The complete set of language codes to be used are manufacturer specific and should all be possible to use with the command. Some examples are described under <code>. For a complete list see ISO 639.

The read command gives the current language as output. If the language has been set to "AUTO", the read command returns the current language set from the SIM-card /UICC. Hence, the "AUTO"-code is never returned by the read-command.

Test command returns supported <code>s.

Defined values

<code>: (not all language codes are present in this list)

"AUTO" Read language from SIM-card /UICC. "Auto" is not returned by the read-command.

"sw" Swedish

"fi" Finnish

"da" Danish

"no" Norwegian

"de" German

"fr" French

"es" Spanish

"it" Italian

"en" English

Implementation

Optional.

8.31 Language Event +CLAE

Table 91: +CLAE parameter command syntax

Command	Possible response(s)
+CLAE=<mode>	*+CME ERROR: <err>*
+CLAE?	+CLAE: <mode> *+CME ERROR: <err>*
+CLAE=?	+CLAE: (list of supported <mode>s) *+CME ERROR: <err>*

Description

This command is used to enable/disable unsolicited result code +CLAV: <code>. If <mode>=1, +CLAV: <code > is sent from the ~~ME~~MT when the language in the ~~ME~~MT is changed. If setting fails, a ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current status for <mode>.

Test command returns supported <mode>s.

Defined values

<mode>:

<u>0</u> Disable unsolicited result code +CLAE

1 Enable unsolicited result code +CLAE

<code>: For description see +CLAN.

Implementation

Optional.

8.32 Set Greeting Text +CSGT

Table 92: +CSGT parameter command syntax

Command	Possible response(s)
+CSGT=<mode>[,<text>]	*+CME ERROR: <err>*
+CSGT?	+CSGT: <text>, <mode> *+CME ERROR: <err>*
+CSGT=?	+CSGT:(list of supported <mode>s), <ltext> *+CME ERROR: <err>*

Description

This command sets and activates the greeting text in the ~~ME~~MT. The greeting text is shown in the ~~ME~~MT display when the ~~ME~~MT is turned on. The command can also be used to deactivate a text.
If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

The read command queries the current <text> and the status of the <mode> parameter

Test command returns supported <mode>s and the maximum number of characters in <text>. For example,

+CSGT: (0-1),20

Defined values

`<text>`: string type; A free text that shall be displayed. The text can not include <CR>

<mode>:

0 **Turn off greeting text.**

1 **Turn on greeting text**

Implementation

Optional.

8.33 Set Voice Mail Number +CSVM

Table 93: +CSVM parameter command syntax

Command	Possible response(s)
+CSVM=<mode>[,<number>[,<type>]]	*+CME ERROR: <err>*
+CSVM?	+CSVM:<mode>,<number>,<type> *+CME ERROR: <err>*
+CSVM=?	+CSVM: (list of supported <mode>s), (list of supported <type>s) *+CME ERROR: <err>*

Description

The number to the voice mail server is set with this command. The parameters <number> and <type> can be left out if the parameter <mode> is set to 0. If setting fails, an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the currently selected voice mail number and the status (i.e. enabled/disabled).

Test command returns supported <mode>s and <type>s.

Defined values

`<mode>`:

0 **Disable the voice mail number.**

1 **Enable the voice mail number.**

`<number>`: string type; **Character string <0..9,+>**

`<type>`: integer type; Type of address octet. (refer TS 24.008 subclause 10.5.4.7)

129 **ISDN / telephony numbering plan, national / international unknown**

145 **ISDN / telephony numbering plan, international number**

161 **ISDN / telephony numbering plan, national number**

128 - 255 **Other values refer TS 24.008 section 10.5.4.7**

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

Implementation

Optional.

8.35   Ring Melody Playback +CRMP

Table 95: +CRMP action command syntax

Command	Possible response(s)
+CRMP=<call type>[,<volume>[,<type>,<index>]]	*+CME ERROR: <err>*
+CRMP=?	+CRMP: (list of supported <call type>s),(list of supported <volume>s),(<type0>),(list of supported <index>s)[<CR><LF> +CRMP: (list of supported <call type>s),(list of supported <volume>s),(<type1>),(list of supported <index>s) *+CME ERROR: <err>*

Description

Execution command causes the ~~ME~~MT to playback a specific ring type. The default values for the optional parameters are the current selected in the ~~ME~~MT.

Test command returns the available ring melodies.

Defined values:

<call type>: integer type; manufacturer specific

<volume>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

<type>:

0   Manufacturer defined

1   User defined

<index>: integer type;

Implementation

Optional.

8.36   Master Reset +CMAR

Table 96: +CMAR action command syntax

Command	Possible response(s)
+CMAR=<phone lock code>	*+CME ERROR: <err>*
+CMAR=?	*+CME ERROR: <err>*

Description

This command requests the ~~ME~~MT to reset user data. The user data in the phone will be reset to default values. If setting fails, a ~~ME~~MT error, +CME ERROR: <err>, is returned. Refer subclause 9.2 for <err> values.

If the ~~ME~~MT is locked and this command is used, then the ~~ME~~MT will be unlocked after the master reset.

Test command returns OK

Defined values

<phone lock code > string type; Security code (Phone Lock code) must be verified before performing the master reset.

Implementation

Optional.

8.37 List all available AT commands +CLAC

Table 97: +C action command syntax

Command	Possible response(s)
+CLAC	<AT Command1> [<CR> <LF> <AT Command2>[…]]
	+CME ERROR: <err>
+CLAC=?	*+CME ERROR: <err>*

Description

Execution command causes the ~~ME~~MT to return one or more lines of AT Commands.

Note: This command only returns the AT commands that are available for the user.

Defined values

<AT Command >:

Defines the AT command including the prefix AT. Text shall not contain the sequence 0<CR> or OK<CR>

Implementation

Optional.

8.38 Delete alarm +CALD

Table 98: +CALD action command syntax

Command	Possible response(s)
+CALD=<n>	*+CME ERROR: <err>*
+CALD=?	+CALD: (list of supported <n>s)
	+CME ERROR: <err>

Description

Action command deletes an alarm in the ~~ME~~MT. If the command fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns supported array index values.

Defined values

<n>: integer type value indicating the index of the alarm; default is manufacturer specific

Implementation

Optional.

## 8.39		Postpone or dismiss an alarm +CAPD

Table 99: +CAPD action command syntax

Command	Possible response(s)
+CAPD=[<sec>]	*+CME ERROR: <err>*
+CAPD=?	+CAPD: (list of supported <sec>s)
	+CME ERROR: <err>

Description

Set command postpones or dismisses a currently active alarm. If the command fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns supported <sec>-parameter values.

Defined values

<sec>: integer type value indicating the number of seconds to postpone the alarm. If <sec> is set to 0 (default), the alarm is dismissed.

Implementation

Optional.

## 8.40		Automatic Time Zone Update +CTZU

Table 100: +CTZU parameter command syntax

Command	Possible response(s)
+CTZU=<onoff>	*+CME ERROR: <err>*
+CTZU?	+CTZU: <onoff>
	+CME ERROR: <err>
+CTZU=?	+CTZU: (list of supported <onoff>s)
	+CME ERROR: <err>

Description

Set command enables and disables automatic time zone update via NITZ. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current settings in the ~~ME~~MT.

Test command returns supported on- and off-values.

Defined values

<onoff>: integer type value indicating:

0 – Disable automatic time zone update via NITZ (default).

1 – Enable automatic time zone update via NITZ.

Implementation

Optional.

8.41 Time Zone Reporting +CTZR

Table 101: +CTZR parameter command syntax

Command	Possible response(s)
+CTZR=<onoff>	*+CME ERROR: <err>*
+CTZR?	+CTZR: <onoff> *+CME ERROR: <err>*
+CTZR=?	+CTZR: (list of supported <onoff>s) *+CME ERROR: <err>*

Description

This set command enables and disables the time zone change event reporting. If the reporting is enabled the ~~ME~~MT returns the unsolicited result code +CTZV: <tz> whenever the time zone is changed. If setting fails in an ~~ME~~MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current reporting settings in the ~~ME~~MT.

Test command returns supported <onoff>-values.

NOTE: The Time Zone reporting is not affected by the Automatic Time Zone setting command, +CTZU.

Defined values

<onoff>: integer type value indicating:

  0 – disable time zone change event reporting (default).

  1 – Enable time zone change event reporting.

Implementation

Optional.

8.42 Enter protocol mode+CPROT

Table 102: +CPROT parameter command syntax

Command	Possible response(s)
+CPROT=<proto>[,<version>[,<lsap1>[,...[<lsapN>]]]]	CONNECT NO CARRIER OK ERROR *+CME ERROR: <err>*
+CPROT=?	+CPROT: <proto1>[,(list of supported <version>s)[,(list of supported <lsap1>s)[,...[,(list of supported <lsapN>s)]]]] [<CR><LF> +CPROT : <proto2>[,(list of supported <version>s)[,(list of supported <lsap1>s)[,...[,(list of supported <lsapN>s)]]]]] [...]]]]]

Description

Set command informs TA that TE wants to establish a peer-to-peer protocol `<proto>` or upper layer connection (indicating by the `<lsap>s` setting) with the ~~ME~~MT on the link from which the command was received. This command can be used in case the link between TE and ~~ME~~MT does not provide itself such a mechanism.

If ~~ME~~MT has succeeded in establishing a logical link between application protocols and external interface, it will send CONNECT message to the TE. Otherwise, the NO CARRIER response will be returned.

If the CONNECT response is received, TE can start sending `<proto>` or upper layer frames.

The connection shall always return for `<proto>` mode when the protocol session is ended. When the ~~ME~~MT receives a disconnect request from its peer entity, it will process it and send OK response to the TE indicating its capability for receiving new AT commands. Since `<proto>` or upper layers can be accessed in other ways, TA must have pre-knowledge of the fact that connection is initiated with AT+CPROT command. This means that switch to `<proto>` mode must include some sort of notification to the protocol entity.

This command can be aborted by sending a `<proto>` or upper layer disconnection frame. In that case, ~~ME~~MT will return in command mode by sending the OK response.

Refer subclause 9.2 for possible `<err>` values.

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

Defined values

> `<proto>`

> 0   OBEX (refer.[44])

> …15   reserved by the present document

> 16...   manufacturer specific

> `<version>:`   version number of `<proto>`: string type

> `<lsap1>:` defines a level of service or application protocol on the top of `<proto>` layer. It may refer to services or protocols defined in other standards development organizations (SDOs).

> 1   IrMC level 1 (Minimum Level) Only .(refer [43] subclause 2.9.4)

> 2   IrMC level 1 and 2 (Minimum and Access Levels) Only. .(refer [43] subclause 2.9.4)

> 4   IrMC level 1, 2 and 3 (Minimum, Access, Index Levels) Only- implies static index support. .(refer [43] subclause 2.9.4)

> 8   IrMC level 1, 2 and 4 (Minimum, Access and Sync Levels) Only-implies unique index support. .(refer [43] subclause 2.9.4)

> 10   IrMC level 1, 2, 3 and 4 (Minimum, Access, Index and Sync Levels)-implies support of static and unique index. .(refer [43] subclause 2.9.4)

> …15   reserved by the present document

> 16...   manufacturer specific

> `<lsap2>...<lsapN>`

> In case `<lsapN>`,`<lsapN+1>` received in the +CPROT command identifies protocol layers, the protocol identified by N+1 shall be on the top of the protocol identified by N on a framework point of view.

> 0…15   reserved by the present document

> 16...   manufacturer specific

Implementation

Optional.

8.43 Informative examples

Phone Activity Status (+CPAS) is a general command used to detect the presence of the ~~ME~~MT, if there is an incoming call, or if there is a call in progress. This command should be used before trying to operate the ~~ME~~MT from the TE. Note that the activity status may change at any time after the execution of +CPAS, and hence the returned value may be obsolete. Detachment of the ~~ME~~MT from the TA is indicated with a special final result code that indicates all errors related to the operation of the ~~ME~~MT. Result code is +CME ERROR: <err>, where <err> is an integer or verbose value giving useful information about the reason for the command failure (refer subclause "Mobile ~~Equipment~~ Termination error result code +CME ERROR").

Set Phone Functionality (+CFUN) can be used to reset the ~~ME~~MT or set the power consumption level of the ~~ME~~MT by disabling certain parts of the ~~ME~~MT (e.g. the transmit and receive RF circuits). Mobile ~~Equipment~~ Termination Control Mode (+CMEC) is a command which manages access sharing between the ~~ME~~MT and the TE to operate the user interface of the ~~ME~~MT. It has three subparameters which describe the access to keypad, display and indicators. Each subparameter has values for restricting the operation of the corresponding user interface part only to the ~~ME~~MT or only to the TE, or to give the access for both of them.

Keypad Control command (+CKPD) is used to operate the keypad of the ~~ME~~MT. Here lies the problem of different keypad types between manufacturers, and also between their ~~ME~~MT models. The keypresses are sent to the ~~ME~~MT as a string type subparameter of this command. Each character in that string represents a key which will be logically pressed. A special character (colon) followed by any character can be used by manufacturers (or TE application programmers) to represent a key which is not defined in this profile. An escape character (semicolon) for direct string entering is also defined. All text between single semicolon characters is treated as an alphanumeric entry and is not converted to keypressings. All semicolon characters inside the text shall be duplicated in the TE and stripped back to one before entering them to the ~~ME~~MT. Command has also optional second and third parameters which can be used to alter the time to strike each key, and the pause to wait between keystrokes (in tenths of a second). A special pause character (W or w) may be added in the string type subparameter for an extra pause of the same length as given by the third subparameter. In the following example alphanumeric mode is entered and a person predefined in the ~~ME~~MT phonebook, "Ilkka", is called; each key is struck for half a second and pauses between strokes are a tenth of a second:

```
AT+CKPD="@:Ilkka:S",5,1
OK
```

Display Control command (+CDIS) is used both for writing to the display text fields and for reading the current status of the fields. Mobile ~~equipment~~ termination usually have a character set of their own, so the TA shall be able to do a conversion between the TE and the ~~ME~~MT character sets. TE can have several character sets and the TA must be informed of the character set in use before starting to write or read the display. Character set is set with general command Select TE Character Set +CSCS. The +CDIS=? query command is a way to get information about the length of the fields. In the following example an ~~ME~~MT is first queried about the supported conversions and the lengths of the fields. The response shows there are three ten character long and two six character long fields. Then the TE character set is set to be IRA and the current status of the display is read. The last command writes the text "Hello, I'm writing to display" in the three fields, and keeps the contents of the two other fields same (the last two commas could also be left out).

```
AT+CSCS=?;+CDIS=?
+CSCS: ("IRA","PCCP850","8859-1")
+CDIS: 10,10,10,6,6
OK
AT+CSCS="IRA"
OK
AT+CDIS?
+CDIS: "RADIOLINJA","","","Menu","Memory"
OK
AT+CDIS="IRA","Hello, I'm","writing to","display",,
OK
```

The writing is possible only when it is permitted by the Mobile ~~Equipment~~ Termination Control Mode command (and by the manufacturer). If a certain field is not writable (but is readable), writing to it should be ignored. The order of the text fields should be determined by manufacturers and follow the rule: first field is in the upper left corner, second in the next field to the right, and so on, until to the last field in the lower right corner.

Indicators can be handled with Indicator Control command (+CIND). Its query command returns a short description (abbreviation) of the purpose of the indicators and the supported values for each indicator. The setting and reading is done similarly as with Display Control command. In the following example the indicators of a phone are queried, their current value is read, and the value of message indicator is tried to set (but it is forbidden):.

```
AT+CIND=?
+CIND: ("memory",(0-2)),("call",(0,1)),("data",(0,1)),("roam",(0,1)),
("alpha",(0,1)),("message",(0,1)),("index1",(0-11)),("index2",(0-11)),
("index3",(0-11)),("signal",(0-5)),("service",(0,1)),("sel1",(0,1)),
("sel2",(0,1)),("sel3",(0,1)),("battchg",(0-5))
OK
AT+CIND?
+CIND: 1,0,0,0,0,1,0,0,0,3,1,0,0,0,5
OK
AT+CIND=,,,,,0
+CME ERROR: 10
```

The subparameter order in the command is defined by the query command order, not by the actual display order. The zero value of an indicator means that it is off (or in state which can be identified as "off"-state), value one means that the indicator is on (or in a state which is more substantial than "off"-state), value two is more substantial than one, and so on.

To this point, only operating through the TE is covered. But when ~~ME~~MT can be operated also through its keypad, or there are changes in the status of the display elements, the information about these actions shall be given to the TE also. This can be solved only with unsolicited result codes which return keypad, display text and indicator events. Each event group has a result code of its own: +CKEV returns the key code and if the key pressed (1) or released (0), +CDEV returns the display text field running number (as specified by command +CDIS) and the new status of the field, and +CIEV returns the running number of the indicator (refer +CIND) and the new value of it. In the following example number key 1 is pressed, updated on the display, released, and signal strength changes its state to five:

```
+CKEV: 49,1
+CDEV: 1,"1"
+CKEV: 49,0
+CIND: 10,5
```

Mobile ~~Equipment~~ Termination Event Reporting command (+CMER) has been specified for the purpose of controlling the sending of these unsolicited result codes to the TE. Four ways are provided to handle the buffering of the result codes (see figure 8). The first is to buffer them always. The second possibility is to discard them when in on-line data mode and otherwise forward them directly to the TE. The third possibility is to buffer them in data mode and otherwise forward them to the TE. The last possibility is to send them always to the TE (some inband technique - e.g. V.80 - shall be used in data mode to send the result codes within the data). This is the first subparameter of +CMER command. Next three subparameters are used to enable or disable each of the keypad, text field and indicator result codes. Sending codes can be enabled either so that only events generated from the ~~ME~~MT user interface are returned, or so that also events caused by Keypad, Display and Indicator Control commands are returned. The fifth subparameter controls the flushing of the buffer when the value of the first subparameter is changed to a value from one to three.
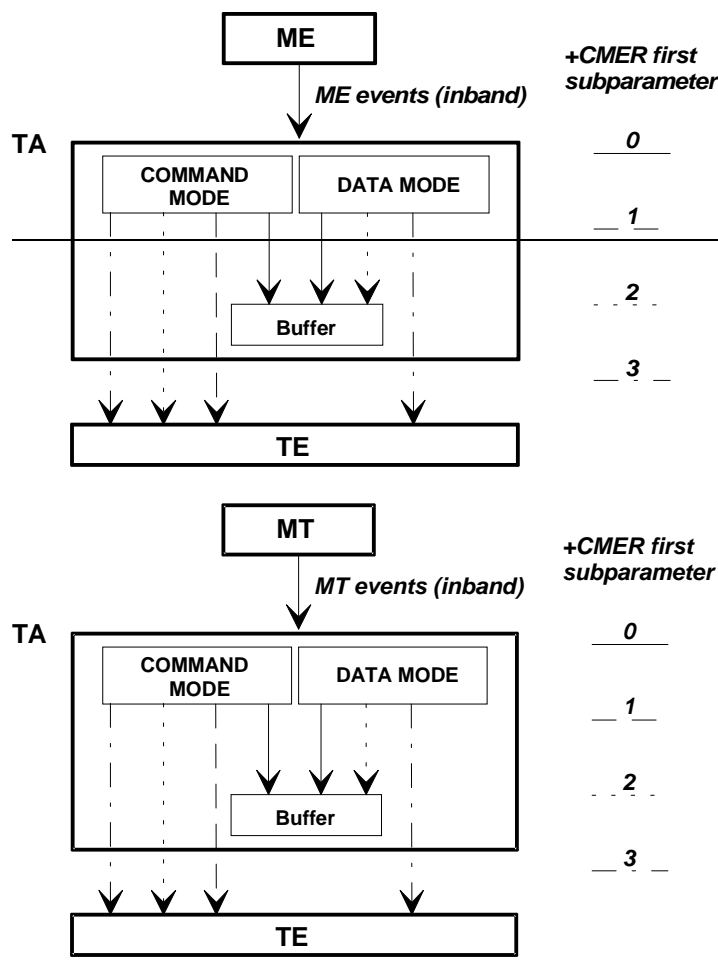
Figure 8: Mobile ~~equipment~~ termination event reporting

An example of complete setup of the TA where TE takes the control of keypad, but does not want to write to display nor control the indicators (in the start ~~ME~~MT is powered off):

```
AT+CMEE=2;+CREG=1              (use verbose <err> values; report registration)
OK
AT+CPAS                        (query MEMT status)
+CPAS: 5                       (MEMT is asleep)
OK
AT+CFUN=1                      (set MEMT to full functionality state)
+CME ERROR: SIM PIN required   (SIM requests PIN)
AT+CPIN="1234"
+CME ERROR: incorrect password (user entered wrong PIN)
AT+CPIN="4321"
OK                             (correct PIN)
AT+COPS=0,0                    (ask for automatic operator selection and registration)
OK
+CREG: 1                       (registered in the network)
AT+COPS?
+COPS: 0,0,"RADIOLINJA"        (get the operator name)
OK
```

```
AT+CMEC=1,0,0                       (take over the keypad, leave display to MEMT)
OK
AT+CDIS=?;+CIND=?                    (query display text and indicator formats)
+CDIS: 10,10,10,6,6
+CIND: ("memory",(0-2)),("call",(0,1)),("data",(0,1)),("roam",(0,1)),
("alpha",(0,1)),("message",(0,1)),("index1",(0-11)),("index2",(0-11)),
("index3",(0-11)),("signal",(0-5)),("service",(0,1)),("sel1",(0,1)),
("sel2",(0,1)),("sel3",(0,1)),("battchg",(0-5))
OK
AT+CSCS="IRA"                       (set TE character set for display text results)
OK
AT+CMER=1,0,2,2,0                   (return display text and indicator result codes when
OK                                   in command state, in data mode discard them)
AT+CDIS?;+CIND?                     (read current state of display texts and indicators)
+CDIS: "","","    12345","Menu","Memory"   (user had pressed number buttons before
+CIND: 1,0,0,0,0,1,0,0,0,3,1,0,0,0,5        TE took control with +CMEC)
OK
AT+CKPD="C",20                     (clear main display text '12345' by holding the
OK                                  'clear' button down two seconds)
+CDEV: 3,"1234"                    (first only one character deleted)
+CDEV: 3,""                        (while holding continues, whole display is cleared)
+CDEV: 1,"RADIOLINJA"              (operator name comes to the display)
```

The start of the previous example could go as follows when MEMT has already been powered on but is waiting for the PIN:

```
AT+CMEE=2;+CREG=1                  (use verbose <err> values; report registration)
OK
AT+CPAS                           (query MEMT status)
+CPAS: 0                          (MEMT is ready to receive commands)
OK
AT+CPIN?                          (is MEMT asking passwords?)
+CPIN: SIM PIN                    (yes, SIM PIN required)
AT+CPIN="4321"
OK                               (correct PIN)
```

One of the most regular operations done through the MEMT user interface is phonebook control. To lessen the workload of the TE, some direct commands for phonebook reading and writing are practical. Command Select Phonebook Memory Storage +CPBS query version returns supported phonebook memories, read version returns current settings, and set version selects the memory. For GSM, the normal storages are SIM, MEMT and TA.

Read Phonebook Entries (+CPBR) can be used to read either one or many phonebook locations at the same time. A regular phonebook entry consists of three elements: memory index number, the phone number and its alphanumeric equivalent given by the user. Query version of this returns supported index values of the selected memory, and the maximum lengths of the number and alphanumeric elements. The query version of the Write Phonebook Entry command (+CPBW) is similar, but the action version sets or clears an entry in the phonebook. Find Phonebook Entries (+CPBF) may be used to search alphanumeric entries starting with specific string. An example where the whole phonebook of the MEMT is read, index number four is cleared, and number three is written:

```
AT+CPBS=?
+CPBS: ("ME","SM")                  (MEMT and SIM have phonebooks)
OK
AT+CPBS="ME"                        (select MEMT memory)
OK
AT+CPBR=?                           (read index range and element lengths)
+CPBR: (1-99),30,30
OK
AT+CPBR=1,99                        (read all entries but only the ones set are returned)
+CPBR: 1,"931123456",129,"Ilkka"
+CPBR: 2,"9501234567",129,""
+CPBR: 4,"901234567",129,"Hesari"
OK
AT+CPBW=4;+CPBW=3,"921123456",,"TS"  (clear index 4 and write index 3)
OK
```

9 Mobile ~~Equipment~~ Termination errors

9.1 Report Mobile ~~Equipment~~ Termination error +CMEE

Table 103: +CMEE parameter command syntax

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

Description

Set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the ~~ME~~MT. When enabled, ~~ME~~MT related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality.

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

Defined values

<n>:

0   disable +CME ERROR: <err> result code and use ERROR instead

1   enable +CME ERROR: <err> result code and use numeric <err> values (refer next subclause)

2   enable +CME ERROR: <err> result code and use verbose <err> values (refer next subclause)

Implementation

Mandatory for <n> values 0 and 1.

9.2 Mobile ~~Equipment~~ Termination 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):

9.3 Informative examples

An example of TA responses with all three +CMEE values when ~~ME~~MT manufacturer identification is requested but ~~ME~~MT is not connected to the TA:

```
AT+CMEE=0     (+CME ERROR shall not be used)
OK
AT+CGMI
ERROR
AT+CMEE=1     (use numeric <err>)
OK
```

```
AT+CGMI
+CME ERROR: 1
AT+CMEE=2    (use verbose <err>)
OK
AT+CGMI
+CME ERROR: no connection to phone
```

10.1.18 Packet Domain event reporting +CGEREP

Table 120: 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 Packet Domain 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~~ termination has forced a context deactivation. The `<cid>` that was used to activate the context is provided if known to the MT.

```
+CGEV: NW DETACH
```

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

```
+CGEV: ME DETACH
```

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

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

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

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

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

Implementation

Optional.

10.1.19 GPRS network registration status +CGREG

Table 121: 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

`<n>`:

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>]`

`<stat>`:

0　not registered, ~~ME~~MT is not currently searching an operator to register to
　The ~~MS~~UE is in GMM state GMM-NULL or GMM-DEREGISTERED-INITIATED.
　The GPRS service is disabled, the ~~MS~~UE is allowed to attach for GPRS if requested by the user.

1　registered, home network
　The ~~MS~~UE is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED
　INITIATED on the home PLMN.

2　not registered, but ~~ME~~MT is currently trying to attach or searching an operator to register to
　The ~~MS~~UE is in GMM state GMM-DEREGISTERED or GMM-REGISTERED-INITIATED. The GPRS
　service is enabled, but an allowable PLMN is currently not available. The ~~MS~~UE will start a GPRS attach as
　soon as an allowable PLMN is available.

3　registration denied
　The ~~MS~~UE is in GMM state GMM-NULL. The GPRS service is disabled, the ~~MS~~UE is not allowed to attach
　for GPRS if requested by the user.

4　unknown

5　registered, roaming
　The ~~MS~~UE is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED on a
　visited PLMN.

`<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.

11.1.1　Accept an incoming Voice Group or Voice Broadcast Call +CAJOIN

Table 125: CAJOIN parameter command syntax

Command	Possible Response(s)
+CAJOIN=<service>, <GId> ,<GCA>	*+CME ERROR: <err>*
CAJOIN=?	

Description

The execute command accepts an incoming or ongoing voice group or voice broadcast call.

See command +CALCC to get a list of current voice group or voice broadcast calls.

Defined Values

`<GId>`: a digit string that specifies the group identification for the incoming voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area identification for the incoming voice group or voice broadcast call.

<service> (tele-service):

17　voice group call

18　voice broadcast call

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and VGCS or VBS is implemented.

11.1.2　Reject an incoming Voice Group or Voice Broadcast Call +CAREJ

Table 126: CAREJ parameter command syntax

Command	Possible Response(s)
+CAREJ=<service>, <GId>, <GCA>	*+CME ERROR: <err>*
+CAREJ=?	

Description

The execute command rejects an incoming voice group or voice broadcast call indicated by RING or +CRING, the command is applicable as long as the indication is pending.

If the call is once rejected the RING or +CRING indication is not repeated to TE although the call is still running and notifications for the call are received.

See command +CALCC to get a list of current voice group or voice broadcast calls.

Defined Values

<GId>: a digit string that specifies the group identification for the incoming voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area identification for the incoming voice group or voice broadcast call.

<service> (tele-service):

17　voice group call

18　voice broadcast call

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and VGCS or VBS is implemented.

11.1.3　Leave an ongoing Voice Group or Voice Broadcast Call +CAHLD

Table 127: CAHLD parameter command syntax

Command	Possible Response(s)
+CAHLD	*+CME ERROR: <err>*
+CAHLD=?	

Description

The execute command forces the MT to leave the active voice group or voice broadcast call without terminating it. The command is only applicable if the MT is in group receive mode. The MT returns to idle mode.

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and VGCS or VBS is implemented.

11.1.4   Talker Access for Voice Group Call +CAPTT

Table 128: CAPTT parameter command syntax

Command	Possible Response(s)
+CAPTT=[<mode> [,<time>]]	*+CME ERROR: <err>*
+CAPTT?	+CAPTT: <mode> *+CME ERROR: <err>*
+CAPTT=?	+CAPTT: (list of supported <mode>s), (list of supported <time>s)

Description

The execute command emulates the Push To Talk function for VGCS talker access.
If the parameter <mode> is set to value "0" i.e. "RELEASED" the PTT key is assumed to be released immediately.
If the parameter <mode> is set to value "1" i.e. "PUSHED" the PTT key is assumed to be pushed immediately for the period of <time> in seconds. If the command execution is repeated before the <time> expires the PTT timer will be loaded with the new <time> value and the PTT key remains "PUSHED" for the period of new <time> in seconds.
If the parameter <mode> is set to value "2" i.e. "PUSHED" the PTT key is assumed to be pushed immediately for an infinite period of time and can be released by <mode> value 0.
For <mode>=0 if the parameter <time> is issued it is ignored.

If the PTT timer expires after <time> seconds during <mode> "PUSHED" an unsolicited result code +CAPTT: 0 is issued to the TE.

The read command returns the current <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>:

0   status of the PTT key is RELEASED (default value)

1   status of the PTT key is PUSHED for a limited time by <time> in seconds

2   status of the PTT key is PUSHED for an infinite time

<time>:

3..255 this gives the time in seconds to wait before the PTT key is released, default value 10

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and VGCS is implemented.

11.1.5   Voice Group Call Uplink Status Presentation +CAULEV

Table 129: CAULEV parameter command syntax

Command	Possible Response(s)
+CAULEV=[<mode>]	*+CME ERROR: <err>*
+CAULEV?	+CAULEV: <mode>,[<status>] *+CME ERROR: <err>*

| +CAULEV=? | +CAULEV: (list of supported <mode>s) |

Description

The set command enables or disables the presentation of uplink access status for an active VGCS call. When enabled the unsolicited response +CAULEV: <status> is returned from MT to TE whenever the call uplink status changes.

Read command returns the current uplink <status> and the selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>: status of unsolicited result response presentation

0 disabled (default)

1 enabled

<status>: network uplink access status

0 uplink free

1 uplink busy

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and VGCS is implemented.

11.1.6 List current Voice Group and Voice Broadcast Calls +CALCC

Table 130: +CALCC action command syntax

Command	Possible response(s)
+CALCC=<mode>	+CALCC: <GId>,<GCA>,<service>,<stat>,<dir>, <ack_flag>[,<priority>] [<CR><LF>+CALCC: <GId>,<GCA>,<service>, <stat>,<dir>,<ack_flag>[,<priority>] [...]] *+CME ERROR: <err>*
+CALCC=?	+CALCC: (list of supported <mode>s)

Description

The set command returns
for <mode>=1 the active voice group or voice broadcast call and
for <mode>=0 a list of all current running voice group and voice broadcast calls for which the user has a subscription and the GId is activated on the SIM. If the command succeeds but no calls are available, OK response is returned.

Defined values

<GId>: a digit string that specifies the group identification of the voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area of the voice group or voice broadcast call.

<service> (tele-service):

17 voice group call

18 voice broadcast call

<stat> (state of the call):

0　active, i.e. user participating at the call as talker or listener

1　held, the call is running but put to background, notifications ignored

2　incoming (MT call), the user doesn't respond to notifications of this call yet

`<dir>:`

0　mobile originated (MO) call, the user is the originator of the call

1　 mobile terminated (MT) call, the user is not the originator of the call

`<ack_flag>:` proposes that a predefined confirmation procedure is to be used after the call is ended

0　 confirmation procedure is not required

1　 confirmation procedure is required

`<priority>:` optional integer type parameter which identifies the priority level of the voice group or voice broadcast call, values specified in 3GPP TS 22.067 [54].

Implementation

Optional. Recommended for a ~~ME~~MT supporting AT commands only and VGCS or VBS is implemented.

11.1.7　Voice Group or Voice Broadcast Call State Attribute Presentation +CACSP

Table 131: CACCS parameter command syntax

Command	Possible Response(s)
+CACSP=[<mode>]	*+CME ERROR: <err>*
+CACSP?	+CACSP: <mode>[,<da>,<ua>,<comm>,<oi>] *+CME ERROR: <err>*
+CACSP=?	+CACSP: (list of supported <mode>s)

Description

The set command enables or disables the presentation of unsolicited result response +CACSP: `<da>,<ua>,<comm>,<oi>` from MT to TE if the call control state attributes of the active voice group or voice broadcast call changes.

Read command returns the current call control state attributes <da>,<ua>,<comm>,<oi> and selected <mode>.

The test command returns values supported as a compound value.

Defined Values

`<mode>:` status of unsolicited result response presentation

<u>0</u>　disabled (default)

1　enabled

`<da>:` User connection in the downlink

0　not attached

1　attached

`<ua>:` User connection in the uplink

0   not attached

1   attached

<comm>: The MT assumes that communication with its peer entity is

0   not enabled in both directions

1   enabled in both directions

<oi>: The ~~MS~~ MT assumes to be

0   not the originator of the call

1   the originator of the call

Implementation

Optional. Recommended for a ~~ME~~ MT supporting AT commands only and VGCS or VBS is implemented.

11.1.8   NCH Support Indication +CANCHEV

Table 132: CAULEV parameter command syntax

Command	Possible Response(s)
+CANCHEV=[<mode>]	*+CME ERROR: <err>*
+CANCHEV?	+CANCHEV: <status>,<mode> *+CME ERROR: <err>*
+CANCHEV=?	+CANCHEV: (list of supported <mode>s)

Description

The set command enables or disables the presentation of unsolicited result response +CANCHEV: <status> from MT to TE if the status of the network NCH support information changes.

Read command returns in parameter <status> the network NCH support information in the selected cell and the selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>: status of unsolicited result response presentation

0   disabled (default)

1   enabled

<status>: network NCH support information

0   NCH not available

1   NCH available

Implementation

Optional. Recommended for a ~~ME~~ MT supporting AT commands only and VGCS or VBS is implemented.

11.1.9 Originator to Dispatcher Information +COTDI

Table 133:+COTDI action command syntax

Command	Possible response(s)
+ COTDI =<message>[,<OTDIE>[,<message>[,<OTDIE>]]]	*+CME ERROR: <err>*
+ COTDI?	[+ COTDI: <message>,<OTDIE> [,<message>,<OTDIE>]]
+ COTDI=?	+ COTDI: (list of supported <message>s)

Description

This command allows control of the Originator-to-Dispatcher Information and Compressed Originator-to-Dispatcher Information according to GSM 44.068[52] and GSM 44.069[53].

When <message> and <OTDIE> are both present the string specified in <OTDIE> is included in the corresponding group or broadcast control <message> as the value part of the Originator-to-Dispatcher Information Element or Compressed Originator-to-Dispatcher Information Element (as defined in GSM 44.068[52] and GSM 44.069[53]) into all subsequent messages of type <message>. If parameter <message> is present but parameter <OTDIE> is not present then the Originator-to-Dispatcher Information Element shall not be present in sub-sequent messages of type <message>.

The read command returns the content of <message> and of <OTDIE>. If no <OTDIE> is available, no information text shall be returned.

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

Defined values

<message>

0   SETUP   message containing the outgoing Originator-to-Dispatcher Information Element

1   IMMEDIATE SETUP 2   message containing the outgoing Compressed Originator-to-Dispatcher Information Element

< OTDIE>: the Originator-to-Dispatcher Information Element or Compressed Originator-to-Dispatcher Information Element (as defined in GSM 44.068 [52] and GSM 44.069 [53]) in hexadecimal character format (for hexadecimal format, refer +CSCS).

Implementation

Optional.

11.2.1 Request VGCS or VBS service 'D'

Table 134: D command syntax

Command	Possible Response(s)
D*<SC$_1$>[*<SC$_2$>]#<GId>;	*+CME ERROR: <err>*

Description

This Dial command extension is a service request application according to 3GPP TS 22.030 [19]. No further commands may follow on the AT command line.

Responses

When the call has terminated, either as a result of an orderly termination or an error, the ~~ME~~MT shall return the NO CARRIER final result code.

Possible error responses include +CME ERROR: <err> when error is related to ~~ME~~MT functionality. The requested service, GId and priority level are checked against the subscriptions of the user and the status of the GId stored on the SIM. In case if no subscription is available for this service, GId or priority level or the GId is deactivated an ERROR or +CMEE ERROR result code is returned. See +CMEE ERROR extensions for VGCS, VBS and eMLPP in subclause 9.2.

Detailed error report of an unsuccessful originated call can be obtained with command Extended Error Report +CEER (if implemented).

NOTE. The dial string conforms to the syntax specified in 3GPP TS 22.030 [19].

Defined Values

<SC$_1$>: Service Code is a digit string which identifies a request to use
  value 17   Voice Group Call Service
  value 18   Voice Broadcast Service

<SC$_2$>: Service Code is a digit string which identifies a request to use eMLPP priority . Service Code values for different priority levels are specified in 3GPP TS 22.030 [19]

<GId>: a digit string that specifies the group identification of a called party.

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and VGCS or VBS is implemented.

11.2.2 Termination of an Voice Group or Voice Broadcast Call 'H'

The V.25ter 'H' or 'H0' (On-hook) command may be used to terminate an ongoing voice group or voice broadcast call. The MT responds with OK. It is an error to issue the 'H' command when there is no outstanding network request.

It is an error to issue the 'H' command if the user is in group receive mode or the user is not the originator of the call and a ERROR or +CME ERROR result code is returned to the TE.

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

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and VGCS or VBS is implemented.

11.3.1 VGCS subscriptions and GId status +CGCS

Table 135: +CGCS action command syntax

Command	Possible response(s)
+CGCS=<GId>,<status>	*+CME ERROR: <err>*
+CGCS?	+CGCS: <GId>,<status><CR><LF> [+CGCS: <GId>,<status><CR><LF> [...]] *+CME ERROR: <err>*
+CGCS=?	+CGCS: (list of supported <GId>s), (list of supported <status>s)

Description

This command works with SIM Card and when the GSM Application is selected in UICC. Function with USIM is for further study. The set command is used to edit the status of the GId EF$_{VGCSS}$ on the SIM. The read command returns all subscribed GIds in EF$_{VGCS}$ and their status in EF$_{VGCSS}$ from the SIM.

Defined values

<GId> integer type, group Id as specified in 3GPP TS 22.030 [19]

<status>: integer type, value

    0   deactivated

    1   activated

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and supporting VGCS.

11.3.2   VBS subscriptions and GId status +CBCS

Table 136: +CBCS action command syntax

Command	Possible response(s)
+CBCS=<GId>,<status>	*+CME ERROR: <err>*
+CBCS?	+CBCS: <GId>,<status><CR><LF> [+CBCS: <GId>,<status><CR><LF> [...]] *+CME ERROR: <err>*
+CBCS=?	+CBCS: (list of supported <GId>s),(list of supported <status>s)

Description

This command works with SIM Card and when the GSM Application is selected in UICC. Function with USIM is for further study. The set command is used to edit the status of the GId EF$_{VBSS}$ on the SIM. The read command returns all subscribed GIds in EF$_{VBS}$ and their status in EF$_{VBSS}$ from the SIM.

Defined values

<GId> integer type, group Id as specified in 3GPP TS 22.030 [19]

<status>: integer type, value

    0   deactivated

    1   activated

Implementation

Mandatory for a ~~ME~~MT supporting AT commands only and supporting VBS.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **27.007** CR **083** | ⌘ ev | **-** | ⌘ | Current version: | **4.3.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title: ⌘	Alignment of UE architecture with 23.101	
Source: ⌘	T2	
Work item code: ⌘	TI-ATC	***Date:*** ⌘ 2002-02-05
Category: ⌘	**A**	***Release:*** ⌘ REL-4

Use <u>one</u> of the following categories:
 F *(correction)*
 A *(corresponds to a correction in an earlier release)*
 B *(addition of feature),*
 C *(functional modification of feature)*
 D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP <u>TR 21.900</u>.

Use <u>one</u> of the following releases:
 2 *(GSM Phase 2)*
 R96 *(Release 1996)*
 R97 *(Release 1997)*
 R98 *(Release 1998)*
 R99 *(Release 1999)*
 REL-4 *(Release 4)*
 REL-5 *(Release 5)*

Reason for change: ⌘	Alignment of the abstract architecture with the General UMTS Architecture specification 23.101
Summary of change: ⌘	Corrections made to use the correct terms ME, MT, TA and UE. The term ME has been replaced by MT and MS by UE, when applicable. UE abbreviation added. Reference to 23.101 added.
Consequences if not approved: ⌘	Inconsistent specifications and incorrect UE architecture

Clauses affected: ⌘	1, 2, 3.2, 4.1, 5, 5.1- 5.7, 5.9, 5.10, 6.1- 6.5, 6.7- 6.12, 6.17- 6.19, 6.21- 6.23, 6.27, 7, 7.1- 7.9, 7.11- 7.13, 7.15- 7.19, 7.21, 7.22- 7.27, 8, 8.1- 8.23, 8.25- 8.42, 9, 9.1- 9.3, 10.1.18, 10.1.19, 11.1.1- 11.1.9, 11.2.1, 11.3.1, 11.3.2

Other specs Affected: ⌘	☐	Other core specifications ⌘	
	☐	Test specifications	
	☐	O&M Specifications	

Other comments: ⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1 Scope

The present document specifies a profile of AT commands and recommends that this profile be used for controlling Mobile Termination (MT)Equipment (ME) functions and GSM/UMTS 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]. The present document has also the syntax details used to construct these extended GSM/UMTS 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 MT of networks other than GSM/UMTS. ITU-T T.31 [11] and T.32 [12] fax AT commands may be used for GSM/UMTS fax transmission from TE. GSM/UMTS Short Message Service AT commands are defined in 3GPP TS 27.005 [24]. GPRS AT commands are defined in clause 10 of this specification. The present document assumes an abstract architecture comprising a TE (e.g. a computer) and a MT 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, MT ME and TE as three separate entities;

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

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

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

The commands described in the present document may be observed on the link between the TE and the TA. However, most of the commands retrieve information about the MTME, not about the TA.
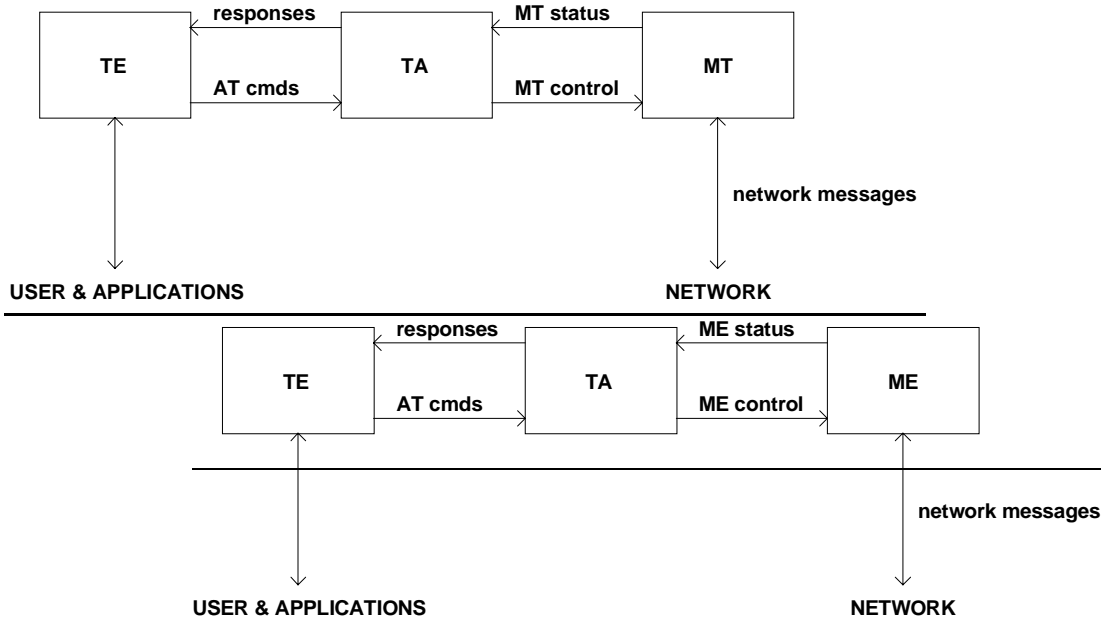

Figure 1: Setup

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 MT is dependent on the interface in the MTME.

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1]   3GPP TS 22.002: "3rd Generation Partnership Project; Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[2]   3GPP TS 22.003: "3rd Generation Partnership Project; Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[3]   3GPP TS 22.081: "3rd Generation Partnership Project; Line identification supplementary services - Stage 1".

[4]   3GPP TS 22.082: "3rd Generation Partnership Project; Call Forwarding (CF) supplementary services - Stage 1".

[5]   3GPP TS 22.083: "3rd Generation Partnership Project; Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[6]   3GPP TS 22.088: "3rd Generation Partnership Project; Call Barring (CB) supplementary services - Stage 1".

[7]   3GPP TS 23.003: "3rd Generation Partnership Project; Numbering, addressing and identification".

[8]   3GPP TS 24.008: "3rd Generation Partnership Project; Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".

[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]   3GPP TS 24.022: "3rd Generation Partnership Project; 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] 3GPP TS 22.030: "3rd Generation Partnership Project; Man Machine Interface (MMI) of the Mobile Station (MS)".

[20] 3GPP TS 45.008: "Digital cellular telecommunication system (Phase 2+); Radio subsystem link control".

[21] 3GPP TS 22.085: "3rd Generation Partnership Project; Closed User Group (CUG) supplementary services - Stage 1".

[22] 3GPP TS 22.084: "3rd Generation Partnership Project; MultiParty (MPTY) supplementary services - Stage 1".

[23] 3GPP TS 22.090: "3rd Generation Partnership Project; Unstructured Supplementary Service Data (USSD) - Stage 1".

[24] 3GPP TS 27.005: "3rd Generation Partnership Project; Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[25] 3GPP TS 23.038: "3rd Generation Partnership Project; Alphabet and language specific information".

[26] 3GPP TS 22.024: "3rd Generation Partnership Project; Description of Charge Advice Information (CAI)".

[27] 3GPP TS 22.086: "3rd Generation Partnership Project; Advice of Charge (AoC) supplementary services - Stage 1".

[28] 3GPP TS 51.011: "Digital cellular telecommunication system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".

[29] 3GPP TS 22.034: "3rd Generation Partnership Project; High Speed Circuit Switched Data (HSCSD) - Stage 1".

[30] 3GPP TS 22.091: "3rd Generation Partnership Project; Explicit Call Transfer (ECT) supplementary service - Stage 1".

[31] 3GPP TS 22.072: "3rd Generation Partnership Project; Call Deflection (CD) supplementary service - Stage 1".

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

[33] 3GPP TS 22.022: "3rd Generation Partnership Project; Personalization of GSM Mobile Equipment (ME) Mobile functionality specification".

[34] 3GPP TS 27.060: "3rd Generation Partnership Project; 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] 3GPP TS 45.005: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".

[39] 3GPP TS 29.061: "3rd Generation Partnership Project; General Packet Radio Service (GPRS); Interworking between the Public Land Mobile Network (PLMN) supporting GPRS and Packet Data Networks (PDN)".

[40] 3GPP TS 23.081: "3rd Generation Partnership Project; Technical Specification Group Core Network; Line identification supplementary services - Stage 2".

[41]   3GPP TS 27.001: "3rd Generation Partnership Project; Technical Specification Group Core Network; General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[42]   3GPP TS 29.007: "3rd Generation Partnership Project; Technical Specification Group Core Network; General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[43]   Infrared Data Association; Specification of Ir Mobile Communications (IrMC).

[44]   IrDA Object Exchange Protocol.

[45]   3GPP TS 27.010: "3rd Generation Partnership Project; Terminal Equipment to User Equipment (TE-UE) multiplexer protocol User Equipment (UE)".

[46]   3GPP TS 23.107: "3rd Generation Partnership Project; Quality of Service, Concept and Architecture".

[47]   3GPP TS 23.060: "3rd Generation Partnership Project; General Packet Radio Service (GPRS) Service description; Stage 2".

[48]   3GPP TS 23.067: "3rd Generation Partnership Project; Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 2".

[49]   3GPP TS 43.068: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 2".

[50]   3GPP TS 43.069: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 2".

[51]   3GPP TS 24.067: "3rd Generation Partnership Project; Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 3".

[52]   3GPP TS 44.068: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 3".

[53]   3GPP TS 44.069: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 3".

[54]   3GPP TS 22.067: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 1".

[55]   3GPP TS 42.068: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 1".

[56]   3GPP TS 42.069: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 1".

[57]   void

[58]   3GPP TS 22.087: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects;User-to-User Signalling (UUS) - Stage 1"

[59]   3GPP TS 31.102: "3rd Generation Partnership Project; Technical Specification Group Terminals; Characteristics of the USIM Application".

[60]   ETSI TS 102 221 "Smart Cards; UICC-Terminal interface; Physical and logical characteristics (Release 1999)".

[61]   3GPP TS 44.065: "3rd Generation Partnership Project; General Packet Radio Service (GPRS); Mobile Station (MS) – Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)".

[62]   3GPP TS 25.323: "3rd Generation Partnership Project; Packet Data Convergence Protocol (PDCP)".

[63]	3GPP TS 23.101: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; General UMTS Architecture "
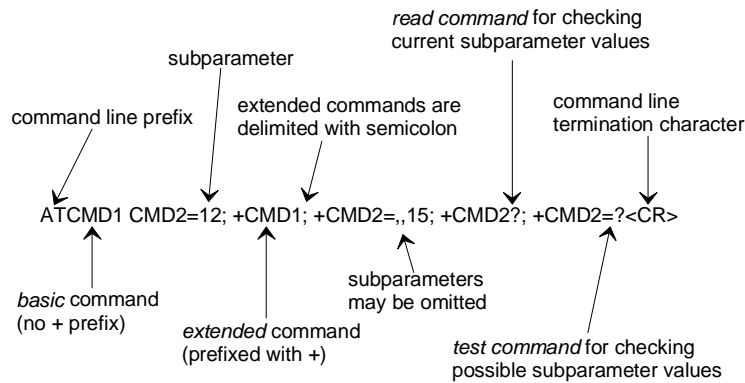
3.2 Abbreviations

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

AT	ATtention; this two-character abbreviation is always used to start a command line to be sent from TE to TA
ASCI	Advanced Speech Call Items, including VGCS, VBS and eMLPP
BCD	Binary Coded Decimal
eMLPP	Enhanced Multi-Level Precedence and Pre-emption Service
ETSI	European Telecommunications Standards Institute
FTM	Frame Tunnelling Mode (refer 3GPP TS 27.001 [41] and 3GPP TS 29.007[42])
HSCSD	High Speed Circuit Switched Data
IMEI	International Mobile station Equipment Identity
IRA	International Reference Alphabet (ITU-T T.50 [13])
IrDA	Infrared Data Association
ISO	International Standards Organization
ITU-T	International Telecommunication Union - Telecommunications Standardization Sector
ME	Mobile Equipment, e.g. a GSM phone (equal to MS; Mobile Station)
MoU	Memorandum of Understanding (GSM operator joint)
MT	Mobile Termination
PCCA	Portable Computer and Communications Association
PTT	Push to Talk
RDI	Restricted Digital Information
RLP	Radio Link Protocol
SIM	Subscriber Identity Module
TA	Terminal Adaptor, e.g. a GSM data card (equal to DCE; Data Circuit terminating Equipment)
TE	Terminal Equipment, e.g. a computer (equal to DTE; Data Terminal Equipment)
TIA	Telecommunications Industry Association
UDI	Unrestricted Digital Information
UE	User Equipment
UICC	Universal Integrated Circuit Card
USIM	Universal Subscriber Identity Module
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service

4.1 Command line

See figure 2 for general structure of a command line. Standardized *basic* commands are found only in V.25ter [14]. GSM/UMTS commands use syntax rules of *extended* commands. 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. *Parameter type* commands also have a *read command* (trailing ?) to check the current values of subparameters. *Action type* commands do not store the values of any of their possible subparameters, and therefore do not have a read command.

read command for checking
current subparameter values

subparameter

command line prefix

extended commands are
delimited with semicolon

command line
termination character

ATCMD1 CMD2=12; +CMD1; +CMD2=,,15; +CMD2?; +CMD2=?<CR>

basic command
(no + prefix)

extended command
(prefixed with +)

subparameters
may be omitted

test command for checking
possible subparameter values

Figure 2: Basic structure of a command line

If verbose responses are enabled with command `V1` and all commands in a command line has been performed successfully, result code `<CR><LF>OK<CR><LF>` is sent from the TA to the TE. If numeric responses are enabled with command `V0`, result code `0<CR>` is sent instead.

If verbose responses are enabled with command `V1` and subparameter values of a command are not accepted by the TA (or command itself is invalid, or command cannot be performed for some reason), result code `<CR><LF>ERROR<CR><LF>` is sent to the TE and no subsequent commands in the command line are processed. If numeric responses are enabled with command `V0`, result code `4<CR>` is sent instead. ERROR (or 4) response may be replaced by `+CME ERROR: <err>` (refer clause 9) when command was not processed due to an error related to ~~ME~~ MT operation.

5 General commands

ITU-T Recommendation V.25ter [14] includes "Generic DCE Control" commands with the prefix +G. These commands are for the identification of the TA. Four of those commands are adapted here to be the identification commands of the MT~~ME~~. Syntax is otherwise similar but the prefix is +CG. TIA IS-99 [15] uses same commands for base station identification.

5.1 Request manufacturer identification +CGMI

Table 2: +CGMI action command syntax

Command	Possible response(s)
+CGMI	`<manufacturer>`
	`+CME ERROR: <err>`
+CGMI=?	

Description

Execution command causes the TA to return one or more lines of information text `<manufacturer>`, determined by the MT ~~ME~~ manufacturer, which is intended to permit the user of the TA to identify the manufacturer of the MT ~~ME~~ to which it is connected to. Typically, the text will consist of a single line containing the name of the manufacturer, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

`<manufacturer>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.2 Request model identification +CGMM

Table 3: +CGMM action command syntax

Command	Possible response(s)
+CGMM	`<model>`
	+CME ERROR: <err>
+CGMM=?	

Description

Execution command causes the TA to return one or more lines of information text `<model>`, determined by the <u>MT</u> <s>ME</s> manufacturer, which is intended to permit the user of the TA to identify the specific model of the <u>MT</u> <s>ME</s> to which it is connected to. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide more information if desired. Refer to subclause 9.2 for possible `<err>` values.

Defined values

    `<model>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.3 Request revision identification +CGMR

Table 4: +CGMR action command syntax

Command	Possible response(s)
+CGMR	`<revision>`
	+CME ERROR: <err>
+CGMR=?	

Description

Execution command causes the TA to return one or more lines of information text `<revision>`, determined by the <u>MT</u> <s>ME</s> manufacturer, which is intended to permit the user of the TA to identify the version, revision level or date, or other pertinent information of the <u>MT</u> <s>ME</s> to which it is connected to. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

    `<revision>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.4   Request product serial number identification +CGSN

Table 5: +CGSN action command syntax

Command	Possible response(s)
+CGSN	`<sn>`
	`+CME ERROR: <err>`
+CGSN=?	

Description

Execution command causes the TA to return one or more lines of information text `<sn>`, determined by the MT ~~ME~~ manufacturer, which is intended to permit the user of the TA to identify the individual MT ~~ME~~ to which it is connected to. Typically, the text will consist of a single line containing the IMEI (International Mobile station Equipment Identity; refer 3GPP TS 23.003 [7]) number of the MT~~ME~~, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

> `<sn>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.5   Select TE character set +CSCS

Table 6: +CSCS parameter command syntax

Command	Possible response(s)
+CSCS=[`<chset>`]	
+CSCS?	`+CSCS: <chset>`
+CSCS=?	`+CSCS: (list of supported <chset>s)`

Description

Set command informs TA which character set `<chset>` is used by the TE. TA is then able to convert character strings correctly between TE and MT ~~ME~~ character sets.

When TA-TE interface is set to 8-bit operation and used TE alphabet is 7-bit, the highest bit shall be set to zero.

> NOTE 1: It is manufacturer specific how the internal alphabet of MT ~~ME~~ is converted to/from the TE alphabet.

Read command shows current setting and test command displays conversion schemes implemented in the TA.

Defined values

> `<chset>` (conversion schemes not listed here can be defined by manufacturers):

"GSM"   GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems

"HEX"   character strings consist only of hexadecimal numbers from 00 to FF; e.g. "032FE6" equals three 8-bit characters with decimal values 3, 47 and 230; no conversions to the original MT ~~ME~~ character set shall be done.

NOTE 2: If <u>MT</u> <s>ME</s> is using GSM 7 bit default alphabet, its characters shall be padded with 8th bit (zero) before converting them to hexadecimal numbers (i.e. no SMS-style packing of 7-bit alphabet).

<u>"IRA"</u> international reference alphabet (ITU-T T.50 [13])

"PCCP*xxx*" PC character set Code Page *xxx*

"PCDN" PC Danish/Norwegian character set

"UCS2" 16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99

"8859-*n*" ISO 8859 Latin *n* (1-6) character set

"8859-C" ISO 8859 Latin/Cyrillic character set

"8859-A" ISO 8859 Latin/Arabic character set

"8859-G" ISO 8859 Latin/Greek character set

"8859-H" ISO 8859 Latin/Hebrew character set

Implementation

Mandatory when a command using the setting of this command is implemented.

5.6 Request international mobile subscriber identity +CIMI

Table 7: +CIMI action command syntax

Command	Possible response(s)
+CIMI	<IMSI>
	+CME ERROR: <err>
+CIMI=?	

Description

Execution command causes the TA to return <IMSI>, which is intended to permit the TE to identify the individual SIM card or active application in the UICC (GSM or USIM) which is attached to <u>MT</u><s>ME</s>. Refer subclause 9.2 for possible <err> values.

Defined values

<IMSI>: International Mobile Subscriber Identity (string without double quotes)

Implementation

Optional.

5.7 Multiplexing mode +CMUX

Table 8: +CMUX parameter command syntax

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

Description

This command is used to enable/disable the 3GPP TS 27.010 [45] multiplexing protocol control channel. Refer to subclause 9.2 for possible <err> values. The AT command sets parameters for the Control Channel. If the parameters are left out, the default value is used.

Read command returns the current mode and the settings.

Test command returns the supported modes and parameters.

It is recommended that the MT~~ME~~/TA/TE should autobaud to the +CMUX command up to and including an interface speed of 9600 bits/s.

The OK or +CME ERROR: <err> response is returned at the speed of the +CMUX command prior to entering <mode>.

It is recommended that whenever the multiplexer control channel is released the MT~~ME~~/TA/TE should assume an interface rate of up to and including 9600 bits/s for auto bauding purposes irrespective of any previous higher speed having been selected.

If a +CMUX command is issued whilst in any multiplexer mode then that +CMUX command shall be ignored and the MT~~ME~~/TA shall return an +CME ERROR: <err> response.

Defined values

<operation> (multiplexer Transparency Mechanism)

0 Basic option

1 Advanced option

<subset>:

This parameter defines the way in which the multiplexer **control channel** is set up. A virtual channel may subsequently be set up differently but in the absence of any negotiation for the settings of a virtual channel, the virtual channel shall be set up according to the control channel <subset> setting.

0 UIH frames used only

1 UI frames used only

2 I frames used only

Default value: 0

`<port_speed>` (transmission rate):

1   9 600 bit/s

2   19 200 bit/s

3   38 400 bit/s

4   57 600 bit/s

5   115 200 bit/s

6   230 400 bits/s

`<N1>` (maximum frame size):

1- 32768

default Value : 31 (64 if Advanced option is used)

`<T1>` (acknowledgement timer in units of ten milliseconds):

1-255, where 10 is default (100 ms)

`<N2>` (maximum number of re-transmissions):

0-100, where 3 is default

`<T2>` (response timer for the multiplexer control channel in units of ten milliseconds):

2-255, where 30 is default (300 ms)

NOTE: T2 must be longer than T1.

`<T3>` (wake up response timer in seconds):

1-255, where 10 is default

`<k>` (window size, for Advanced operation with Error Recovery options):

1-7, where 2 is default

Implementation

Mandatory, if 3GPP TS 27.010 [45] supported in the MTME/TA.

5.9   PCCA STD-101 [17] select wireless network +WS46

PCCA STD-101 [17] includes a command to select the cellular network (Wireless Data Service; WDS) to operate with the MT/TA. PCCA calls this as WDS-Side Stack Selection. This command may be used when MT/TA is asked to indicate the networks in which it can operate.

Table 10: +WS46 parameter command syntax

Command	Possible response(s)
`+WS46=[<n>]`	
`+WS46?`	`<n>`
`+WS46=?`	`(list of supported <n>s)`

Description

Set command selects to WDS side stack `<n>` to be used by the MT/TA. Read command shows current setting and test command displays side stacks implemented in the MT/TA.

Defined values

`<n>`:

12 GSM digital cellular

refer PCCA STD-101 [17] for other values

Implementation
Mandatory in PCCA STD-101, but optional for GSM/UMTS.

5.10   Informative examples

When beginning to build a communication link, a general TE application controlling a TA needs to determine the TA and the MT ME to which it is connected. V.25ter [14] has seven commands for TA identification from which four are mandatory to be implemented in a TA. An example of this command sequence requesting manufacturer (`+GMI`), model (`+GMM`), revision (`+GMR`) and serial number (`+GSN`) information would be:

```
AT+GMI
Manufacturer ABC
OK
AT+GMM
GSM Ultimate Data Device
OK
AT+GMR
1.00
OK
AT+GSN
987612345-123
OK
```

The maximum lengths of the information responses are defined to be 2048 characters, but it is recommended that they are kept as simple as in the example. The serial number command is defined as optional. Another optional command is Global Object Identification command (`+GOI`) which should return the object identifiers of ITU-T Recommendation X.208 as numeric strings delimited by periods. The Complete Capabilities List command (`+GCAP`) should indicate the major capability areas of the TA. The support of different areas is presented in the response of `+GCAP` command. Each area may be presented by the selection command name of a specific capability area (e.g. `+FCLASS` for fax support) or some other predefined response. For instance, a GSM TA with fax capabilities could respond as follows:

```
AT+GCAP
+GCAP: +CGSM,+FCLASS,+W
OK
```

The first supported area in the response is presented with `+CGSM`. It is the response text to show that some or all GSM commands of the present document are supported. Second response text (`+FCLASS`) informs that some fax or voice capabilities are present, and the third text (`+W`) about the presence of wireless commands as specified by PCCA

STD-101 [17]. Command +FCLASS=? (refer e.g. ITU-T T.31 [11] and T.32 [12]) should be used to query the supported fax capabilities and +WS46=? to query the wireless data services available:

```
AT+FCLASS=?;+WS46=?
0,1,2,2.0
(12)
OK
```

The TA of this example supports GSM data services, and fax service class 1 (TIA-578-A), 2 (manufacturer specific) and 2.0 (ITU-T T.32 [12]/ TIA-592).

The present document defines commands for MT ~~ME~~ identification which are similar to those for TA identification in V.25ter [14], for an example:

```
AT+CGMI
Mobile Manufacturer XYZ
OK
AT+CGMM
GSM Phone 1234
OK
AT+CGMR
1.00
OK
AT+CGSN
123456121234561
OK
```

Manufacturer, model and version commands work similarly as for TA, except that the serial number query returns the International Mobile Station Equipment Identity (IMEI) number. IMEI is fifteen digits long and consists of a type approval code, a final assembly code, a serial number and a spare digit (refer 3GPP TS 23.003 [7]). When the TA is implemented inside MT~~ME~~, the responses for both TA and MT ~~ME~~ queries will most likely follow the responses of MT ~~ME~~ identification.

6.1   Select type of address +CSTA

Table 11: +CSTA parameter command syntax

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

Description

Set command selects the type of number for further dialling commands (D) according to GSM/UMTS specifications. Test command returns values supported ~~by the TA~~ as a compound value.

Defined values

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

Implementation

Mandatory when other than default value allowed.

6.2   ITU-T V.25ter [14] dial command D

V.25ter [14] dial command D lists characters that may be used in a dialling string for making a call or controlling supplementary services in accordance with 3GPP TS 22.030 [19]. Their use in GSM/UMTS is listed in this subclause, as well as new dial modifiers applicable only to GSM/UMTS are introduced. For a MT ~~ME~~ supporting AT commands only, it is mandatory to support the control of supplementary services in accordance with 3GPP TS 22.030 [19] through

the dial command or through the specific supplementary service commands (+CCFC, +CLCK, etc.), where 3GPP TS 22.030 [19] identifies the supplementary services as mandatory.

V.25ter dialling digits

1 2 3 4 5 6 7 8 9 0 * # + A B C (implementation of these characters is mandatory for GSM/UMTS)

D (implementation of this character is optional for GSM/UMTS, and it is ignored)

V.25ter modifier characters

, (implementation of this character is mandatory for GSM/UMTS, but it may be ignored)

T P (implementation of these characters is mandatory for GSM/UMTS, but they are ignored)

! W @ (implementation of these characters is optional for GSM/UMTS, and they are ignored)

V.25ter semicolon character

In GSM/UMTS, when semicolon character is given after dialling digits (or modifiers), a voice call originated to the given address. TA returns to command state immediately (or after possible +COLP result code; refer subclause "Connected line identification presentation +COLP"). Refer Annex G for a detailed example.

GSM/UMTS modifier characters

> (refer subclause "Direct dialling from phonebooks")

I or i (override the CLIR supplementary service subscription default value for this call; I = invocation (restrict CLI presentation) and i = suppression (allow CLI presentation); refer subclause "Calling line identification restriction +CLIR")

G or g (control the CUG supplementary service information for this call; uses index and info values set with command +CCUG; refer subclause "Closed user group +CCUG")

6.3 Direct dialling from phonebooks

GSM/UMTS MT/TA ~~ME~~ and SIM/UICC can contain phonebooks which have a phone number and an alphanumeric field for each phonebook entry location. The use of V.25ter [14] dialling command ensures that direct dialling from MT/TA ~~ME~~ and SIM/UICC phonebook is possible through ordinary communications software which just gives the phone number field to be filled and then use the D command to originate the call. Available memories may be queried with Select Phonebook Storage test command +CPBS=?, and location range for example with Read Phonebook Entries test command +CPBR=?.

Execute commands

1. D><str>[I][G][;]   originate call to phone number which corresponding alphanumeric field is <str> (if possible, all available memories should be searched for the correct entry).

2. D>*mem*<n>[I][G][;]   originate call to phone number in memory *mem* entry location <n> (available memories may be queried with Select Phonebook Storage test command +CPBS=?; *mem* could be e.g. ME).

3. D><n>[I][G][;]   originate call to phone number in entry location <n> (it is manufacturer specific which memory storage of MT~~ME~~, SIM/UICC and TA is used; command Select Phonebook Memory Storage +CPBS setting is recommended to be used).

Semicolon character shall be added when voice call is originated. CLIR and CUG per call base modifiers may also be present.

Responses

Possible error responses include +CME ERROR: <err> when error is related to MT ~~ME~~ functionality. Refer subclause 9.2 for possible error values. Otherwise TA responses can have values defined by V.25ter [14] and

commands Service Reporting Control +CR and Connected Line Identification Presentation +COLP. Detailed error report of an unsuccessful originated call failed in a GSM/UMTS network error can be obtained with command Extended Error Report +CEER (if implemented).

Defined values

<str>: string type value, which should equal to an alphanumeric field in at least one phonebook entry in the searched memories; used character set should be the one selected with Select TE Character Set +CSCS

<n>: integer type memory location should be in the range of locations available in the memory used

Implementation

Mandatory when direct dialling is implemented. Also phonebook commands implementation is required.

6.4 Call mode +CMOD

Table 12: +CMOD parameter command syntax

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

Description

Set command selects the call mode of further dialling commands (D) or for next answering command (A). Mode can be either single or alternating (in the present document, terms "alternating mode" and "alternating call" refer to all GSM/UMTS bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call). When single mode is selected the call originating and hangup procedures are similar to procedures specified in ITU-T Recommendations V.25ter [14], T.31 [11] and T.32 [12]. In GSM/UMTS there can be voice followed by data (refer 3GPP TS 22.002 [1]), alternating voice/data (refer 3GPP TS 22.002 [1]) and alternating voice/fax calls (refer 3GPP TS 22.003 [2]). Refer next two subclauses for alternating call control methods.

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

NOTE: +CMOD shall be set to zero after a successfully completed alternating mode call. It shall be set to zero also after a failed answering. The power-up, factory (&F) and user resets (Z) shall also set the value to zero. This reduces the possibility that alternating mode calls are originated or answered accidentally.

Defined values

<mode>:

0   single mode

1   alternating voice/fax (teleservice 61)

2   alternating voice/data (bearer service 61)

3   voice followed by data (bearer service 81)

also all other values below 128 are reserved by the present document

Implementation

Mandatory when alternating mode calls are implemented in the TA.

6.5 Hangup call +CHUP

Table 13: +CHUP action command syntax

Command	Possible response(s)
+CHUP	
+CHUP=?	

Description

Execution command causes the TA to hangup the current GSM/UMTS call of the MTME.

NOTE: The purpose of this command is not to replace the V.25ter [14] command H, but to give an assured procedure to terminate an alternating mode call. Refer next subclause.

Implementation

Mandatory when alternating mode calls implemented in the TA.

6.7 Select bearer service type +CBST

Table 14: +CBST parameter command syntax

Command	Possible response(s)
+CBST=[<speed>[,<name>[,<ce>]]]	
+CBST?	+CBST: <speed>,<name>,<ce>
+CBST=?	+CBST: (list of supported <speed>s),(list of supported <name>s),(list of supported <ce>s)

Description

Set command selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated (refer 3GPP TS 22.002 [1]). Values may also be used during mobile terminated data call setup, especially in case of single numbering scheme calls (refer +CSNS).

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

Defined values

NOTE: The default values of the subparameters are manufacturer specific since they depend on the purpose of the device and data services provided by it. Not all combinations of these subparameters are supported by GSM/UMTS (refer 3GPP TS 22.002 [1]).

<speed>:

0	autobauding (automatic selection of the speed; this setting is possible in case of 3.1 kHz modem and non-transparent service)
1	300 bps (V.21)
2	1200 bps (V.22)
3	1200/75 bps (V.23)
4	2400 bps (V.22bis)
5	2400 bps (V.26ter)
6	4800 bps (V.32)
7	9600 bps (V.32)
12	9600 bps (V.34)
14	14400 bps (V.34)
15	19200 bps (V.34)
16	28800 bps (V.34)
17	33600 bps (V.34)
34	1200 bps (V.120)
36	2400 bps (V.120)
38	4800 bps (V.120)
39	9600 bps (V.120)
43	14400 bps (V.120)
47	19200 bps (V.120)
48	28800 bps (V.120)
49	38400 bps (V.120)
50	48000 bps (V.120)
51	56000 bps (V.120)
65	300 bps (V.110)
66	1200 bps (V.110)
68	2400 bps (V.110 or X.31 flag stuffing)
70	4800 bps (V.110 or X.31 flag stuffing)
71	9600 bps (V.110 or X.31 flag stuffing)
75	14400 bps (V.110 or X.31 flag stuffing)
79	19200 bps (V.110 or X.31 flag stuffing)
80	28800 bps (V.110 or X.31 flag stuffing)
81	38400 bps (V.110 or X.31 flag stuffing)
82	48000 bps (V.110 or X.31 flag stuffing)

83	56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM)
84	64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)
115	56000 bps (bit transparent)
116	64000 bps (bit transparent)
120	32000 bps (PIAFS32k)
121	64000 bps (PIAFS64k)
130	28800 bps (multimedia)
131	32000 bps (multimedia)
132	33600 bps (multimedia)
133	56000 bps (multimedia)
134	64000 bps (multimedia)

also all other values below 128 are reserved by the present document.

`<name>`:

0	data circuit asynchronous (UDI or 3.1 kHz modem)
1	data circuit synchronous (UDI or 3.1 kHz modem)
2	PAD Access (asynchronous) (UDI)
3	Packet Access (synchronous) (UDI)
4	data circuit asynchronous (RDI)
5	data circuit synchronous (RDI)
6	PAD Access (asynchronous) (RDI)
7	Packet Access (synchronous) (RDI)

also all other values below 128 are reserved by the present document.

`<ce>`:

0	transparent
1	non-transparent
2	both, transparent preferred
3	both, non-transparent preferred

Implementation

Mandatory when data calls implemented.

6.8 Radio link protocol +CRLP

Table 15: +CRLP parameter command syntax

Command	Possible response(s)
+CRLP=[<iws>[,<mws>[,<T1>[,<N2>[,<ver>[,<T4>]]]]]]	
+CRLP?	+CRLP: <iws>,<mws>,<T1>,<N2>[,<ver1>[,<T4>]] [<CR><LF>+CRLP: <iws>,<mws>,<T1>,<N2>[,<ver2>[,<T4>]] [...]]
+CRLP=?	+CRLP: (list of supported <iws>s),(list of supported <mws>s), (list of supported <T1>s),(list of supported <N2>s)[,<ver1> [,(list of supported <T4>s)]] [<CR><LF>+CRLP: (list of supported <iws>s),(list of supported <mws>s),(list of supported <T1>s),(list of supported <N2>s) [,<ver1>[,(list of supported <T4>s)]] [...]]

Description

Radio link protocol (RLP) parameters used when non-transparent data calls are originated may be altered with set command. Available command subparameters depend on the RLP versions implemented by the device (e.g. `<ver>` may not be available if device supports only versions 0 and 1).

NOTE 1: If radio link protocol is not used, but some other error correcting protocol (for transparent data calls), V.25ter [14] Error Control Selection test command `+ES=?` may be used to indicate the presence of the protocol.

Read command returns current settings for each supported RLP version `<verx>`. Only RLP parameters applicable to the corresponding `<verx>` are returned.

Test command returns values supported by the TA as a compound value. If MTME/TA supports several RLP versions `<verx>`, the RLP parameter value ranges for each `<verx>` are returned in a separate line.

Defined values

`<ver>`, `<verx>`: RLP version number in integer format; when version indication is not present it shall equal 0

NOTE 2: Versions 0 and 1 share the same parameter set. Read and test commands shall return only one line for this set (where `<verx>` is not present).

`<iws>`, `<mws>`, `<T1>`, `<N2>`, `<T4>`: IWF to MS window size, MS to IWF window size, acknowledgement timer T1, retransmission attempts N2, re-sequencing period T4 in integer format (default values and value ranges depend on RLP version; refer 3GPP TS 24.022 [18]): T1 and T4 are in units of 10 ms.

Implementation

Mandatory when RLP implemented.

6.9   Service reporting control +CR

Table 16: +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/UMTS 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>`:

<u>0</u>   disables reporting

1   enables reporting

`<serv>`:

ASYNC   asynchronous transparent

SYNC   synchronous transparent

REL ASYNC   asynchronous non-transparent

REL SYNC   synchronous non-transparent

GPRS [<L2P>]   GPRS

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 17: +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 MT ~~ME~~ manufacturer, which should offer the user of the TA an extended report of the reason for

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

- the 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 cause information given by GSM/UMTS 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 18: +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 or notification for VBS/VGCS calls 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 [,<priority>[,<subaddr>,<satype>]]		asynchronous transparent

SYNC [,<priority>[,<subaddr>,<satype>]]		synchronous transparent

REL ASYNC [,<priority>[,<subaddr>,<satype>]]		asynchronous non-transparent

REL SYNC [,<priority>[,<subaddr>,<satype>]]		synchronous non-transparent

FAX [,<priority>[,<subaddr>,<satype>]]		facsimile (TS 62)

VOICE [,<priority>[,<subaddr>,<satype>]]		normal voice (TS 11)

VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]]		voice followed by data (BS 81) (*XXX* is ASYNC,
		SYNC, REL ASYNC or REL SYNC)

ALT VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]]	alternating voice/data, voice first (BS 61)

ALT *XXX*/VOICE [,<priority>[,<subaddr>,<satype>]]	alternating voice/data, data first (BS 61)

ALT VOICE/FAX [,<priority>[,<subaddr>,<satype>]]	alternating voice/fax, voice first (TS 61)

ALT FAX/VOICE [,<priority>[,<subaddr>,<satype>]]	alternating voice/fax, fax first (TS 61)

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

VGC <GCA>, <GId>, <ackflag> [,<priority>]		voice group call (TS 91)

VBC <GCA>, <GId>, <ackflag> [,<priority>]		voice broadcast call (TS 92)

The optional <priority> indicates the eMLPP priority level of the incoming call by paging, notification or setup message. The priority level values are as defined in eMLPP specification 3GPP TS 22.067 [54].

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer 3GPP TS 24.008 [8] subclause 10.5.4.8)

<PDP_type> ,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.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.

<GCA> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call area.

<GId> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call identification.The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0 no confirmation procedure is required.

Implementation

Mandatory when data or fax circuit mode calls implemented or for a <u>MT</u> ~~ME~~ supporting AT commands only and eMLPP or VGCS or VBS is implemented.

6.12 HSCSD device parameters +CHSD

Table 19: +CHSD action command syntax

Command	Possible response(s)
+CHSD	+CHSD: <mclass>,<maxRx>,<maxTx>,<sum>,<codings>
	+CME ERROR: <err>
+CHSD=?	

Description

Execution command returns information about HSCSD features (refer 3GPP TS 22.034 [29]) supported by the <u>MT</u>~~ME~~/TA. Refer subclause 9.2 for possible <err> values.

The return information is only applicable in GERAN.

Defined values

<mclass>: integer type; multislot class

<maxRx>: integer type; maximum number of receive timeslots that <u>MT</u> ~~ME~~ can use

<maxTx>: integer type; maximum number of transmit timeslots that <u>MT</u> ~~ME~~ can use

<sum>: integer type; total number of receive and transmit timeslots that <u>MT</u> ~~ME~~ can use at the same time (per TDMA frame). The following applies in a HSCSD call: $1 \leq$ (receive slots) + (transmit slots) $\leq$ <sum>

<codings> is a sum of integers each representing a supported channel coding (e.g. value 5 indicates that 4,8k and 9,6k channel codings are supported):

1 4,8k full rate data traffic channel

4 9,6k full rate data traffic channel

8 14,4k full rate data traffic channel

16 28,8k full rate data traffic channel (only possible when 14.4k is supported)

32 32,0k full rate data traffic channel (only possible in a two-timeslot configuration)

64 43,2k full rate data traffic channel (only possible when 14.4k is supported)

Implementation

Mandatory when HSCSD implemented.

This command is not applicable to UTRAN single mode UE.

6.17 HSCSD automatic user initiated upgrading + CHSU

Table 24: +CHSU parameter command syntax

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

Description

Set command controls whether or not automatic user initiated service level upgrading shall be used for non-transparent HSCSD calls. "Automatic" means that, if enabled, the MTME/TA shall use the UP bit in the received RLP frames to determine when to initiate user initiated service level upgrading (i.e. when to modify the +CHSN parameters <wAiur> and/or <wRx> for the current call). Refer to 3GPP TS 27.001 for details on the interpretation of the UP bit(s).

NOTE1: The validity of the UP bit in the RLP frames depends on the result of the RLP negotiations. The UP bit shall only be used if the result of the RLP negotiations were successful with respect to the UP bit.

NOTE2: This command is only applicable in GERAN.

Defined values

<mode>:

0   disables use of UP bit for upgrading

1   enables use of UP bit for upgrading

Implementation

Optional

This command is not applicable to UTRAN single mode UE.

6.18 HSCSD non-transparent asymmetry configuration +CHSA

Table 25: +CHSA parameter command syntax

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

Description

Set command controls the preferred asymmetry bias for non-transparent ECSD calls. Downlink biased asymmetry means that 8-PSK modulation is preferred downlink and GMSK modulation uplink. Uplink based asymmetry means that 8-PSK modulation is preferred uplink and GMSK downlink. Changing of <mode> affects the current call only if <topRx> (refer +CHSN) was non-zero when call was established.

Test command returns values supported by the MTME/TA as compound values. The <mode> subparameter range indirectly indicates the MS UE Type; range (0-1) indicates MS UE Type A and range (0-2) indicates MS UE Type B.

NOTE1: ECSD is also controlled by +CHSD, +CHSN and +CHST.

NOTE2: This command is only applicable in GERAN.

Defined values

<mode>:

0 No preference

1 Downlink biased asymmetry

2 Uplink biased asymmetry

Implementation

Mandatory when non-transparent ECSD is implemented.

This command is not applicable to UTRAN single mode UE.

6.19 Single numbering scheme +CSNS

Table 26: +CSNS parameter command syntax

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

Description

Set command selects the bearer or teleservice to be used when mobile terminated single numbering scheme call is established. Parameter values set with +CBST command shall be used when <mode> equals to a data service.

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

Defined values

<mode>:

0 voice

1 alternating voice/fax, voice first (TS 61)

2 fax (TS 62)

3 alternating voice/data, voice first (BS 61)

4 data

5 alternating voice/fax, fax first (TS 61)

6 alternating voice/data, data first (BS 61)

7 voice followed by data (BS 81)

Implementation

Optional.

6.21 V.120 rate adaption protocol +CV120

Table 28: +CV120 parameter command syntax

Command	Possible response(s)
+CV120=[<rah>[,<mfm>[, <mode>[,<llineg>[, <assign>[,<negtype>]]]]]]	
+CV120?	+CV120: <rah>,<mfm>,<mode>,<llineg>, <assign>,<negtype>

+CV120=?	+CV120: (list of supported <rah>s),(list of supported <mfm>s),(list of supported <mode>s),(list of supported <llineg>s),(list of supported <assign>s),(list of supported <negtype>s)

Description

Set command sets the values of the V.120 protocol parameters (defined in CCITT V.120) that are carried in the GSM BC and/or LLC information elements.

Read command returns current settings for the V.120 parameters.

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

Defined values

<rah>

0 rate adaption header not included

1 rate adaption header included (mandatory for protocol sensitive modes).

<mfm>

0 multiple frame establishment not supported, only UI frames allowed

1 multiple frame establishment supported, both I and UI frames allowed.

<mode>

0 bit transparent mode of operation

1 protocol sensitive mode of operation.

<llineg>

0 no negotiation, LLI = 256 only

1 negotiation allowed. Note - <negtype> indicates the connection over which the negotiation is performed.

<assign>

0 message originator is "default assignee"

1 message originator is "assignor only".

<negtype>

0 negotiation is done using logical link zero

1 negotiation is done with USER INFORMATION messages on a temporary signalling connection.

GSM/UMTS does not support all the possible modes of V.120 operation. However, in order to accommodate possible future additions, the complete set of parameters is included in the command.

The permitted values are: 1, 1 or 0, 1, 0, 0, 0.

A recommended set of default values is: 1, 1, 1, 0, 0, 0.

Implementation

Mandatory, if the MT/TA ME supports V.120 interworking.

6.22 Settings date format +CSDF

Table 29: +CSDF parameter command syntax

Command	Possible response(s)
+CSDF=[[<mode>] [,<auxmode>]]	*+CME ERROR: <err>*
+CSDF?	+CSDF:<mode>[,<auxmode>] *+CME ERROR: <err>*
+CSDF=?	+CSDF:(list of supported <mode>s) [,(list of supported <auxmode>s)] *+CME ERROR: <err>*

Description

This command sets the date format via MMI of the date information presented to the user, which is specified by use of the <mode> parameter. The <mode> affects the date format on the phone display and doesn't affect the date format of the AT command serial interface. The command also sets the date format of the TE-TA interface, which is specified by use of the <auxmode> parameter (e.g. the <auxmode> affects the <time> of +CCLK and +CALA). If the parameter is omitted ("+CSDF =","+CSDF =<mode>","+CSDF=,<auxmode>"),then this sets the default value.

Defined values

<mode>:

NOTE: It is manufacturer specific which modes that are supported.

1 DD-MMM-YYYY

NOTE: Presentation of MMM is language dependent.

2 DD-MM-YY

3 MM/DD/YY

4 DD/MM/YY

5 DD.MM.YY

6 YYMMDD

7 YY-MM-DD

8-255 Manufacturer specific

<auxmode>:

1 yy/MM/dd (default)

2 yyyy/MM/dd

also all other values are reserved by the present document

NOTE: The <time> format of +CCLK and +CALA "yy/MM/dd,hh:mm:ss±zz" when <auxmode>=1 and it is "yyyy/MM/dd,hh:mm:ss±zz" when <auxmode>=2. If the ~~MT~~ ~~ME~~ does not support time zone information then the three last characters may be omitted (see +CCLK command).

Implementation

Optional

6.23 Silence Command +CSIL

Table 30: +CSIL parameter command syntax

Command	Possible response(s)
+CSIL=[<mode>]	*+CME ERROR: <err>*
+CSIL?	+CSIL:<mode> *+CME ERROR: <err>*
+CSIL=?	+CSIL:(list of supported <mode>s) *+CME ERROR: <err>*

Description

Set command enables/disables the silent mode. When the phone is in silent mode, all sounds from <u>MT</u> ~~MS~~ are suppressed except voice.

Read command reads the current setting.

Test command lists the supported modes.

Defined values

<mode>:

0   Silent mode off

1   Silent mode on

Implementation

Optional

6.27 Informative examples

The alternating mode call handling (voice and fax, or voice and data) and the data call setup commands are defined such that the dialling command of V.25ter [14] (D) still always originates a call. The purpose is to support all current TE applications using the dialling command as default. Fax calls are controlled following the rules of ITU-T T.31 [11] and T.32 [12] standards.

An example where a voice call is originated:

```
ATD+1 812 555673I;  (type of address defaults to 145, CLI presentation is restricted for this call)
OK                  (call setup was successful)
```

An example where a voice call is attempted from a phonebook:

```
ATD>"Doe Joe"G;  (enable CUG control for this call)
+CME ERROR: 22   (entry "Doe Joe" is not found)
```

Also supplementary services may be controlled using dial command according to 3GPP TS 22.030 [19]. An example of call forwarding on no reply for telephony with the adjustment of the no reply condition timer on 25 seconds:

```
ATD**61*+1812555673*11*25#
OK                  (modification was successful)
```

Two new commands are created for controlling the alternating mode calls. First one, Call Mode (+CMOD), selects between single and alternating mode. Because this is a crucial command, it is defined that the value is set back to zero (single mode) after every successfully originated alternating mode call. Also on power-up and factory or user resets, the value is set to zero. The second new command, Hangup Call (+CHUP), is not a replacement of V.25ter [14] command H, but a command which reliably disconnects the call in GSM/UMTS network. This is defined because the H command is used to switch from fax or data mode to voice mode.

The setting of GSM/UMTS bearer service (data circuit duplex asynchronous and synchronous, PAD access circuit asynchronous, or data packet duplex synchronous), is done with Select Bearer Service Type (+CBST). It chooses one of the four mentioned bearer services, the data rate of the service (or actually the modulation when modem IWFs are used), and enables or disables RLP. Command Radio Link Protocol (+CRLP) is used to set the RLP parameters in the radio path.

Service Reporting Control command (+CR) is defined similarly as the reporting of modulation, V.18, error control, and data compression which are V.25ter [14] features used to show information about the type of the established connection before the CONNECT intermediate result code. +CR command has one subparameter which specifies whether the intermediate result code +CR: <serv> is returned or not. The result code should be returned before any V.25ter [14] reporting result codes. An example of setting up an asynchronous 9600 bit/s modem connection with service reporting:

```
AT+CBST=7,0,1       (asynchronous modem 9600 bit/s and RLP)
OK
AT+CR=1             (enable reporting)
OK
ATD1234567890
+CR: REL ASYNC
CONNECT 9600
```

As GSM/UMTS network offers more information about the reason of the failure in call originating and answering than normal PSTN, it is useful to add an extra command to return this information to the TE. This information should not be returned always after unsuccessful call originating or answering, because many TE applications look for just the regular NO CARRIER, BUSY, NO ANSWER and CONNECT messages. Action command Extended Error Report (+CEER) does not have any subparameters, and it returns the cause of the latest call setup failure. This information may be the textual presentation of the GSM/UMTS network failure code (refer TS 24.008 [8] Annex H), or some other information defined by the MT/TA manufacturer.

7   Network service related commands

This clause describes GSM/UMTS network related commands, which are not covered in call control clause of the present document. Commands include GSM/UMTS supplementary service handling, MSISDN query, MT ~~ME~~ and network facility locking, and network registration information query.

7.1   Subscriber number +CNUM

Table 34: +CNUM action command syntax

Command	Possible response(s)
+CNUM	+CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]] [<CR><LF>+CNUM: [<alpha2>],<number2>,<type2>[,<speed>,<service> [,<itc>]] [...]] *+CME ERROR: <err>*
+CNUM=?	

Description

Action command returns the MSISDNs related to the subscriber (this information can be stored in the SIM/UICC or in the MT~~ME)~~. When storing information in the SIM/UICC, if a SIM card is present or if a UICC with an active GSM application is present, the information is stored in the EF$_{MSISDN}$ under DF$_{Telecom}$. If a UICC with an active USIM application is present, the information is stored in the EF$_{MSISDN}$ under ADF$_{USIM}$). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line. Refer subclause 9.2 for possible <err> values.

Defined values

<alpha$x$>: optional alphanumeric string associated with <number$x$>; used character set should be the one selected with command Select TE Character Set +CSCS

<number$x$>: string type phone number of format specified by <type$x$>

<typex>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<speed>: as defined in subclause 6.7

<service> (service related to the phone number):

0 asynchronous modem

1 synchronous modem

2 PAD Access (asynchronous)

3 Packet Access (synchronous)

4 voice

5 fax

also all other values below 128 are reserved by the present document

<itc> (information transfer capability):

0 3,1 kHz

1 UDI

Implementation

Optional.

7.2 Network registration +CREG

Table 35: +CREG parameter command syntax

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

Description

Set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the ~~ME~~ MT network registration status, or code +CREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

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~~ME~~. Location information elements <lac> and <ci> are returned only when <n>=2 and MT ~~ME~~ is registered in the network. Refer subclause 9.2 for possible <err> values.

Defined values

`<n>`:

<u>0</u>   disable network registration unsolicited result code

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

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

`<stat>`:

0   not registered, <u>MT</u> <s>ME</s> is not currently searching a new operator to register to

1   registered, home network

2   not registered, but <u>MT</u> <s>ME</s> 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.

7.3   PLMN selection +COPS

Table 36: +COPS parameter command syntax

Command	Possible response(s)
`+COPS=[<mode>[,<format>` `[,<oper>[,< AcT>]]]]`	*+CME ERROR: <err>*
`+COPS?`	`+COPS: <mode>[,<format>,<oper>[,< AcT>]]` *+CME ERROR: <err>*
`+COPS=?`	`+COPS:` [list of supported (`<stat>`, long alphanumeric `<oper>` , short alphanumeric `<oper>`, numeric `<oper>`[,`< AcT>`])s] [,,(list of supported `<mode>`s),(list of supported `<format>`s)] *+CME ERROR: <err>*

Description

Set command forces an attempt to select and register the GSM/UMTS network operator. `<mode>` is used to select whether the selection is done automatically by the <u>MT</u> <s>ME</s> or is forced by this command to operator `<oper>` (it shall be given in format `<format>`) to a certain access technology, indicated in <AcT>. If the selected operator is not available, no other operator shall be selected (except `<mode>`=4). The selected operator name format shall apply to further read commands (`+COPS?`) also. `<mode>`=2 forces an attempt to deregister from the network. The selected mode affects to all further network registration (e.g. after `<mode>`=2, <u>MT</u> <s>ME</s> shall be unregistered until `<mode>`=0 or 1 is selected). Refer subclause 9.2 for possible `<err>` values. This command should be abortable when registration/deregistration attempt is made.

Read command returns the current mode, the currently selected operator and the current Access Technology. If no operator is selected, `<format>`, `<oper>` and `< AcT>` are omitted.

Test command returns a set of five parameters, each representing an operator present in the network. A set consists of an integer indicating the availability of the operator <stat>, long and short alphanumeric format of the name of the operator, numeric format representation of the operator and access technology. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in order: home network, networks referenced in SIM or active application in the UICC (GSM or USIM) in the following order: HPLMN selector, User controlled PLMN selector, Operator controlled PLMN selector and PLMN selector (in the SIM or GSM application), and other networks.

It is recommended (although optional) that after the operator list TA returns lists of supported <mode>s and <format>s. These lists shall be delimited from the operator list by two commas.

NOTE: The access technology selected paramters, <AcT>, should only be used in terminals capable to register to more than one access technology.

Defined values

<mode>:

0 automatic (<oper> field is ignored)

1 manual (<oper> field shall be present, and <AcT> optionally)

2 deregister from network

3 set only <format> (for read command +COPS?), do not attempt registration/deregistration (<oper> and < AcT> fields are ignored); this value is not applicable in read command response

4 manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered

<format>:

0 long format alphanumeric <oper>

1 short format alphanumeric <oper>

2 numeric <oper>

<oper>: string type; <format> indicates if the format is alphanumeric or numeric; long alphanumeric format can be upto 16 characters long and short format up to 8 characters (refer GSM MoU SE.13 [9]); numeric format is the GSM Location Area Identification number (refer TS 24.008 [8] subclause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A [10], plus a two BCD digit network code, which is administration specific; returned <oper> shall not be in BCD format, but in IRA characters converted from BCD; hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1)

<stat>:

0 unknown

1 available

2 current

3 forbidden

<AcT> access technology selected:

0 GSM

1 GSM Compact

2 UTRAN

Implementation

Optional.

7.4 Facility lock +CLCK

Table 37: +CLCK action command syntax

Command	Possible response(s)
+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	*+CME ERROR: <err>* **when <mode>=2 and command successful:** +CLCK: <status>[,<class1>[<CR><LF>+CLCK: <status>,<class2>[...]]
+CLCK=?	+CLCK: (list of supported <fac>s) *+CME ERROR: <err>*

Description

Execute command is used to lock, unlock or interrogate a <u>MT</u> ~~ME~~ or a network facility <fac>. Password is normally needed to do such actions. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Refer subclause 9.2 for possible <err> values. This command should be abortable when network facilities are set or interrogated.

Call barring facilities are based on GSM/UMTS supplementary services (refer 3GPP TS 22.088 [6]). The interaction of these with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standard.

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

Defined values

<fac> values reserved by the present document:

"CS"   CNTRL (lock CoNTRoL surface (e.g. phone keyboard))

"PS"   PH-SIM (lock PHone to SIM/UICC card) (<u>MT</u> ~~ME~~ asks password when other than current SIM/UICC card inserted; <u>MT</u> ~~ME~~ may remember certain amount of previously used cards thus not requiring password when they are inserted)

"PF"   lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PH-FSIM) (<u>MT</u> ~~ME~~ asks password when other than the first SIM/UICC card is inserted)

"SC"   SIM (lock SIM/UICC card) (SIM/UICC asks password in <u>MT</u> ~~ME~~ power-up and when this lock command issued)

"AO"   BAOC (Barr All Outgoing Calls) (refer 3GPP TS 22.088 [6] clause 1)

"OI"   BOIC (Barr Outgoing International Calls) (refer 3GPP TS 22.088 [6] clause 1)

"OX"   BOIC-exHC (Barr Outgoing International Calls except to Home Country) (refer 3GPP TS 22.088 [6] clause 1)

"AI"   BAIC (Barr All Incoming Calls) (refer 3GPP TS 22.088 [6] clause 2)

"IR"   BIC-Roam (Barr Incoming Calls when Roaming outside the home country) (refer 3GPP TS 22.088 [6] clause 2)

"NT"   barr incoming calls from numbers Not stored to TA memory

"NM"   barr incoming calls from numbers Not stored to <u>MT</u> ~~ME~~ memory

"NS"   barr incoming calls from numbers Not stored to SIM/UICC memory

"NA"   barr incoming calls from numbers Not stored in Any memory

"AB"   All Barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)

"AG"   All outGoing barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)

"AC"   All inComing barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)

"FD"   SIM card or active application in the UICC (GSM or USIM) fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>)

"PN"   Network Personalization (refer 3GPP TS 22.022 [33])

"PU"   network sUbset Personalization (refer 3GPP TS 22.022 [33])

"PP"   service Provider Personalization (refer 3GPP TS 22.022 [33])

"PC"   Corporate Personalization (refer 3GPP TS 22.022 [33])

<mode>:

0   unlock

1   lock

2   query status

<status>:

0   not active

1   active

<passwd>: string type; shall be the same as password specified for the facility from the MT ~~ME~~ user interface or with command Change Password +CPWD

<classx> is a sum of integers each representing a class of information (default 7):

1   voice (telephony)

2   data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4   fax (facsimile services)

8   short message service

16 data circuit sync

32 data circuit async

64 dedicated packet access

128   dedicated PAD access

Implementation

The call barring supplementary service control is mandatory for MT/TA ~~ME~~ supporting AT commands only and not supporting the control through dial command D.

7.5   Change password +CPWD

Table 38: +CPWD action command syntax

Command	Possible response(s)
+CPWD=<fac>,<oldpwd>,<newpwd>	*+CME ERROR: <err>*

| +CPWD=? | +CPWD: list of supported (<fac>,<pwdlength>)s |
| | *+CME ERROR: <err>* |

Description

Action command sets a new password for the facility lock function defined by command Facility Lock +CLCK. Refer subclause 9.2 for possible <err> values.

Test command returns a list of pairs which present the available facilities and the maximum length of their password.

Defined values

<fac>:

"P2"   SIM PIN2

refer Facility Lock +CLCK for other values

<oldpwd>, <newpwd>: string type; <oldpwd> shall be the same as password specified for the facility from the MT ~~ME~~ user interface or with command Change Password +CPWD and <newpwd> is the new password; maximum length of password can be determined with <pwdlength>

<pwdlength>: integer type maximum length of the password for the facility

Implementation
Optional.

7.6   Calling line identification presentation +CLIP

Table 39: +CLIP parameter command syntax

Command	Possible response(s)
+CLIP=[<n>]	
+CLIP?	+CLIP: <n>,<m>
+CLIP=?	+CLIP: (list of supported <n>s)

Description

This command refers to the GSM/UMTS supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. Set command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

When the presentation of the CLI at the TE is enabled (and calling subscriber allows), +CLIP: <number>,<type>[,<subaddr>,<satype>[,[<alpha>][,<CLI validity>]]] response is returned after every RING (or +CRING: <type>; refer subclause "Cellular result codes +CRC") result code sent from TA to TE. It is manufacturer specific if this response is used when normal voice call is answered.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the CLIP service according 3GPP TS 22.081 [3] (given in <m>).Test command returns values supported ~~by the TA~~ as a compound value.

Defined values

<n> (parameter sets/shows the result code presentation status in the MT/TA):

0   disable

1   enable

<m> (parameter shows the subscriber CLIP service status in the network):

0　CLIP not provisioned

1　CLIP provisioned

2　unknown (e.g. no network, etc.)

`<number>`: string type phone number of format specified by `<type>`

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

`<subaddr>`: string type subaddress of format specified by `<satype>`

`<satype>`: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

`<alpha>`: optional string type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

`<CLI validity>`:

0　CLI valid

1　CLI has been withheld by the originator.

2　CLI is not available due to interworking problems or limitations of originating network.

When CLI is not available (`<CLI validity>`=2), `<number>` shall be an empty string ("") and `<type>` value will not be significant. Nevertheless, MT/-TA may return the recommended value **128** for <type> ((TON/NPI unknown in accordance with TS 24.008 [8] subclause 10.5.4.7).

When CLI has been withheld by the originator, (`<CLI validity>`=1) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081[3] and 3GPP TS 23.081[40]), <number> and <type> is provided. Otherwise, MT/TA shall return the same setting for <number> and <type> as if the CLI was not available.

Implementation

Optional.

7.7　Calling line identification restriction +CLIR

Table 40: +CLIR parameter command syntax

Command	Possible response(s)
+CLIR=[<n>]	
+CLIR?	+CLIR: <n>,<m>
+CLIR=?	+CLIR: (list of supported <n>s)

Description

This command refers to CLIR-service according to 3GPP TS 22.081 [3] that allows a calling subscriber to enable or disable the presentation of the CLI to the called party when originating a call.

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. This adjustment can be revoked by using the opposite command.. If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according 3GPP TS 22.081 [3].

Read command gives the default adjustment for all outgoing calls (given in <n>), and also triggers an interrogation of the provision status of the CLIR service (given in <m>). Test command returns values supported by the TA as a compound value.

NOTE:　On a per call base CLIR functionality is explained in subclause "ITU-T V.25ter [14] dial command".

Defined values

<n> (parameter sets the adjustment for outgoing calls):

<u>0</u>   presentation indicator is used according to the subscription of the CLIR service

1   CLIR invocation

2   CLIR suppression

<m> (parameter shows the subscriber CLIR service status in the network):

0   CLIR not provisioned

1   CLIR provisioned in permanent mode

2   unknown (e.g. no network, etc.)

3   CLIR temporary mode presentation restricted

4   CLIR temporary mode presentation allowed

Implementation

Optional.

7.8   Connected line identification presentation +COLP

Table 41: +COLP parameter command syntax

Command	Possible response(s)
+COLP=[<n>]	
+COLP?	+COLP: <n>,<m>
+COLP=?	+COLP: (list of supported <n>s)

Description

This command refers to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

When enabled (and called subscriber allows), +COLP:
<number>,<type>[,<subaddr>,<satype> [,<alpha>]] intermediate result code is returned from MT/TA to TE before any +CR or V.25ter [14] responses. It is manufacturer specific if this response is used when normal voice call is established.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the COLP service according 3GPP TS 22.081 [3] (given in <m>).

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

Defined values

<n> (parameter sets/shows the result code presentation status in the MT/TA):

<u>0</u>   disable

1   enable

<m> (parameter shows the subscriber COLP service status in the network):

0   COLP not provisioned

1 COLP provisioned

2 unknown (e.g. no network, etc.)

`<number>, <type>, <subaddr>, <satype>, <alpha>`: refer +CLIP

Implementation

Optional.

7.9 Called line identification presentation +CDIP

Table 42: +CDIP parameter command syntax

Command	Possible response(s)
+CDIP=[<n>]	
+CDIP?	+CDIP: <n>,<m>
+CDIP=?	+CDIP: (list of supported <n>s)

Description

This command related to a network service that provides "multiple called numbers (called line identifications) service" to an MT. This command enables a called subscriber to get the called line identification of the called party when receiving a mobile terminated call. Set command enables or disables the presentation of the called line identifications at the TE.

When the presentation of the called line identification at the TE is enabled,
`+CDIP:<number>,<type>[,<subaddr>,<satype>]` response is returned after every RING (or +CRING: <type>; refer subclause "Cellular result codes +CRC") result code sent from MT/TA to TE. It is manufacturer specific if this response is used when normal voice call is answered.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the "multiple called numbers" service. Test command returns values supported by the TA as a compound value.

Defined values

`<n>` (parameter sets/shows the result code presentation status in the MT/TA):

0 disable

1 enable

`<m>` (parameter shows the subscriber "multiple called numbers" service status in the network):

0 "multiple called numbers service" is not provisioned

1 "multiple called numbers service" is provisioned

2 unknown (e.g. no network, etc.)

`<number>`: string type phone number of format specified by `<type>`

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

`<subaddr>`: string type subaddress of format specified by `<satype>`

`<satype>`: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

Implementation

Optional.

7.11 Call forwarding number and conditions +CCFC

Table 44: +CCFC action command syntax

Command	Possible response(s)

`+CCFC=<reason>,<mode>`
`[,<number>[,<type>`
`[,<class>`
`[,<subaddr>[,<satype>`
`[,<time>]]]]]]`
	`+CME ERROR: <err>`
	when <mode>=2 and command successful:
	`+CCFC: <status>,<class1>[,<number>,<type>`
	`[,<subaddr>,<satype>[,<time>]]][`
	`<CR><LF>+CCFC: <status>,<class2>[,<number>,<type>`
	`[,<subaddr>,<satype>[,<time>]]]`
	`[...]]`

`+CCFC=?`	`+CCFC:` (list of supported `<reason>`s)

Description

This command allows control of the call forwarding supplementary service according to 3GPP TS 22.082 [4]. Registration, erasure, activation, deactivation, and status query are supported. When querying the status of a network service (`<mode>`=2) the response line for 'not active' case (`<status>`=0) should be returned only if service is not active for any `<class>`.

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

Defined values

`<reason>`:

0 unconditional

1 mobile busy

2 no reply

3 not reachable

4 all call forwarding (refer 3GPP TS 22.030 [19])

5 all conditional call forwarding (refer 3GPP TS 22.030 [19])

`<mode>`:

0 disable

1 enable

2 query status

3 registration

4 erasure

`<number>`: string type phone number of forwarding address in format specified by `<type>`

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

`<subaddr>`: string type subaddress of format specified by `<satype>`

`<satype>`: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8); default 128

`<classx>` is a sum of integers each representing a class of information (default 7):

1 voice (telephony)

2   data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4   fax (facsimile services)

8   short message service

16   data circuit sync

32   data circuit async

64   dedicated packet access

128   dedicated PAD access

<time>:

1...30   when "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded, default value 20

<status>:

0   not active

1   active

Implementation

Mandatory for MT/TA ~~ME~~ supporting AT commands only and not supporting the control through dial command D.

7.12   Call waiting +CCWA

Table 45: +CCWA parameter command syntax

Command	Possible response(s)
+CCWA=[<n>[,<mode>[,<class>]]]	*+CME ERROR: <err>* **when <mode>=2 and command successful** +CCWA: <status>,<class1> [<CR><LF>+CCWA: <status>,<class2> [...]]
+CCWA?	+CCWA: <n>
+CCWA=?	+CCWA: (list of supported <n>s)

Description

This command allows control of the Call Waiting supplementary service according to 3GPP TS 22.083 [5]. Activation, deactivation and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable/enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>[,<subaddr>,<satype> [,<priority>]]] to the TE when call waiting service is enabled. Command should be abortable when network is interrogated.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

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

Defined values

<n> (sets/shows the result code presentation status in the MT/TA):

0   disable

1   enable

<mode> (when <mode> parameter is not given, network is not interrogated):

0   disable

1   enable

2   query status

<classx> is a sum of integers each representing a class of information (default 7):

1   voice (telephony)

2   data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4   fax (facsimile services)

8   short message service

16 data circuit sync

32 data circuit async

64 dedicated packet access

128   dedicated PAD access

<status>:

0   not active

1   active

<number>: string type phone number of calling address in format specified by <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<alpha>: optional string type alphanumeric representation of <number> corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

<CLI validity>:

0   CLI valid

1   CLI has been withheld by the originator.

2   CLI is not available due to interworking problems or limitations of originating network.

When CLI is not available (<CLI validity>=2), <number> shall be an empty string ("") and <type> value will not be significant. Nevertheless, MT/TA may return the recommended value **128** for <type> ((TON/NPI unknown in accordance with TS 24.008 [8] subclause 10.5.4.7).

When CLI has been withheld by the originator, (<CLI validity>=1) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081[3] and 3GPP TS 23.081[40]), <number> and <type> is provided. Otherwise, TA shall return the same setting for <number> and <type> as if the CLI was not available.

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

<priority>: optional digit type parameter indicating that the eMLPP priority level of the incoming call. The priority level values are as defined in eMLPP specification 3GPP TS 22.067 [54].

Implementation

Optional.

7.13   Call related supplementary services +CHLD

Table 46: +CHLD action command syntax

Command	Possible response(s)
+CHLD=[<n>]	*+CME ERROR: <err>*
+CHLD=?	[+CHLD: (list of supported <n>s)]

Description

This command allows the control of the following call related services:

- a call can be temporarily disconnected from the MT ~~ME~~ but the connection is retained by the network;

- multiparty conversation (conference calls);

- the served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030 [19]. Refer subclause 9.2 for possible <err> values.

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; refer 3GPP TS 22.083 [5] clause 2), MPTY (MultiParty; refer 3GPP TS 22.084 [22]) and ECT (Explicit Call Transfer; refer 3GPP TS 22.091 [29]). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

NOTE: Call Hold, MultiParty and Explicit Call Transfer are only applicable to teleservice 11.

It is recommended (although optional) that test command returns a list of operations which are supported. The call number required by some operations shall be denoted by "x" (e.g. +CHLD: (0,1,1x,2,2x,3)).

Defined values

<n>: integer type; equals to numbers entered before SEND button in 3GPP TS 22.030 [19] subclause 4.5.5.1

NOTE: The "directory number" case shall be handled with dial command D, and the END case with hangup command H (or +CHUP). The 4*"directory number" case is handled with +CTFR command.

Implementation

Optional.

7.15   Unstructured supplementary service data +CUSD

Table 48: +CUSD parameter command syntax

Command	Possible response(s)
+CUSD=[<n>[,<str>[,<dcs>]]]	*+CME ERROR: <err>*
+CUSD?	+CUSD: <n>
+CUSD=?	+CUSD: (list of supported <n>s)

Description

This command allows control of the Unstuctured Supplementary Service Data (USSD) according to 3GPP TS 22.090 [23]. Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session.

When <str> is given, a mobile initiated USSD-string or a response USSD-string to a network initiated operation is sent to the network. The response USSD-string from the network is returned in a subsequent unsolicited +CUSD result code.

NOTE: In case of successful mobile initiated operation, MT/TA implemented according to a version prior to 6 of this standard, waits the USSD response from the network and sends it to the TE before the final result code. This will block the AT command interface for the period of the operation. Such MT/TA does not support <n> value 2.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

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

Defined values

<n>:

0 disable the result code presentation in to the TEA

1 enable the result code presentation toin the TEA

2 cancel session (not applicable to read command response)

<str>: string type USSD-string (when <str> parameter is not given, network is not interrogated):

- if <dcs> indicates that 3GPP TS 23.038 [25] 7 bit default alphabet is used:

    - if TE character set other than "HEX" (refer command Select TE Character Set +CSCS): MTME/TA converts GSM alphabet into current TE character set according to rules of 3GPP TS 27.005 [24] Annex A

    - if TE character set is "HEX": MTME/TA converts each 7-bit character of GSM alphabet into two IRA character long hexadecimal number (e.g. character Π (GSM 23) is presented as 17 (IRA 49 and 55))

- if <dcs> indicates that 8-bit data coding scheme is used: MTME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65))

<dcs>: 3GPP TS 23.038 [25] Cell Broadcast Data Coding Scheme in integer format (default 0)

<m>:

0 no further user action required (network initiated USSD-Notify, or no further information needed after mobile initiated operation)

1 further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation)

2 USSD terminated by network

3 other local client has responded

4 operation not supported

5 network time out

Implementation

Optional.

7.16   Advice of Charge +CAOC

Table 49: +CAOC parameter command syntax

Command	Possible response(s)
+CAOC[=<mode>]	[+CAOC: <ccm>]
	+CME ERROR: <err>
+CAOC?	+CAOC: <mode>
+CAOC=?	[+CAOC: (list of supported <mode>s]

Description

This refers to Advice of Charge supplementary service (3GPP TS 22.024 [26] and 3GPP TS 22.086 [27]) that enables subscriber to get information about the cost of calls. With <mode>=0, the execute command returns the current call meter value from the MT~~ME~~.

The command also includes the possibility to enable an unsolicited event reporting of the CCM information. The unsolicited result code +CCCM: <ccm> is sent when the CCM value changes, but not more that every 10 seconds. Deactivation of the unsolicited event reporting is made with the same command.

Refer subclause 9.2 for possible <err> values.

NOTE: Advice of Charge values stored in the SIM card or in the active application in the UICC (GSM or USIM) (ACM, ACMmax, PUCT) can be accessed with generic or restricted SIM access command (+CSIM or +CRSM)).Those values can be more readily accessed with commands +CACM, +CAMM and +CPUC.

The Read command indicates whether the unsolicited reporting is activated or not. Read command is available when the unsolicited result code is supported.

It is recommended (although optional) that the test command returns the supported mode values.

Defined values

<mode>:

0   query CCM value

1   deactivate the unsolicited reporting of CCM value

2   activate the unsolicited reporting of CCM value

<ccm>: string type; three bytes of the current call meter value in hexadecimal format (e.g. "00001E" indicates decimal value 30); value is in home units and bytes are similarly coded as ACMmax value in the SIM card or in the active application in the UICC (GSM or USIM)

Implementation

Optional.

7.17   Supplementary service notifications +CSSN

Table 50: +CSSN parameter command syntax

Command	Possible response(s)
+CSSN=[<n>[,<m>]]	
+CSSN?	+CSSN: <n>,<m>
+CSSN=?	+CSSN: (list of supported <n>s),(list of supported <m>s)

Description

This command refers to supplementary service related network initiated notifications. The set command enables/disables the presentation of notification result codes from <u>MT</u>/TA to TE.

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code +CSSI: <code1>[,<index>] is sent to TE before any other MO call setup result codes presented in the present document or in V.25ter [14]. When several different <code1>s are received from the network, each of them shall have its own +CSSI result code.

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code +CSSU: <code2>[,<index>[,<number>,<type>[,<subaddr>,<satype>]]] is sent to TE. In case of MT call setup, result code is sent after every +CLIP result code (refer command "Calling line identification presentation +CLIP") and when several different <code2>s are received from the network, each of them shall have its own +CSSU result code.

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

Defined values

<n> (parameter sets/shows the +CSSI result code presentation status ~~in~~to the TE~~A~~):

<u>0</u> disable

1 enable

<m> (parameter sets/shows the +CSSU result code presentation status ~~in~~to the TE~~A~~):

<u>0</u> disable

1 enable

<code1> (it is manufacturer specific, which of these codes are supported):

0 unconditional call forwarding is active

1 some of the conditional call forwardings are active

2 call has been forwarded

3 call is waiting

4 this is a CUG call (also <index> present)

5 outgoing calls are barred

6 incoming calls are barred

7 CLIR suppression rejected

8 call has been deflected

<index>: refer "Closed user group +CCUG"

<code2> (it is manufacturer specific, which of these codes are supported):

0 this is a forwarded call (MT call setup)

1 this is a CUG call (also <index> present) (MT call setup)

2 call has been put on hold (during a voice call)

3 call has been retrieved (during a voice call)

4 multiparty call entered (during a voice call)

5 call on hold has been released (this is not a SS notification) (during a voice call)

6   forward check SS message received (can be received whenever)

7   call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call)

8   call has been connected with the other remote party in explicit call transfer operation (also number and subaddress parameters may be present) (during a voice call or MT call setup)

9   this is a deflected call (MT call setup)

10 sdditional incoming call forwarded

<number>: string type phone number of format specified by <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8)

Implementation

Optional.

7.18   List current calls +CLCC

Table 51:+CLCC action command syntax

Command	Possible response(s)
+CLCC	[+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>[, <number>,<type>[,<alpha>[,<priority>]]] [<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty>[, <number>,<type>[,<alpha>[,<priority>]]] [...]]] *+CME ERROR: <err>*
+CLCC=?	

Description

Returns list of current calls of MT~~ME~~. If command succeeds but no calls are available, no information response is sent to TE. Refer subclause 9.2 for possible <err> values.

Defined values

<idx>: integer type; call identification number as described in 3GPP TS 22.030 [19] subclause 4.5.5.1; this number can be used in +CHLD command operations

<dir>:

0   mobile originated (MO) call

1   mobile terminated (MT) call

<stat> (state of the call):

0   active

1   held

2   dialing (MO call)

3   alerting (MO call)

4 incoming (MT call)

5 waiting (MT call)

`<mode>` (bearer/teleservice):

0 voice

1 data

2 fax

3 voice followed by data, voice mode

4 alternating voice/data, voice mode

5 alternating voice/fax, voice mode

6 voice followed by data, data mode

7 alternating voice/data, data mode

8 alternating voice/fax, fax mode

9 unknown

`<mpty>`:

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

1 call is one of multiparty (conference) call parties

`<number>`: string type phone number in format specified by `<type>`

`<type>`: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

`<alpha>`: string type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

`<priority>`: optional digit type parameter indicating the eMLPP priority level of the call, values specified in 3GPP TS 22.067 [54]

Implementation

Optional. Recommended when +CHLD command is implemented.

7.19 Preferred PLMN list +CPOL

Table 52:+CPOL parameter command syntax

Command	Possible response(s)
+CPOL=[<index>][,<format>[,<oper>[,<GSM_AcT>,<GSM_Compact_AcT>,<UTRAN_AcT>]]]	+CME ERROR: <err>
+CPOL?	+CPOL: <index1>,<format>,<oper1>[,<GSM_AcT1>,<GSM_Compact_AcT1>,<UTRAN_AcT1>] [<CR><LF>+CPOL: <index2>,<format>,<oper2>[,<GSM_AcT2>,<GSM_Compact_AcT2>,<UTRAN_AcT2>] [...]] +CME ERROR: <err>

+CPOL=?	+CPOL: (list of supported <index>s),(list of supported <format>s)
	+CME ERROR: <err>

Description

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

Execute command writes an entry in the SIM/USIM list of preferred PLMNs, previously selected by the command +CPLS. If no list has been previously selected, the User controlled PLMN selector with Access Technology, EF$_{PLMNwAcT,}$ is the one accessed by default. If <index> is given but <oper> is left out, entry is deleted. If <oper> is given but <index> is left out, <oper> is put in the next free location. If only <format> is given, the format of the <oper> in the read command is changed. The Access Technology selection parameters, <GSM_AcT>, <GSM_Compact_AcT> and <UTRAN_AcT>, are required when writing User controlled PLMN selector with Access Technology, EF EF$_{PLMNwAcT}$, Operator controlled PLMN selector with Access Technology EF$_{OPLMNwAcT}$ and HPLMN selector with Access Technology EF$_{HPLMNwAcT}$, see TS 31.102. Refer subclause 9.2 for possible <err> values.

NOTE1: MT ~~ME~~ may also update the User controlled PLMN selector with Access Technology, EF$_{PLMNwAcT}$, automatically when new networks are selected.

NOTE2: The Operator controlled PLMN selector with Access Technology EF$_{OPLMNwAcT}$, can only be written if the write access condition in the SIM/USIM has been previously verified.

Read command returns all used entries from the SIM/USIM list of preferred PLMNs, previously selected by the command +CPLS, with the Access Technologies for each PLMN in the list.

Test command returns the whole index range supported by the SIM.

Defined values

<index$n$>: integer type; the order number of operator in the SIM/USIM preferred operator list

<format>:

0 long format alphanumeric <oper>

1 short format alphanumeric <oper>

2 numeric <oper>

<oper$n$>: string type; <format> indicates if the format is alphanumeric or numeric (see +COPS)

<GSM_AcTn>: GSM access technology:

0 access technology not selected

1 access technology selected

<GSM_Compact_AcTn>: GSM compact access technology:

0 access technology not selected

1 access technology selected

<UTRA_AcTn>: UTRA access technology:

0 access technology not selected

1 access technology selected

Implementation

Optional.

7.21   Read operator names +COPN

Table 54:+COPN action command syntax

Command	Possible response(s)
+COPN	+COPN: <numeric1>,<alpha1> [<CR><LF>+COPN: <numeric2>,<alpha2> [...]] *+CME ERROR: <err>*
+COPN=?	

Description

Execute command returns the list of operator names from the MT~~ME~~. Each operator code <numeric*n*> that has an alphanumeric equivalent <alpha*n*> in the MT ~~ME~~ memory shall be returned. Refer subclause 9.2 for possible <err> values.

Defined values

<numeric*n*>: string type; operator in numeric format (see +COPS)

<alpha*n*>: string type; operator in long alphanumeric format (see +COPS)

Implementation

Optional.

7.22   eMLPP Priority Registration and Interrogation +CAEMLPP

Table 55: CAEMLPP parameter command syntax

Command	Possible Response(s)
+CAEMLPP=<priority>	*+CME ERROR: <err>*
+CAEMLPP?	+CAEMLPP: <default_priority>,<max_priority> *+CME ERROR: <err>*
+CAEMLPP=?	

Description

The execute command is used to change the default priority level of the user in the network. The requested priority level is checked against the eMLPP subscription of the user stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$. If the user doesn't have subscription for the requested priority level an ERROR or +CMEE ERROR result code is returned.

The read command triggers an interrogation of the provision of the maximum priority level which the service subscriber is allowed to use and default priority level activated by the user.

If the service is not provisioned, a result code including the SS-Status (?) parameter is returned.

Defined Values

<priority>: integer type parameter which identifies the default priority level to be activated in the network, values specified in 3GPP TS 22.067 [54]

<default_priority>: integer type parameter which identifies the default priority level which is activated in the network, values specified in 3GPP TS 22.067 [54]

<max_priority>: integer type parameter which identifies the maximum priority level for which the service subscriber has a subscription in the network, values specified in 3GPP TS 22.067 [54]

Implementation

Mandatory for a MT/TA ~~ME~~ supporting AT commands only and supplemantery service eMLPP is implemented.

7.23   eMLPP subscriptions +CPPS

Table 56: +CPPS action command syntax

Command	Possible response(s)
+CPPS	+CPPS: <priority>[,<priority> [...]] *+CME ERROR: <err>*
+CPPS=?	

Description

This command returns all eMLPP priority subscriptions of the user stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$. If no explicit priority level subscription is stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$ the result code OK is returned.

Defined values

<priority>: integer type, eMLPP subscription to priority level {0,1,..,4} as defined in 3GPP TS 22.067 [45].

Implementation

Mandatory for a MT ~~ME~~ supporting AT commands only and eMLPP is implemented.

7.24   Fast call setup conditions +CFCS

Table 57: +CFCS action command syntax

Command	Possible response(s)
+CFCS=<priority>,<status>	*+CME ERROR: <err>*
+CFCS?	+CFCS: <priority>[,<priority> [...]] *+CME ERROR: <err>*
+CFCS=?	+CFCS: (list of supported <priority>,<status>)

Description

The set command is used to edit the status of the priority level for fast call set-up stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$. If the user has no subscription to the priority level status he wants to edit, an ERROR or +CME ERROR result code is returned.

The read command returns all enabled priority levels for fast call set-up stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{eMLPP}$. If no priority level is enabled for fast call set-up, the result code OK is returned.

Defined values

<priority>: integer type, eMLPP fast call set-up priority level {0,1,..,4} as defined in 3GPP TS 22.067 [45]

<status>: integer type

0   disable <priority> for fast call set-up

1   enable <priority> for fast call set-up

Implementation

Mandatory for a <u>MT</u> ~~ME~~ supporting AT commands only and eMLPP is implemented.

7.25   Automatic answer for eMLPP Service +CAAP

Table 58: +CAAP action command syntax

Command	Possible response(s)
+CAAP=<priority>,<status>	*+CME ERROR: <err>*
+CAAP?	+CAAP: <priority>[,<priority> [...]]
	+CME ERROR: <err>
+CAAP=?	+CAAP: (list of supported <priority>,<status>)

Description

The set command is used to edit the status of the priority level for automatic answering for eMLPP stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{AAeM}$. If the user has no subscription to the priority level status he wants to edit, an ERROR or +CME ERROR result code is returned.

The read command returns all enabled priority levels for automatic answering for eMLPP stored on the SIM card or in the active application in the UICC (GSM or USIM) EF$_{AAeM.}$ If no priority level is enabled for automatic answering for eMLPP, the result code OK is returned.

Defined values

<priority>: eMLPP automatic answer priority level value {A,B,0,1,..,4} as defined in 3GPP TS 22.067 [45]

<status>: integer type

0   disable eMLPP <priority> for automatic answering

1   enable eMLPP <priority> for automatic answering

Implementation

Mandatory for a <u>MT</u> ~~ME~~ supporting AT commands only and eMLPP is implemented.

7.26   User to User Signalling Service 1 +CUUS1

Table 59: +CUUS1 action command syntax

Command	Possible response(s)
+ CUUS1 =[<n>[,<m>[,<message>[,<UUIE> [,<message>[,<UUIE>[,...]]]]]]]]	*+CME ERROR: <err>*
+ CUUS1?	+ CUUS1: <n>,<m>[,<message>,<UUIE> [,<message>,<UUIE>[,...]]]
+ CUUS1=?	+ CUUS1: (list of supported <n>s), (list of supported <m>s), (list of supported <message>s), (list of supported <messageI>s), (list of supported <messageU>s)

Description

This command allows control of the User-to-User Signalling Supplementary Service 1 (UUS1) according to 3G 22.087 [58].

Parameters <message> and <UUIE> are used to activate/deactivate the implicit request of the User-to-User Signalling Supplementary Service 1.
When <message> and <UUIE> are both present the string specified in <UUIE> is included as the value part of the User-to-User Information Element (as defined in 3G 24.008) into all subsequent messages of type <message>. If parameter <message> is present but parameter <UUIE> is not present then the User-to-User Information Element shall not be present in subsequent messages of type <message>.

Parameters <n> and <m> are used to enable/disable the presentation of incoming User-to-User Information Elements.
When <n> = 1 and a User-to-User Information is received after a mobile originated call setup or after hanging up a call, intermediate result code +CUUS1I: <messageI>,<UUIE> is sent to the TE.
When <m> = 1 and a User-to-User Information is received during a mobile terminated call setup or during a remote party call hangup, unsolicited result code +CUUS1U: <messageU>,<UUIE> is sent to the TE.

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

The interaction of this command with other commands based on other supplementary services is described in the 3G standard.

Defined values
    <n> (parameter sets/shows the +CUUS1I result code presentation status in the TA)

    0   disable.

    1   enable.

    <m> (parameter sets/shows the +CUUS1U result code presentation status in the TA)

    0   disable.

    1   enable.

    <message> (type of message containing the outgoing User-to-User Information Element)

    0   ANY

    1   SETUP

    2   ALERT

    3   CONNECT

    4   DISCONNECT

    5   RELEASE

    6   RELEASE_COMPLETE

    <messageI> (type of message containing the intermediate User-to-User Information Element)

    0   ANY

    1   ALERT

    2   PROGRESS

    3   CONNECT (sent after +COLP if enabled)

    4   RELEASE

    <messageU> (type of message containing the unsollicited User-to-User Information Element)

0   ANY

1   SETUP (returned after +CLIP if presented, otherwise after every RING or +CRING)

2   DISCONNECT

3   RELEASE_COMPLETE

< UUIE>: the User-user Information Element (as defined in 3G 24.008) in hexadecimal character format (for hexadecimal format, refer +CSCS).

NOTE**:**   If the TA does not distinguish the type of message containing the User-to-user Information Element, it can use the value for ANY message.

Implementation

Optional.

7.27   Informative examples

This subclause includes all the GSM/UMTS supplementary service related commands, additional commands to lock MT ~~ME~~ and SIM/UICC capabilities, and commands to check the network registration status.

An example where MSISDNs ~~of a ME~~ are queried, calls are forwarded to different numbers when mobile is busy (CFB) or when it does not answer (CFNRy). The status of CFNRy is read:

```
AT+CNUM
+CNUM: ,"+358501234567",145,,4          (voice number)
OK
AT+CCFC=1,1,"931123456"                  (enable CFB)
OK
AT+CCFC=2,1,"921654321"                  (enable CFNRy)
OK
AT+CCFC=1,2                              (query CFNRy)
+CCFC: 1,7,"+35821654321",145,,,20       (forward after 20 seconds)
OK
```

An example of Call Waiting (+CCWA), Call Related Supplementary Services (+CHLD), and Connected Line Identification Presentation (+COLP) usage:

```
AT+CCWA=1,1;+COLP=1         (enable call waiting and COLP result codes)
OK
ATD9311234567;             (originate a voice call)
+COLP: "+358311234567",145
OK
...conversation...
+CCWA: "+358317654321",145  (another call is waiting)
AT+CHLD=2                  (put first call on hold and answer the second one)
OK
...conversation...
AT+CHLD=1                  (release the second (active) call and recover the first (held) call)
OK
ATH                        (release the first call)
OK
```

Call barring supplementary services are combined in one command, Facility Lock (+CLCK), which is also used to restrict MT ~~ME~~ and SIM/UICC functionality Some of the facilities require a password when enabled or disabled. An additional command, Change Password (+CPWD), is defined for changing the password of different barring and restriction facilities. An example where locking status of outgoing international calls is interrogated and then barred, and the password of the SIM/UICC card lock (Personal Identity Number, PIN) is changed:

```
AT+CLCK="OI",2
+CLCK: 0,7
OK
```

```
AT+CLCK="OI",1,"1234"
OK
AT+CPWD="SC","4321","1234"
OK
```

Operator Selection (+COPS) command is used for querying the status of all GSM/UMTS operators detected in the area, and switching between operators.

Following example illustrates a network selection sequence in Finland. Two operators are found, the status of Tele is unknown and Radiolinja is currently selected. Read command shows that automatic selection mode is on and that Radiolinja is selected. Then an attempt is made to access Tele, but it is denied (shown by +CME ERROR).

```
AT+COPS=?
+COPS: (2,"RADIOLINJA","RL","24405"),(0,"TELE","TELE","24491")
OK
AT+COPS?
+COPS: 0,0,"RADIOLINJA"
OK
AT+COPS=1,0,"TELE"
+CME ERROR: 3
```

When a terminal wanders between countries (i.e. networks), an application may follow this e.g. with the following scenario:

```
AT+CREG=1                      (enable +CREG: <stat> unsolicited result code)
OK
AT+CREG?
+CREG: 1,1                     (MT ME is registered in home PLMN)
OK
AT+COPS=3,2;+COPS?;+COPS=3,0;+COPS?
+COPS: 0,2,"24405"            (get the country...
+COPS: 0,0,"RADIOLINJA"       ...and operator name)
OK
...user wanders to another PLMN...
+CREG: 2                      (deregistered, roaming ongoing)
+CREG: 5                      (registered again, not home PLMN)
AT+COPS=3,2;+COPS?;+COPS=3,0;+COPS?
+COPS: 0,2,"24001"           (get the country...
+COPS: 0,0,"TELIA MOBITEL"    ...and operator name)
OK
...user loses connection, no other PLMNs around...
+CREG: 0
```

An example of eMLPP Supplementary Service usage for a ptp voice call:

```
ATD*752#+436644101453;        ( originate a voice call with the priority level 2, see for priority level definitions GSM 02.30 )
OK                            ( call setup was successful )
```

8   Mobile ~~Equipment~~ Termination control and status commands

This clause includes commands for MT ~~ME~~ power, keypad, display and indicator handling. Also commands for selecting, reading and writing of phonebooks, and setting real-time clock facilities are specified. Two commands are specified for accessing SIM/UICC database records in a general way.

Figure 7 illustrates the effect of these commands. Command Phone Activity Status +CPAS indicates the current general activity status of the MT~~ME~~. Command Set Phone Functionality +CFUN is used to set the MT ~~ME~~ to different power consumption states. Command Enter PIN +CPIN is used to enter ~~ME~~ passwords which are needed before any other functionality of the MT ~~ME~~ can be used (e.g. SIM PIN, PUK). Commands Generic SIM Access +CSIM and Restricted SIM Access +CRSM can be used to access all data in SIM/UICC. Commands Battery Charge +CBC and Signal Quality +CSQ are same as in TIA IS-135 [16] and they are used to query the battery charge of the MT ~~ME~~ and the current RSSI of the MT~~ME~~. Command Mobile ~~Equipment~~ Termination Control Mode +CMEC is used to select the controlling unit of MT ~~ME~~ keypad, display and indicators. Controlling commands for the TE are Keypad Emulation +CKPD, Display Control +CDIS and Indicator Control +CIND. If corresponding event reporting is enabled with command Mobile ~~Equipment~~ Termination Event Reporting +CMER, +CKEV is the result code of a keypad event, +CDEV is the result code of a display event, and +CIEV is the result code of an indicator event. Phonebook commands are Select Phonebook Memory Storage +CPBS, Read Phonebook Entries +CPBR, Find Phonebook Entries +CPBF and Write Phonebook

Entry +CPBW. Additional command Clock +CCLK can be used to control the real-time clock of the <u>MT</u> ~~ME~~ if available. Command Alarm +CALA sets possible alarm clock facilities of the <u>MT</u>~~ME~~.
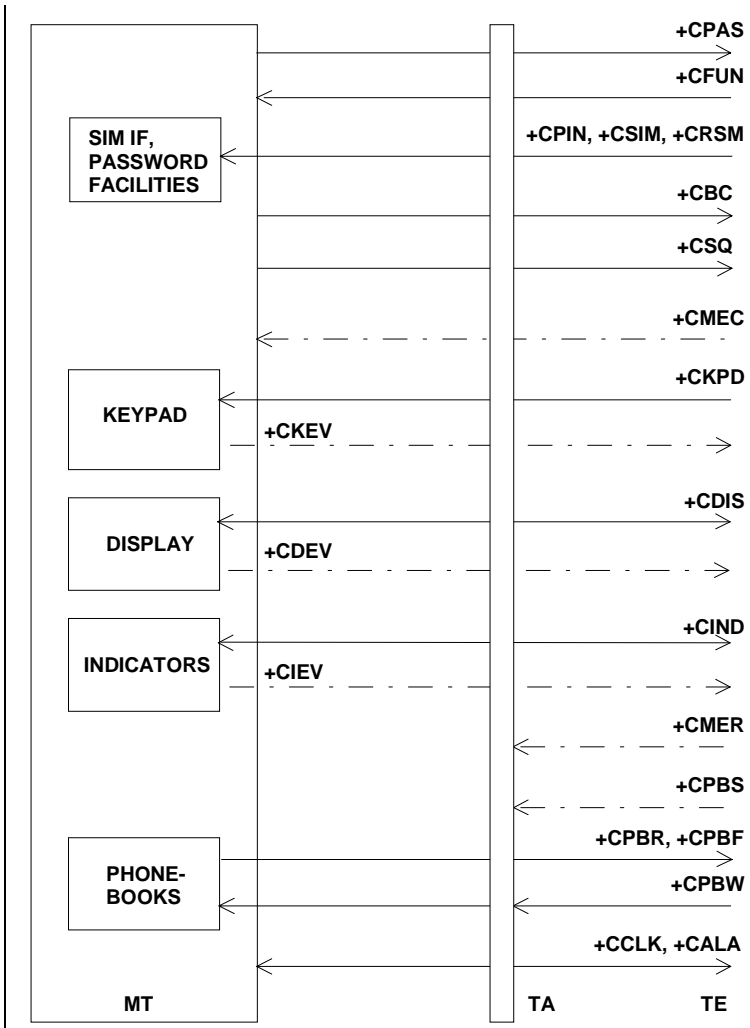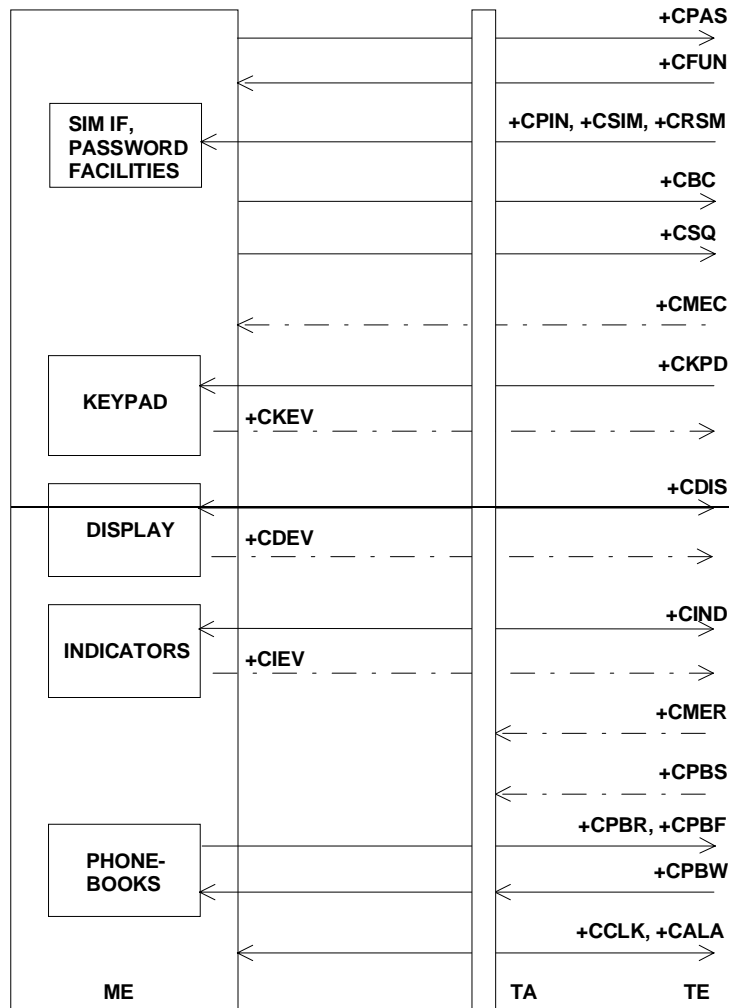
+CPAS

+CFUN

+CPIN, +CSIM, +CRSM

SIM IF,
PASSWORD
FACILITIES

+CBC

+CSQ

+CMEC

KEYPAD

+CKPD

+CKEV

+CDIS

DISPLAY

+CDEV

+CIND

INDICATORS

+CIEV

+CMER

+CPBS

+CPBR, +CPBF

PHONE-
BOOKS

+CPBW

+CCLK, +CALA

MT   TA   TE

Figure 7: Mobile ~~equipment~~ termination control and status commands

8.1 Phone activity status +CPAS

Table 60: +CPAS action command syntax

Command	Possible response(s)
+CPAS	+CPAS: <pas>
	+CME ERROR: <err>
+CPAS=?	+CPAS: (list of supported <pas>s)
	+CME ERROR: <err>

Description

Execution command returns the activity status <pas> of the ~~ME~~MT. It can be used to interrogate the MT~~ME~~ before requesting action from the phone. Refer subclause 9.2 for possible <err> values.

Test command returns values supported by the MT~~ME~~ as a compound value.

Defined values

<pas>:

0 ready (MT~~ME~~ allows commands from TA/TE)

1 unavailable (MT~~ME~~ does not allow commands from TA/TE)

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2 unknown (MT~~ME~~ is not guaranteed to respond to instructions)

3 ringing (MT~~ME~~ is ready for commands from TA/TE, but the ringer is active)

4 call in progress (MT~~ME~~ is ready for commands from TA/TE, but a call is in progress)

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

also all other values below 128 are reserved by the present document.

Implementation

Mandatory when MT~~ME~~ can be operated from TE (refer subclause "Mobile ~~Equipment~~ Termination control mode +CMEC").

8.2 Set phone functionality +CFUN

Table 61: +CFUN parameter command syntax

Command	Possible response(s)
+CFUN=[<fun>[,<rst>]]	*+CME ERROR: <err>*
+CFUN?	+CFUN: <fun>
	+CME ERROR: <err>
+CFUN=?	+CFUN: (list of supported <fun>s), (list of supported <rst>s)
	+CME ERROR: <err>

Description

Set command selects the level of functionality <fun> in the MT~~ME~~. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn. Level of functionality between these may also be specified by manufacturers. When supported by manufacturers, MT~~ME~~ resetting with <rst> parameter may be utilized. Refer subclause 9.2 for possible <err> values.

NOTE: It is manufacturer specific does this command affect network registration. Command Operator Selection +COPS is used to force registration/deregistration.

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

Defined values

<fun>:

0 minimum functionality

1 full functionality

2 disable phone transmit RF circuits only

3 disable phone receive RF circuits only

4 disable phone both transmit and receive RF circuits

5...127 reserved for manufacturers as intermediate states between full and minimum functionality

<rst>:

0 do not reset the MT~~ME~~ before setting it to <fun> power level

NOTE: This shall be always default when <rst> is not given.

1 reset the MT~~ME~~ before setting it to <fun> power level

Implementation

Optional.

8.3   Enter PIN +CPIN

Table 62: +CPIN parameter command syntax

Command	Possible response(s)
+CPIN=<pin>[,<newpin>]	*+CME ERROR: <err>*
+CPIN?	+CPIN: <code>
	+CME ERROR: <err>
+CPIN=?	

Description

Set command sends to the MTME a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH-SIM PIN, etc.). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken towards MTME and an error message, +CME ERROR, is returned to TE. Refer subclause 9.2 for possible <err> values.

If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM.

NOTE: Commands which interact with MTME that are accepted when MTME is pending SIM PIN, SIM PUK, or PH-SIM are: +CGMI, +CGMM, +CGMR, +CGSN, D112; (emergency call), +CPAS, +CFUN, +CPIN, +CDIS (read and test command only), and +CIND (read and test command only).

Read command returns an alphanumeric string indicating whether some password is required or not.

Defined values

<pin>, <newpin>: string type values

<code> values reserved by the present document:

READY   MTME is not pending for any password

SIM PIN   MTME is waiting SIM PIN to be given

SIM PUK   MTME is waiting SIM PUK to be given

PH-SIM PIN   MTME is waiting phone-to-SIM card password to be given

PH-FSIM PIN   MTME is waiting phone-to-very first SIM card password to be given

PH-FSIM PUK   MTME is waiting phone-to-very first SIM card unblocking password to be given

SIM PIN2   MTME is waiting SIM PIN2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered right after the failure, it is recommended that MTME does not block its operation)

SIM PUK2   MTME is waiting SIM PUK2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered right after the failure, it is recommended that MTME does not block its operation)

PH-NET PIN   MTME is waiting network personalization password to be given

PH-NET PUK   MTME is waiting network personalization unblocking password to be given

```
PH-NETSUB PIN   MTME is waiting network subset personalization password to be given

PH-NETSUB PUK   MTME is waiting network subset personalization unblocking password to be given

PH-SP PIN       MTME is waiting service provider personalization password to be given

PH-SP PUK       MTME is waiting service provider personalization unblocking password to be given

PH-CORP PIN     MTME is waiting corporate personalization password to be given

PH-CORP PUK     MTME is waiting corporate personalization unblocking password to be given
```

Implementation

Mandatory for ME MT not supporting the +CKPD command and supporting AT commands only.

8.4 Battery charge +CBC

Table 63: +CBC action command syntax

Command	Possible response(s)
+CBC	+CBC: <bcs>,<bcl>
	+CME ERROR: <err>
+CBC=?	+CBC: (list of supported <bcs>s),(list of supported <bcl>s)

Description

Execution command returns battery connection status <bcs> and battery charge level <bcl> of the MTME. Refer subclause 9.2 for possible <err> values.

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

Defined values

<bcs>:

0   MTME is powered by the battery

1   MTME has a battery connected, but is not powered by it

2   ME MT does not have a battery connected

3   Recognized power fault, calls inhibited

<bcl>:

0   battery is exhausted, or MTME does not have a battery connected

1...100 battery has 1-100 percent of capacity remaining

Implementation

Optional.

8.5 Signal quality +CSQ

Table 64: +CSQ action command syntax

Command	Possible response(s)
+CSQ	+CSQ: <rssi>,<ber>
	+CME ERROR: <err>

+CSQ=?	+CSQ: (list of supported <rssi>s),(list of supported <ber>s)

Description

Execution command returns received signal strength indication <rssi> and channel bit error rate <ber> from the MT~~ME~~. Refer subclause 9.2 for possible <err> values.

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

<rssi>:

0   -113 dBm or less

1   -111 dBm

2...30 -109... -53 dBm

31 -51 dBm or greater

99 not known or not detectable

<ber> (in percent):

0...7   as RXQUAL values in the table in TS 45.008 [20] subclause 8.2.4

99 not known or not detectable

Implementation

Optional.

8.6 Mobile ~~Equipment~~ Termination control mode +CMEC

Table 65: +CMEC parameter command syntax

Command	Possible response(s)
+CMEC=[<keyp>[,<disp>[,<ind>]]]	*+CME ERROR: <err>*
+CMEC?	+CMEC: <keyp>,<disp>,<ind>
+CMEC=?	+CMEC: (list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s)

Description

Set command selects the equipment, which operates MT~~ME~~ keypad, writes to MT~~ME~~ display and sets MT~~ME~~ indicators. If operation mode is not allowed by the ~~ME~~MT, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the modes supported ~~by the TA as~~ compound values.

Defined values

<keyp>:

0   MT~~ME~~ can be operated only through its keypad (execute command of +CKPD cannot be used)

1   MT~~ME~~ can be operated only from TE (with command +CKPD)

2   MT~~ME~~ can be operated from both MT~~ME~~ keypad and TE

<disp>:

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0 only MT~~ME~~ can write to its display (command +CDIS can only be used to read the display)

1 only TE can write to MT~~ME~~ display (with command +CDIS)

2 MT~~ME~~ display can be written by both MT~~ME~~ and TE

<ind>:

0 only MT~~ME~~ can set the status of its indicators (command +CIND can only be used to read the indicators)

1 only TE can set the status of MT~~ME~~ indicators (with command +CIND)

2 MT~~ME~~ indicators can be set by both MT~~ME~~ and TE

Implementation

Mandatory when any of keypad, display or indicator commands is implemented.

8.7 Keypad control +CKPD

Table 66: +CKPD action command syntax

Command	Possible response(s)
+CKPD=<keys>[,<time>[,<pause>]]	*+CME ERROR: <err>*
+CKPD=?	

Description

Execution command emulates MT~~ME~~ keypad by giving each keystroke as a character in a string <keys>. <time>*0.1 seconds is the time to stroke each key and <pause>*0.1 seconds is the length of pause between two strokes. If emulating fails in an MT~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. This command should be accepted (OK returned) before actually starting to press the keys. Thus unsolicited result codes of key pressings and display events can be returned (refer subclause "Mobile ~~Equipment~~ Termination event reporting +CMER").

Defined values

<keys>: string of characters representing keys as listed in the following table (based on PCCA STD-101 Annex table I-3). Colon character (IRA 58) followed by one character can be used to indicate a manufacturer specific key not listed here. All characters from a semicolon character (IRA 59) to the next single semicolon character are treated as alpha entries and are not converted to key equivalents. All semicolon characters inside alpha entries should be duplicated in the TE and stripped to one before entering to the MT~~ME~~. Pause character (IRA 87 or 119) can be used to pause between key pressings for a time specified by <pause>. All IRA values not listed here are reserved.

Table 67: Character codes

Char	IRA (dec)	Comment (+ some known key symbols)
#	35	hash (number sign)
%	37	percent sign (P)
*	42	star (*)
0... 9	48... 57	number keys
:	58	escape character for manufacturer specific keys
;	59	escape character for string entering
<	60	left arrow
>	62	right arrow
@	64	alpha key (α/ABC)
A/a	65/97	channel A (A)
B/b	66/98	channel B (B)

Char	IRA (dec)	Comment (+ some known key symbols)
C/c	67/99	clear display (C/CLR)
D/d	68/100	volume down
E/e	69/101	connection end (END)
F/f	70/102	function (FCN)
L/l	76/108	phone lock (LOCK)
M/m	77/109	menu (MENU)
P/p	80/112	power (PWR)
Q/q	81/113	quiet/mute (MUTE)
R/r	82/114	recall last number (R/RCL/MR)
S/s	83/115	connection start (SEND)
T/t	84/116	store/ memory (STO/M/M+)
U/u	85/117	volume up
V/v	86/118	down arrow
W/w	87/119	pause character
X/x	88/120	auxiliary (AUX)
Y/y	89/121	delete last character (C)
[	91	soft key 1
]	93	soft key 2
^	94	up arrow

`<time>, <pause>:`

0...255   0... 25.5 seconds (default values are manufacturer specific, but should be so long that a normal MT~~ME~~ can handle keystrokes correctly)

Implementation

Mandatory for MT~~ME~~ not supporting the +CPIN command and supporting AT commands only.

8.8   Display control +CDIS

Table 68: +CDIS parameter command syntax

Command	Possible response(s)
+CDIS=[<text>[,<text>[,...]]]	*+CME ERROR: <err>*
+CDIS?	+CDIS: <text>[,<text>[,...]]
	+CME ERROR: <err>
+CDIS=?	+CDIS: <length>[,<length>[,...]]
	+CME ERROR: <err>

Description

Set command is used to write the contents of MT~~ME~~ text type display elements. An element can consist of one character or several characters. The order of element parameters `<text>` should follow the rule: first is the element in upper left corner, second is the next element to the right and so on. The last element is the element in lower right corner. The number of elements is MT~~ME~~ specific. If MT~~ME~~ does not allow writing to its display or MT~~ME~~ is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for `<err>` values. If certain element is not writable, setting of it should be ignored. If element parameter is empty field, element shall remain in the previous value.

   NOTE 1: This command cannot be used to write to a display which sum of element lengths exceed the length of the command line buffer of the TA.

Read command returns the contents of MT~~ME~~ display elements. If `<text>` field is empty (not empty string), MT~~ME~~ does not allow the reading of corresponding element. If MT~~ME~~ is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for `<err>` values.

Test command returns maximum length of each display element. If <u>MT</u><s>ME</s> does not offer the length of elements, <length> fields should be empty. If <u>MT</u><s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

NOTE 2: <u>MT</u><s>ME</s> manufacturer should offer the order and maximum length of elements.

Defined values

<text>: string type parameter using character set specified by command Select TE Character Set +CSCS

<length>: integer type parameter giving the maximum length of corresponding <text> parameter

Implementation

Optional.

8.9 Indicator control +CIND

Table 69: +CIND parameter command syntax

Command	Possible response(s)
+CIND=[<ind>[,<ind>[,...]]]	*+CME ERROR: <err>*
+CIND?	+CIND: <ind>[,<ind>[,...]]
	+CME ERROR: <err>
+CIND=?	+CIND: (<descr>,(list of supported <ind>s)) [,(<descr>,(list of supported <ind>s))[,...]]
	+CME ERROR: <err>

Description

Set command is used to set the values of <u>MT</u><s>ME</s> indicators. <ind> value 0 means that the indicator is off (or in state which can be identified as "off"-state), 1 means that indicator is on (or in a state which is more substantial than "off"-state), 2 is more substantial than 1, and so on. If the indicator is a simple on/off style element, it has values 0 and 1. The number of elements is <u>MT</u><s>ME</s> specific. If <u>MT</u><s>ME</s> does not allow setting of indicators or <u>MT</u><s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. If certain indicator is not writable, setting of it should be ignored. If parameter is empty field, indicator shall remain in the previous value.

Read command returns the status of <u>MT</u><s>ME</s> indicators. If <u>MT</u><s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns pairs, where string value <descr> is a maximum 16 character description of the indicator and compound value is the allowed values for the indicator. If <u>MT</u><s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

NOTE: <u>MT</u><s>ME</s> manufacturer should offer the description of supported indicators not listed here and their value ranges and default values.

Defined values

<ind>: integer type value, which shall be in range of corresponding <descr>

<descr> values reserved by the present document and their <ind> ranges:

"battchg" battery charge level (0-5)

"signal" signal quality (0-5)

"service" service availability (0-1)

"sounder" sounder activity (0-1)

"message"   message received (0-1)

"call"   call in progress (0-1)

"vox"   transmit activated by voice activity (0-1)

"roam"   roaming indicator (0-1)

"smsfull"   a short message memory storage in the MT has become full (1), or memory locations are available (0); i.e. the range is (0-1)

Implementation

Optional.

8.10   Mobile ~~Equipment~~ Termination event reporting +CMER

Table 70: +CMER parameter command syntax

Command	Possible response(s)
+CMER=[<mode>[,<keyp>[,<disp>[,<ind>[,<bfr>]]]]]	*+CME ERROR: <err>*
+CMER?	+CMER: <mode>,<keyp>,<disp>,<ind>,<bfr>
+CMER=?	+CMER: (list of supported <mode>s),(list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s),(list of supported <bfr>s)

Description

Set command enables or disables sending of unsolicited result codes from TA to TE in the case of key pressings, display changes, and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1, 2 or 3 is entered. If setting is not supported by the MT~~ME~~, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the modes supported ~~by the TA~~ as compound values.

Defined values

<mode>:

0   buffer unsolicited result codes in the TA; if TA result code buffer is full, codes can be buffered in some other place or the oldest ones can be discarded

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

3   forward unsolicited result codes directly to the TE; TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<keyp>:

0   no keypad event reporting

1   keypad event reporting using result code +CKEV: <key>,<press>. <key> indicates the key (refer IRA values defined in table in subclause "Keypad control +CKPD") and <press> if the key is pressed or released (1 for pressing and 0 for releasing). Only those key pressings, which are not caused by +CKPD shall be indicated by the TA to the TE.

NOTE 1: When this mode is enabled, corresponding result codes of all keys currently pressed should be flushed to the TA regardless of `<bfr>` setting.

2 keypad event reporting using result code `+CKEV: <key>,<press>`. All key pressings shall be directed from TA to TE.

NOTE 2: When this mode is enabled, corresponding result codes of all keys currently pressed should be flushed to the TA regardless of `<bfr>` setting.

`<disp>`:

0 no display event reporting

1 display event reporting using result code `+CDEV: <elem>,<text>`. `<elem>` indicates the element order number (as specified for `+CDIS`) and `<text>` is the new value of text element. Only those display events, which are not caused by `+CDIS` shall be indicated by the TA to the TE. Character set used in `<text>` is as specified by command Select TE Character Set `+CSCS`

2 display event reporting using result code `+CDEV: <elem>,<text>`. All display events shall be directed from TA to TE. Character set used in `<text>` is as specified by command Select TE Character Set `+CSCS`

`<ind>`:

0 no indicator event reporting

1 indicator event reporting using result code `+CIEV: <ind>,<value>`. `<ind>` indicates the indicator order number (as specified for `+CIND`) and `<value>` is the new value of indicator. Only those indicator events, which are not caused by `+CIND` shall be indicated by the TA to the TE

2 indicator event reporting using result code `+CIEV: <ind>,<value>`. All indicator events shall be directed from TA to TE

`<bfr>`:

0 TA buffer of unsolicited result codes defined within this command is cleared when `<mode>` 1...3 is entered

1 TA buffer of unsolicited result codes defined within this command is flushed to the TE when `<mode>` 1...3 is entered (`OK` response shall be given before flushing the codes)

Implementation

Mandatory when any of the keypad, display, or indicator result codes is implemented.

8.11 Select phonebook memory storage +CPBS

Table 71: +CPBS parameter command syntax

Command	Possible response(s)
`+CPBS=<storage>` `[,<password>]`	*+CME ERROR: <err>*
`+CPBS?`	`+CPBS: <storage>[,<used>,<total>]` *+CME ERROR: <err>*
`+CPBS=?`	`+CPBS:` (list of supported `<storage>`s)

Description

Set command selects phonebook memory storage `<storage>`, which is used by other phonebook commands. If setting fails in an ~~MT~~ME error, `+CME ERROR: <err>` is returned. Refer subclause 9.2 for `<err>` values.

Read command returns currently selected memory, and when supported by manufacturer, number of used locations and total number of locations in the memory.

Test command returns supported storages as compound value.

Defined values

<storage> values reserved by the present document:

"DC"   MT~~ME~~ dialled calls list (+CPBW may not be applicable for this storage)

"EN"   SIM/USIM (or MT~~ME~~) emergency number (+CPBW is not be applicable for this storage)

"FD"   SIM/USIM fixdialling-phonebook. If a SIM card is present or if a UICC with an active GSM application is present, the information in EF$_{FDN}$ under DF$_{Telecom}$ is selected. If a UICC with an active USIM application is present, the information in EF$_{FDN}$ under ADF$_{USIM}$ is selected.

"LD"   SIM/UICC last-dialling-phonebook

"MC"   MT~~ME~~ missed (unanswered received) calls list (+CPBW may not be applicable for this storage)

"ME"   MT~~ME~~ phonebook

"MT"   combined MT~~ME~~ and SIM/USIM phonebook

"ON"   SIM (or MT~~ME~~) own numbers (MSISDNs) list (reading of this storage may be available through +CNUM also). When storing information in the SIM/UICC, if a SIM card is present or if a UICC with an active GSM application is present, the information in EF$_{MSISDN}$ under DF$_{Telecom}$ is selected. If a UICC with an active USIM application is present, the information in EF$_{MSISDN}$ under ADF$_{USIM}$ is selected.

"RC"   MT~~ME~~ received calls list (+CPBW may not be applicable for this storage)

"SM"   SIM/UICC phonebook. If a SIM card is present or if a UICC with an active GSM application is present, the EF$_{ADN}$ under DF$_{Telecom}$ is selected. If a UICC with an active USIM application is present, the global phonebook, DF$_{PHONEBOOK}$ under DF$_{Telecom}$ is selected.

"TA"   TA phonebook

"AP"   Selected application phonebook. If a UICC with an active USIM application is present, the application phonebook, DF$_{PHONEBOOK}$ under ADF$_{USIM}$ is selected.

<password>: string type value representing the PIN2-code required when selecting PIN2-code locked <storage>s above, e.g. "FD" or the hidden key to be verified in order to access to the hidden phonebook entries in the UICC/USIM or any other phonebook with hidden entries.

If the combined phonebook is selected, "MT", the <password> will correspond to the hidden key of the USIM phonebook.

<used>: integer type value indicating the number of used locations in selected memory

<total>: integer type value indicating the total number of locations in selected memory

Implementation

Mandatory when phonebook read, find or write command, or direct dialling (refer subclause "Direct dialling from phonebooks") is implemented.

8.12   Read phonebook entries +CPBR

Table 72: +CPBR action command syntax

Command	Possible response(s)
+CPBR=<index1> [,<index2>]	[+CPBR: <index1>,<number>,<type>,<text>[,<hidden>]][[...] <CR><LF>+CPBR: <index2>,<number>,<type>,<text>[,<hidden>]]] *+CME ERROR: <err>*

+CPBR=?	+CPBR: (list of supported <index>s),[<nlength>],[<tlength>]
	+CME ERROR: <err>

Description

Execution command returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned. Entry fields returned are location number <index*n*>, phone number stored there <number> (of format <type>), text <text> associated with the number and , if the selected phonebook supports hidden entries, <hidden> indicating if the entry is hidden. If all queried locations are empty (but available), no information text lines may be returned. If listing fails in an ~~MT~~ME error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns location range supported by the current storage as a compound value and the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If ~~MT~~ME is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Defined values

<index1>, <index2>, <index>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

<hidden>: indicates if the entry is hidden or not

<u>0</u>:   phonebook entry not hidden

1:         phonebook entry hidden

Implementation

Optional.

8.13   Find phonebook entries +CPBF

Table 73: +CPBF action command syntax

Command	Possible response(s)
+CPBF=<findtext>	[+CPBF: <index1>,<number>,<type>,<text>[,<hidden>][[...] <CR><LF>+CBPF: <index2>,<number>,<type>,<text>[,<hidden>]]]
	+CME ERROR: <err>
+CPBF=?	+CPBF: [<nlength>],[<tlength>]
	+CME ERROR: <err>

Description

Execution command returns phonebook entries (from the current phonebook memory storage selected with +CPBS) which alphanumeric field start with string <findtext>. Entry fields returned are location number <index*n*>, phone number stored there <number> (of format <type>), text <text> associated with the number and, if the selected

phonebook supports hidden entries, <hidden> indicating if the entry is hidden. If listing fails in an ~~ME~~ MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If ~~ME~~ MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Defined values

<index1>, <index2>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

<findtext>, <text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

<hidden>: indicates if the entry is hidden or not

0: phonebook entry not hidden

1: phonebook entry hidden

Implementation

Optional.

8.14 Write phonebook entry +CPBW

Table 74: +CPBW action command syntax

Command	Possible response(s)
+CPBW=[<index>][,<number> [,<type>[,<text>[,<hidden>]]]]	*+CME ERROR: <err>*
+CPBW=?	+CPBW: (list of supported <index>s),[<nlength>], (list of supported <type>s),[<tlength>] *+CME ERROR: <err>*

Description

Execution command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS. Entry fields written are phone number <number> (in the format <type>), text <text> associated with the number and, if the selected phonebook supports hidden entries, <hidden> parameter, which indicates if the entry is hidden or not. If those fields are omitted, phonebook entry is deleted. If <index> is left out, but <number> is given, entry is written to the first free location in the phonebook (the implementation of this feature is manufacturer specific). If writing fails in an MT~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns location range supported by the current storage as a compound value, the maximum length of <number> field, supported number formats of the storage, and the maximum length of <text> field. In case of SIM storage, the lengths may not be available. If MT~~ME~~ is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. If storage does not offer format information, the format list should be empty parenthesis

Defined values

<index>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7) ; default 145 when dialling string includes international access code character "+", otherwise 129

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

<hidden>: indicates if the entry is hidden or not

0: phonebook entry not hidden

1: phonebook entry hidden

Implementation

Optional.

8.15 Clock +CCLK

Table 75: +CCLK parameter command syntax

Command	Possible response(s)
+CCLK=<time>	*+CME ERROR: <err>*

+CCLK?	+CCLK: <time>
	+CME ERROR: <err>
+CCLK=?	

Description

Set command sets the real-time clock of the MT~~ME~~. If setting fails in an MT~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current setting of the clock.

Defined values

<time>: string type value; format is "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48). E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to "94/05/06,22:10:00+08"

NOTE: If MT~~ME~~ does not support time zone information then the three last characters of <time> are not returned by +CCLK?. The format of <time> is specified by use of the +CSDF command.

Implementation

Optional.

8.16 Alarm +CALA

Table 76: +CALA parameter command syntax

Command	Possible response(s)
+CALA=<time>[,<n>[,<type> [,<text>[,<recurr>[,<silent >]]]]]	*+CME ERROR: <err>*
+CALA?	[+CALA: <time>,<n1>,<type>,[<text>],[<recurr>],<silent > [<CR><LF>+CALA: <time>,<n2>,<type>,[<text>],[<recurr>],<silent > [...]]] *+CME ERROR: <err>*
+CALA=?	+CALA: (list of supported <n>s),(list of supported <type>s),<tlength>,<rlength>,(list of supported <silent>s) *+CME ERROR: <err>*

Description

Set command sets an alarm time in the MT~~ME~~. There can be an array of different types of alarms, and each alarm may cause different text to be displayed in the MT~~ME~~ display. If setting fails in an MT~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

To set up a recurrent alarm for one or more days in the week, the <recurr>-parameter may be used.

When an alarm is timed out and executed, the unsolicited result code +CALV: <n> is always returned, even if the alarm is set up to be silent.

Read command returns the list of current active alarm settings in the MT~~ME~~.

Test command returns supported array index values, alarm types, and maximum length of the text to be displayed.

Defined values

<time>: refer +CCLK,+CSDF

NOTE: If the <recurr>-parameter is used, the <time>-parameter must not contain a date.

<n>, <n1>, <n2>: integer type value indicating the index of the alarm; default is manufacturer specific

<type>: integer type value indicating the type of the alarm (e.g. sound, volume, LED); values and default are manufacturer specific

<text>: string type value indicating the text to be displayed when alarm time is reached; maximum length <tlength>

<tlength>: integer type value indicating the maximum length of <text>

<recurr>: string type value indicating day of week for the alarm in one of the following formats:

"<1..7>[,<1..7>[…]]" – Sets a recurrent alarm for one or more days in the week. The digits 1 to 7 corresponds to the days in the week, Monday (1), …, Sunday (7).
Example: The string "1,2,3,4,5" may be used to set an alarm for all weekdays.

"0" – Sets a recurrent alarm for all days in the week.

<rlength>: integer type value indicating the maximum length of <recurr>

<silent>: Integer type value indicating if the alarm is silent or not. If set to 1 the alarm will be silent and the only result from the alarm is the unsolicited result code +CALV. If set to 0 the alarm will not be silent.

Implementation

Optional.

8.17   Generic SIM access +CSIM

Table 77: +CSIM action command syntax

Command	Possible response(s)
+CSIM=<length>,<command>	+CSIM: <length>,<response>
	+CME ERROR: <err>
+CSIM=?	

Description

Set command transmits to the ~~MT~~ME the <command> it then shall send as it is to the SIM. In the same manner the SIM <response> shall be sent back by the ~~MT~~ME to the TA as it is. Refer subclause 9.2 for <err> values.

This command allows a direct control of the SIM by an distant application on the TE. The TE shall then take care of processing SIM information within the frame specified by GSM/UMTS.

NOTE: Compared to Restricted SIM Access command +CRSM, the definition of +CSIM allows TE to take more control over the SIM-~~MT~~ME interface. The locking and unlocking of the interface may be done by a special <command> value or automatically by TA/MT ~~ME~~ (by interpreting <command> parameter). In case that TE application does not use the unlock command (or does not send a <command> causing automatic unlock) in a certain timeout value, ~~MT~~ME may release the locking.

Defined values

<length> : integer type; length of the characters that are sent to TE in <command> or <response> (two times the actual length of the command or response)

<command> : command passed on by the ~~ME~~ MT to the SIM in the format as described in GSM 51.011 [28] (hexadecimal character format; refer +CSCS)

<response> : response to the command passed on by the SIM to the ~~ME~~ MT in the format as described in GSM 51.011 [28] (hexadecimal character format; refer +CSCS)

Implementation

Optional.

8.18   Restricted SIM access +CRSM

Table 1: +CRSM action command syntax

Command	Possible response(s)
+CRSM=<command>[,<fileid> [,<P1>,<P2>,<P3>[,<data>]]]	+CRSM: <sw1>,<sw2>[,<response>] *+CME ERROR: <err>*
+CRSM=?	

Description

By using this command instead of Generic SIM Access +CSIM TE application has easier but more limited access to the SIM database. Set command transmits to the MT~~ME~~ the SIM <command> and its required parameters. MT~~ME~~ handles internally all SIM-MT~~ME~~ interface locking and file selection routines. As response to the command, MT~~ME~~ sends the actual SIM information parameters and response data. MT~~ME~~ error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters. Refer to subclause 9.2 for <err> values.

Coordination of command requests to SIM and the ones issued by GSM/UMTS application inside the MT~~ME~~ is implementation dependent. However the TE should be aware of the precedence of the GSM/UMTS application commands to the TE commands.

Defined values

<command> (command passed on by the MT~~ME~~ to the SIM; refer GSM 51.011 [28]):

176   READ BINARY

178   READ RECORD

192   GET RESPONSE

214   UPDATE BINARY

220   UPDATE RECORD

242   STATUS

all other values are reserved

NOTE 1: The MT~~ME~~ internally executes all commands necessary for selecting the desired file, before performing the actual command.

<fileid>: integer type; this is the identifier of a elementary datafile on SIM. Mandatory for every command except STATUS

NOTE 2: The range of valid file identifiers depends on the actual SIM and is defined in GSM 51.011 [28]. Optional files may not be present at all.

<P1>, <P2>, <P3>: integer type; parameters passed on by the MT~~ME~~ to the SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in GSM 51.011 [28]

<data>: information which shall be written to the SIM (hexadecimal character format; refer +CSCS)

<sw1>, <sw2>: integer type; information from the SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command

<response>: response of a successful completion of the command previously issued (hexadecimal character format; refer +CSCS). STATUS and GET RESPONSE return data, which gives information about the current elementary datafield. This information includes the type of file and its size (refer GSM 51.011 [28]). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command

Implementation

Optional.

8.19 Secure control command +CSCC

Table 79: +CSCC parameter command syntax

Command	Possible response(s)
+CSCC=<mode>[,<cmd_set>[, <token>]]	+CSCC: <challenge> *+CME ERROR: <err>*
+CSCC?	+CSCC: <mode>,<cmd_set1> [<CR><LF>+CSCC: <mode>,<cmd_set2> [...]] *+CME ERROR: <err>*
+CSCC=?	+CSCC: (list of supported <mode>s),(list of supported <cmd_set>s)

Description

This command is used to enable/disable access to commands protected by security mechanism. This enables/disables access to command sets designated as "secure" such as programming of MT~~ME~~. Refer subclause 9.2 for possible <err> values.

The TE asks for a <challenge> with <mode>=1 and one specific command set (<cmd_set>), the MT~~ME~~ replies with the <challenge>, which should be inserted into the identification algorithm in both entities (TE and MT~~ME~~). The algorithm output <token> is sent to the MT~~ME~~ with <mode>=2 to enable the specified command set. <mode>=3 is used to disable the command set.

The read command returns the status (<mode> 2 or 3) of each supported command set.

Defined values

    <mode>:

1   request challenge token to enable access to specified command set

2   enable access to specified command set (<token> required)

3   disable access to specified command set

    <cmd_set>, <cmd_set1>, <cmd_set2>:

0   MT/TA ~~MS~~ code re-programming command set.

    other values below 128 are reserved by the present document

<token>: string type; a variable length bit string represented with IRA characters 0 - 9 and A - F, each character representing a nibble; e.g. bit string "0110 1100 1001 1010" is represented by the IRA string "6C9A". The length of the required bit string varies depending on the value of <cmd_set>.

<challenge>: same format as token

Implementation

Optional.

8.20 Alert sound mode +CALM

Table 80: +CALM parameter command syntax

Command	Possible response(s)
+CALM=<mode>	*+CME ERROR: <err>*
+CALM?	+CALM: <mode>
	+CME ERROR: <err>
+CALM=?	+CALM: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to select the general alert sound mode of the MTME. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

   <mode>:

<u>0</u> normal mode

1 silent mode (all sounds from MTME are prevented)

2… manufacturer specific

Implementation

Optional.

8.21 Ringer sound level +CRSL

Table 81: +CRSL parameter command syntax

Command	Possible response(s)
+CRSL=<level>	*+CME ERROR: <err>*
+CRSL?	+CRSL: <level>
	+CME ERROR: <err>
+CRSL=?	+CRSL: (list of supported <level>s)
	+CME ERROR: <err>

Description

This command is used to select the incoming call ringer sound level of the MTME. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

   <level>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

Implementation

Optional.

8.22 Vibrator mode +CVIB

Table 82: +CVIB parameter command syntax

Command	Possible response(s)
+CVIB=<mode>	*+CME ERROR: <err>*
+CVIB?	+CVIB: <mode>
	+CME ERROR: <err>
+CVIB=?	+CVIB: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to enable and disable the vibrator alert feature of the MTME. It is manufacturer specific how this interacts with +CALM command. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

<mode>:

0   disable

1   enable

...15   reserved by the present document

16…   manufacturer specific

Implementation

Optional.

8.23 Loudspeaker volume level +CLVL

Table 83: +CLVL parameter command syntax

Command	Possible response(s)
+CLVL=<level>	*+CME ERROR: <err>*
+CLVL?	+CLVL: <level>
	+CME ERROR: <err>
+CLVL=?	+CLVL: (list of supported <level>s)
	+CME ERROR: <err>

Description

This command is used to select the volume of the internal loudspeaker of the MTME. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

<level>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

Implementation

Optional.

8.25   Accumulated call meter +CACM

Table 85: +CACM parameter command syntax

Command	Possible response(s)
+CACM=[<passwd>]	*+CME ERROR: <err>*
+CACM?	+CACM: <acm>
	+CME ERROR: <err>
+CACM=?	

Description

Set command resets the Advice of Charge related accumulated call meter value in SIM card or in the active application in the UICC (GSM or USIM) file EF_{ACM}. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value. If setting fails in an MTME error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current value of ACM.

Defined values

<passwd>: string type; SIM PIN2

<acm>: string type; accumulated call meter value similarly coded as <ccm> under +CAOC

Implementation

Optional.

8.26   Accumulated call meter maximum +CAMM

Table 86: +CAMM parameter command syntax

Command	Possible response(s)
+CAMM=[<acmmax>[,<passwd>]]	*+CME ERROR: <err>*
+CAMM?	+CAMM: <acmmax>
	+CME ERROR: <err>
+CAMM=?	

Description

Set command sets the Advice of Charge related accumulated call meter maximum value in SIM card or in the active application in the UICC (GSM or USIM) file EF_{ACMmax}. ACMmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM (refer +CACM) reaches ACMmax calls are prohibited (see also 3GPP TS 22.024 [26]). SIM PIN2 is usually required to set the value. If setting fails in an MT ME error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current value of ACMmax.

Defined values

<acmmax>: string type; accumulated call meter maximum value similarly coded as <ccm> under +CAOC; value zero disables ACMmax feature

<passwd>: string type; SIM PIN2

Implementation

Optional.

8.27 Price per unit and currency table +CPUC

Table 87: +CPUC parameter command syntax

Command	Possible response(s)
+CPUC=<currency>,<ppu>[,<passwd>]	*+CME ERROR: <err>*
+CPUC?	+CPUC: <currency>,<ppu>
	+CME ERROR: <err>
+CPUC=?	

Description

Set command sets the parameters of Advice of Charge related price per unit and currency table in SIM card or in the active application in the UICC (GSM or USIM) file EF$_{PUCT}$. PUCT information can be used to convert the home units (as used in +CAOC, +CACM and +CAMM) into currency units. SIM PIN2 is usually required to set the parameters. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current parameters of PUCT.

Defined values

<currency>: string type; three-character currency code (e.g. "GBP", "DEM"); character set as specified by command Select TE Character Set +CSCS

<ppu>: string type; price per unit; dot is used as a decimal separator (e.g. "2.66")

<passwd>: string type; SIM PIN2

Implementation

Optional.

8.28 Call Meter maximum event +CCWE

Table 88: +CCWE parameter command syntax

Command	Possible response(s)
+CCWE=<mode>	*+CME ERROR: <err>*
+CCWE?	+CCWE: <mode>
	+CME ERROR: <err>
+CCWE=?	+CCWE: (list of supported <mode>s)
	+CME ERROR: <err>

Description

Shortly before the ACM (Accumulated Call Meter) maximum value is reached, an unsolicited result code +CCWV will be sent, if enabled by this command. The warning is issued approximately when 30 seconds call time remains. It is also issued when starting a call if less than 30 s call time remains. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current setting.

Test command returns supported settings.

Defined values

<mode>:

0 Disable the call meter warning event

1 Enable the call meter warning event

Implementation

Optional.

8.29 Power class +CPWC

Table 89: +CPWC parameter command syntax

Command	Possible response(s)
+CPWC=[<class>[,<band>]]	*+CME ERROR: <err>*
+CPWC?	+CPWC: <curr_class1>,<def_class1>,<band1>[,<curr_class2>,<def_class2>,<band2>[...]] *+CME ERROR: <err>*
+CPWC=?	+CPWC: list of supported (<band>,(list of <class>s)) pairs *+CME ERROR: <err>*

Description

This command is used to set the preferred MT ME power class for each GSM frequency band supported. The interaction of this setting with the selected bearer service (+CBST and HSCSD commands) is manufacturer specific (for example, selecting a multislot operation might reduce the power class automatically). If setting fails in an MT ME error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the currently selected output power class and default output power class for each supported frequency band (as defined by MT ME manufacturer). Parameter <band1> and its associated power class parameters refer to the currently used frequency band. For example, +CPWC: 2,1,1,5,4,0 in case of a dual-band MT ME currently using band GSM1800, for which the power class is currently set to 2, the default being class 1, and for which the currently set power class value for GSM900 is class 5 the default being class 4.

Test command returns supported bands and their power classes. For example,

+CPWC: (0,(0,4,5)),(1,(0-2)) in case of a dual-band handheld MT ME.

Defined values

   <class>, <curr_class*n*>s, <def_class*n*>s:

0 default (not applicable to <curr_class>s or <def_class*n*>s)

1… MT MS output power class as in GSM 45.005 [38]

   <band>, <band*n*>s:

0 GSM900

1 GSM1800

2 reserved for GSM1900

3 GSM 400

Implementation

Optional.

8.30   Set Language +CLAN

Table 90: +CLAN parameter command syntax

Command	Possible response(s)
+CLAN=<code>	*+CME ERROR: <err>*
+CLAN?	+CLAN: <code>
	+CME ERROR: <err>
+CLAN=?	+CLAN:(list of supported <code>s)
	+CME ERROR: <err>

Description

This command sets the language in the MT~~ME~~. The set-command must confirm the selected language with the MMI-module in the MT~~ME~~. If setting fails, a MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

The <code>-parameter is a two-letter abbreviation of the language. The language codes, as defined in ISO 639, consists of two characters, e.g. "sv", "en" etc.

The complete set of language codes to be used are manufacturer specific and should all be possible to use with the command. Some examples are described under <code>. For a complete list see ISO 639.

The read command gives the current language as output. If the language has been set to "AUTO", the read command returns the current language set from the SIM-card /UICC. Hence, the "AUTO"-code is never returned by the read-command.

Test command returns supported <code>s.

Defined values

<code>: (not all language codes are present in this list)

"AUTO"   Read language from SIM-card /UICC. "Auto" is not returned by the read-command.

"sw"   Swedish

"fi"   Finnish

"da"   Danish

"no"   Norwegian

"de"   German

"fr"   French

"es"   Spanish

"it"   Italian

"en"   English

Implementation

Optional.

8.31 Language Event +CLAE

Table 91: +CLAE parameter command syntax

Command	Possible response(s)
+CLAE=<mode>	*+CME ERROR: <err>*
+CLAE?	+CLAE: <mode>
	+CME ERROR: <err>
+CLAE=?	+CLAE: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to enable/disable unsolicited result code +CLAV: <code>. If <mode>=1, +CLAV: <code > is sent from the <u>MT</u> ~~ME~~ when the language in the <u>MT</u> ~~ME~~ is changed. If setting fails, a <u>MT</u> ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current status for <mode>.

Test command returns supported <mode>s.

Defined values

<mode>:

0 Disable unsolicited result code +CLAE

1 Enable unsolicited result code +CLAE

<code>: For description see +CLAN.

Implementation

Optional.

8.32 Set Greeting Text +CSGT

Table 92: +CSGT parameter command syntax

Command	Possible response(s)
+CSGT=<mode>[,<text>]	*+CME ERROR: <err>*
+CSGT?	+CSGT: <text>, <mode>
	+CME ERROR: <err>
+CSGT=?	+CSGT:(list of supported <mode>s), <ltext>
	+CME ERROR: <err>

Description

This command sets and activates the greeting text in the <u>MT</u>~~ME~~. The greeting text is shown in the <u>MT</u> ~~ME~~ display when the <u>MT</u> ~~ME~~ is turned on. The command can also be used to deactivate a text. If setting fails in an <u>MT</u> ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

The read command queries the current <text> and the status of the <mode> parameter

Test command returns supported <mode>s and the maximum number of characters in <text>. For example,

+CSGT: (0-1),20

Defined values

`<text>`: string type; A free text that shall be displayed. The text can not include <CR>

<mode>:

0   *Turn off greeting text.*

1   *Turn on greeting text*

Implementation

Optional.

8.33   Set Voice Mail Number +CSVM

Table 93: +CSVM parameter command syntax

Command	Possible response(s)
+CSVM=<mode>[,<number>[, type>]]	*+CME ERROR: <err>*
+CSVM?	+CSVM:<mode>,<number>,<type> *+CME ERROR: <err>*
+CSVM=?	+CSVM: (list of supported <mode>s), (list of supported <type>s) *+CME ERROR: <err>*

Description

The number to the voice mail server is set with this command. The parameters <number> and <type> can be left out if the parameter <mode> is set to 0. If setting fails, an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the currently selected voice mail number and the status (i.e. enabled/disabled).

Test command returns supported <mode>s and <type>s.

Defined values

    <mode>:

0   Disable the voice mail number.

1   Enable the voice mail number.

  <number>: string type; Character string <0..9,+>

  <type>: integer type; Type of address octet. (refer TS 24.008 subclause 10.5.4.7)

129   ISDN / telephony numbering plan, national / international unknown

145   ISDN / telephony numbering plan, international number

161   ISDN / telephony numbering plan, national number

128 - 255   Other values refer TS 24.008 section 10.5.4.7

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

Implementation

Optional.

8.34 Ring Melody Playback +CRMP

Table 94: +CRMP action command syntax

Command	Possible response(s)
+CRMP=<call type>[,<volume>[,<type>,<index>]]	*+CME ERROR: <err>*
+CRMP=?	+CRMP: (list of supported <call type>s),(list of supported <volume>s),(<type0>),(list of supported <index>s)[<CR><LF> +CRMP: (list of supported <call type>s),(list of supported <volume>s),(<type1>),(list of supported <index>s) *+CME ERROR: <err>*

Description

Execution command causes the MT ~~ME~~ to playback a specific ring type. The default values for the optional parameters are the current selected in the MT~~ME~~.

Test command returns the available ring melodies.

Defined values:

<call type>: integer type; manufacturer specific

<volume>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

<type>:

0   Manufacturer defined

1   User defined

<index>: integer type;

Implementation

Optional.

8.35 Master Reset +CMAR

Table 95: +CMAR action command syntax

Command	Possible response(s)
+CMAR=<phone lock code>	*+CME ERROR: <err>*
+CMAR=?	*+CME ERROR: <err>*

Description

This command requests the MT ~~ME~~ to reset user data. The user data in the phone will be reset to default values. If setting fails, a MT ~~ME~~ error, +CME ERROR: <err>, is returned. Refer subclause 9.2 for <err> values.

If the MT ~~ME~~ is locked and this command is used, then the MT ~~ME~~ will be unlocked after the master reset.

Test command returns OK

Defined values

<phone lock code > string type; Security code (Phone Lock code) must be verified before performing the master reset.

Implementation

Optional.

8.36 List all available AT commands +CLAC

Table 96: +C action command syntax

Command	Possible response(s)
+CLAC	<AT Command1> [<CR> <LF> <AT Command2>[…]]
	+CME ERROR: <err>
+CLAC=?	*+CME ERROR: <err>*

Description

Execution command causes the MT ~~ME~~ to return one or more lines of AT Commands.

Note: This command only returns the AT commands that are available for the user.

Defined values

<AT Command >:

Defines the AT command including the prefix AT. Text shall not contain the sequence 0<CR> or OK<CR>

Implementation

Optional.

8.37 Delete alarm +CALD

Table 97: +CALD action command syntax

Command	Possible response(s)
+CALD=<n>	*+CME ERROR: <err>*
+CALD=?	+CALD: (list of supported <n>s)
	+CME ERROR: <err>

Description

Action command deletes an alarm in the MT~~ME~~. If the command fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns supported array index values.

Defined values

<n>: integer type value indicating the index of the alarm; default is manufacturer specific

Implementation

Optional.

8.38 Postpone or dismiss an alarm +CAPD

Table 98: +CAPD action command syntax

Command	Possible response(s)
+CAPD=[<sec>]	*+CME ERROR: <err>*
+CAPD=?	+CAPD: (list of supported <sec>s)
	+CME ERROR: <err>

Description

Set command postpones or dismisses a currently active alarm. If the command fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns supported <sec>-parameter values.

Defined values

<sec>: integer type value indicating the number of seconds to postpone the alarm. If <sec> is set to 0 (default), the alarm is dismissed.

Implementation

Optional.

8.39 Automatic Time Zone Update +CTZU

Table 99: +CTZU parameter command syntax

Command	Possible response(s)
+CTZU=<onoff>	*+CME ERROR: <err>*
+CTZU?	+CTZU: <onoff>
	+CME ERROR: <err>
+CTZU=?	+CTZU: (list of supported <onoff>s)
	+CME ERROR: <err>

Description

Set command enables and disables automatic time zone update via NITZ. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current settings in the MT~~ME~~.

Test command returns supported on- and off-values.

Defined values

<onoff>: integer type value indicating:

0 – Disable automatic time zone update via NITZ (default).

1 – Enable automatic time zone update via NITZ.

Implementation

Optional.

8.40 Time Zone Reporting +CTZR

Table 100: +CTZR parameter command syntax

Command	Possible response(s)
+CTZR=<onoff>	*+CME ERROR: <err>*
+CTZR?	+CTZR: <onoff>
	+CME ERROR: <err>
+CTZR=?	+CTZR: (list of supported <onoff>s)
	+CME ERROR: <err>

Description

This set command enables and disables the time zone change event reporting. If the reporting is enabled the MT ~~ME~~ returns the unsolicited result code +CTZV: <tz> whenever the time zone is changed. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current reporting settings in the MT~~ME~~.

Test command returns supported <onoff>-values.

NOTE: The Time Zone reporting is not affected by the Automatic Time Zone setting command, +CTZU.

Defined values

<onoff>: integer type value indicating:

0 – disable time zone change event reporting (default).

1 – Enable time zone change event reporting.

Implementation

Optional.

8.41 Enter protocol mode+CPROT

Table 101: +CPROT parameter command syntax

Command	Possible response(s)
+CPROT=<proto>[,<version>[,<lsap1>[,...[<lsapN>]]]]	CONNECT NO CARRIER OK ERROR *+CME ERROR: <err>*
+CPROT=?	+CPROT: <proto1>[,(list of supported <version>s)[,(list of supported <lsap1>s)[,...[,(list of supported <lsapN>s)]]]] [<CR><LF> +CPROT : <proto2>[,(list of supported <version>s)[,(list of supported <lsap1>s)[,...[,(list of supported <lsapN>s)]]]]] [...]]]]]

Description

Set command informs TA that TE wants to establish a peer-to-peer protocol <proto> or upper layer connection (indicating by the <lsap>s setting) with the MT ~~ME~~ on the link from which the command was received. This command can be used in case the link between TE and MT ~~ME~~ does not provide itself such a mechanism.

If MT ~~ME~~ has succeeded in establishing a logical link between application protocols and external interface, it will send CONNECT message to the TE. Otherwise, the NO CARRIER response will be returned.

If the CONNECT response is received, TE can start sending <proto> or upper layer frames.

The connection shall always return for <proto> mode when the protocol session is ended. When the MT ~~ME~~ receives a disconnect request from its peer entity, it will process it and send OK response to the TE indicating its capability for receiving new AT commands. Since <proto> or upper layers can be accessed in other ways, TA must have pre-knowledge of the fact that connection is initiated with AT+CPROT command. This means that switch to <proto> mode must include some sort of notification to the protocol entity.

This command can be aborted by sending a <proto> or upper layer disconnection frame. In that case, ~~ME~~ MT will return in command mode by sending the OK response.

Refer subclause 9.2 for possible <err> values.

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

Defined values

<proto>

0 OBEX (refer.[44])

…15 reserved by the present document

16... manufacturer specific

<version>: version number of <proto>: string type

<lsap1>: defines a level of service or application protocol on the top of <proto> layer. It may refer to services or protocols defined in other standards development organizations (SDOs).

1 IrMC level 1 (Minimum Level) Only .(refer [43] subclause 2.9.4)

2 IrMC level 1 and 2 (Minimum and Access Levels) Only. .(refer [43] subclause 2.9.4)

4 IrMC level 1, 2 and 3 (Minimum, Access, Index Levels) Only- implies static index support. .(refer [43] subclause 2.9.4)

8 IrMC level 1, 2 and 4 (Minimum, Access and Sync Levels) Only-implies unique index support. .(refer [43] subclause 2.9.4)

10 IrMC level 1, 2, 3 and 4 (Minimum, Access, Index and Sync Levels)-implies support of static and unique index. .(refer [43] subclause 2.9.4)

…15 reserved by the present document

16... manufacturer specific

<lsap2>...<lsapN>

In case <lsapN>,<lsapN+1> received in the +CPROT command identifies protocol layers, the protocol identified by N+1 shall be on the top of the protocol identified by N on a framework point of view.

0…15 reserved by the present document

16... manufacturer specific

Implementation

Optional.

8.42 Informative examples

Phone Activity Status (+CPAS) is a general command used to detect the presence of the MT~~ME~~, if there is an incoming call, or if there is a call in progress. This command should be used before trying to operate the ~~ME~~ MT from the TE. Note that the activity status may change at any time after the execution of +CPAS, and hence the returned value may be obsolete. Detachment of the MT ~~ME~~ from the TA is indicated with a special final result code that indicates all errors related to the operation of the MT~~ME~~. Result code is +CME ERROR: <err>, where <err> is an integer or verbose value giving useful information about the reason for the command failure (refer subclause "Mobile ~~Equipment~~ Termination error result code +CME ERROR").

Set Phone Functionality (+CFUN) can be used to reset the MT ~~ME~~ or set the power consumption level of the ~~ME~~ MT by disabling certain parts of the ~~ME~~ MT (e.g. the transmit and receive RF circuits). Mobile ~~Equipment~~ Termination Control Mode (+CMEC) is a command which manages access sharing between the MT ~~ME~~ and the TE to operate the user interface of the MT~~ME~~. It has three subparameters which describe the access to keypad, display and indicators. Each subparameter has values for restricting the operation of the corresponding user interface part only to the ~~ME~~ MT or only to the TE, or to give the access for both of them.

Keypad Control command (+CKPD) is used to operate the keypad of the MT~~ME~~. Here lies the problem of different keypad types between manufacturers, and also between their MT ~~ME~~ models. The keypresses are sent to the MT ~~ME~~ as a string type subparameter of this command. Each character in that string represents a key which will be logically pressed. A special character (colon) followed by any character can be used by manufacturers (or TE application programmers) to represent a key which is not defined in this profile. An escape character (semicolon) for direct string entering is also defined. All text between single semicolon characters is treated as an alphanumeric entry and is not converted to keypressings. All semicolon characters inside the text shall be duplicated in the TE and stripped back to one before entering them to the MT~~ME~~. Command has also optional second and third parameters which can be used to alter the time to strike each key, and the pause to wait between keystrokes (in tenths of a second). A special pause character (W or w) may be added in the string type subparameter for an extra pause of the same length as given by the third subparameter. In the following example alphanumeric mode is entered and a person predefined in the MT ~~ME~~ phonebook, "Ilkka", is called; each key is struck for half a second and pauses between strokes are a tenth of a second:

```
AT+CKPD="@:Ilkka:S",5,1
OK
```

Display Control command (+CDIS) is used both for writing to the display text fields and for reading the current status of the fields. Mobile ~~equipment~~ termination usually have a character set of their own, so the TA shall be able to do a conversion between the TE and the MT ~~ME~~ character sets. TE can have several character sets and the TA must be informed of the character set in use before starting to write or read the display. Character set is set with general command Select TE Character Set +CSCS. The +CDIS=? query command is a way to get information about the length of the fields. In the following example an MT ~~ME~~ is first queried about the supported conversions and the lengths of the fields. The response shows there are three ten character long and two six character long fields. Then the TE character set is set to be IRA and the current status of the display is read. The last command writes the text "Hello, I'm writing to display" in the three fields, and keeps the contents of the two other fields same (the last two commas could also be left out).

```
AT+CSCS=?;+CDIS=?
+CSCS: ("IRA","PCCP850","8859-1")
+CDIS: 10,10,10,6,6
OK
AT+CSCS="IRA"
OK
AT+CDIS?
+CDIS: "RADIOLINJA","","","Menu","Memory"
OK
AT+CDIS="IRA","Hello, I'm","writing to","display",,
OK
```

The writing is possible only when it is permitted by the Mobile ~~Equipment~~ Termination Control Mode command (and by the manufacturer). If a certain field is not writable (but is readable), writing to it should be ignored. The order of the text fields should be determined by manufacturers and follow the rule: first field is in the upper left corner, second in the next field to the right, and so on, until to the last field in the lower right corner.

Indicators can be handled with Indicator Control command (+CIND). Its query command returns a short description (abbreviation) of the purpose of the indicators and the supported values for each indicator. The setting and reading is done similarly as with Display Control command. In the following example the indicators of a phone are queried, their current value is read, and the value of message indicator is tried to set (but it is forbidden):.

```
AT+CIND=?
+CIND: ("memory",(0-2)),("call",(0,1)),("data",(0,1)),("roam",(0,1)),
("alpha",(0,1)),("message",(0,1)),("index1",(0-11)),("index2",(0-11)),
("index3",(0-11)),("signal",(0-5)),("service",(0,1)),("sel1",(0,1)),
("sel2",(0,1)),("sel3",(0,1)),("battchg",(0-5))
OK
AT+CIND?
+CIND: 1,0,0,0,0,1,0,0,0,3,1,0,0,0,5
OK
AT+CIND=,,,,,0
+CME ERROR: 10
```

The subparameter order in the command is defined by the query command order, not by the actual display order. The zero value of an indicator means that it is off (or in state which can be identified as "off"-state), value one means that the indicator is on (or in a state which is more substantial than "off"-state), value two is more substantial than one, and so on.

To this point, only operating through the TE is covered. But when MT ~~ME~~ can be operated also through its keypad, or there are changes in the status of the display elements, the information about these actions shall be given to the TE also. This can be solved only with unsolicited result codes which return keypad, display text and indicator events. Each event group has a result code of its own: +CKEV returns the key code and if the key pressed (1) or released (0), +CDEV returns the display text field running number (as specified by command +CDIS) and the new status of the field, and +CIEV returns the running number of the indicator (refer +CIND) and the new value of it. In the following example number key 1 is pressed, updated on the display, released, and signal strength changes its state to five:

```
+CKEV: 49,1
+CDEV: 1,"1"
+CKEV: 49,0
+CIND: 10,5
```

Mobile ~~Equipment~~ Termination Event Reporting command (+CMER) has been specified for the purpose of controlling the sending of these unsolicited result codes to the TE. Four ways are provided to handle the buffering of the result codes (see figure 8). The first is to buffer them always. The second possibility is to discard them when in on-line data mode and otherwise forward them directly to the TE. The third possibility is to buffer them in data mode and otherwise forward them to the TE. The last possibility is to send them always to the TE (some inband technique - e.g. V.80 - shall be used in data mode to send the result codes within the data). This is the first subparameter of +CMER command. Next three subparameters are used to enable or disable each of the keypad, text field and indicator result codes. Sending codes can be enabled either so that only events generated from the MT ~~ME~~ user interface are returned, or so that also events caused by Keypad, Display and Indicator Control commands are returned. The fifth subparameter controls the flushing of the buffer when the value of the first subparameter is changed to a value from one to three.

Figure 8: Mobile ~~equipment~~ termination event reporting

An example of complete setup of the TA where TE takes the control of keypad, but does not want to write to display nor control the indicators (in the start ~~ME~~ MT is powered off):

```
AT+CMEE=2;+CREG=1              (use verbose <err> values; report registration)
OK
AT+CPAS                        (query MT ME status)
+CPAS: 5                       (MT ME is asleep)
OK
AT+CFUN=1                      (set MT ME to full functionality state)
+CME ERROR: SIM PIN required   (SIM requests PIN)
AT+CPIN="1234"
+CME ERROR: incorrect password (user entered wrong PIN)
AT+CPIN="4321"
OK                             (correct PIN)
AT+COPS=0,0                    (ask for automatic operator selection and registration)
OK
+CREG: 1                       (registered in the network)
AT+COPS?
+COPS: 0,0,"RADIOLINJA"        (get the operator name)
OK
AT+CMEC=1,0,0                  (take over the keypad, leave display to MT ME)
```

```
OK
AT+CDIS=?;+CIND=?                      (query display text and indicator formats)
+CDIS: 10,10,10,6,6
+CIND: ("memory",(0-2)),("call",(0,1)),("data",(0,1)),("roam",(0,1)),
("alpha",(0,1)),("message",(0,1)),("index1",(0-11)),("index2",(0-11)),
("index3",(0-11)),("signal",(0-5)),("service",(0,1)),("sel1",(0,1)),
("sel2",(0,1)),("sel3",(0,1)),("battchg",(0-5))
OK
AT+CSCS="IRA"                          (set TE character set for display text results)
OK
AT+CMER=1,0,2,2,0                      (return display text and indicator result codes when
OK                                      in command state, in data mode discard them)
AT+CDIS?;+CIND?                        (read current state of display texts and indicators)
+CDIS: "","","    12345","Menu","Memory"    (user had pressed number buttons before
+CIND: 1,0,0,0,0,1,0,0,0,3,1,0,0,0,5        TE took control with +CMEC)
OK
AT+CKPD="C",20                        (clear main display text '12345' by holding the
OK                                     'clear' button down two seconds)
+CDEV: 3,"1234"                       (first only one character deleted)
+CDEV: 3,""                           (while holding continues, whole display is cleared)
+CDEV: 1,"RADIOLINJA"                 (operator name comes to the display)
```

The start of the previous example could go as follows when MT ~~ME~~ has already been powered on but is waiting for the PIN:

```
AT+CMEE=2;+CREG=1                     (use verbose <err> values; report registration)
OK
AT+CPAS                               (query MT ~~ME~~ status)
+CPAS: 0                              (MT ~~ME~~ is ready to receive commands)
OK
AT+CPIN?                              (is MT ~~ME~~ asking passwords?)
+CPIN: SIM PIN                        (yes, SIM PIN required)
AT+CPIN="4321"
OK                                    (correct PIN)
```

One of the most regular operations done through the MT ~~ME~~ user interface is phonebook control. To lessen the workload of the TE, some direct commands for phonebook reading and writing are practical. Command Select Phonebook Memory Storage +CPBS query version returns supported phonebook memories, read version returns current settings, and set version selects the memory. For GSM, the normal storages are SIM, MT ~~ME~~ and TA.

Read Phonebook Entries (+CPBR) can be used to read either one or many phonebook locations at the same time. A regular phonebook entry consists of three elements: memory index number, the phone number and its alphanumeric equivalent given by the user. Query version of this returns supported index values of the selected memory, and the maximum lengths of the number and alphanumeric elements. The query version of the Write Phonebook Entry command (+CPBW) is similar, but the action version sets or clears an entry in the phonebook. Find Phonebook Entries (+CPBF) may be used to search alphanumeric entries starting with specific string. An example where the whole phonebook of the MT ~~ME~~ is read, index number four is cleared, and number three is written:

```
AT+CPBS=?
+CPBS: ("ME","SM")                    (MT ~~ME~~ and SIM have phonebooks)
OK
AT+CPBS="ME"                          (select MT ~~ME~~ memory)
OK
AT+CPBR=?                             (read index range and element lengths)
+CPBR: (1-99),30,30
OK
AT+CPBR=1,99                          (read all entries but only the ones set are returned)
+CPBR: 1,"931123456",129,"Ilkka"
+CPBR: 2,"9501234567",129,""
+CPBR: 4,"901234567",129,"Hesari"
OK
AT+CPBW=4;+CPBW=3,"921123456",,"TS"  (clear index 4 and write index 3)
OK
```

9 Mobile ~~Equipment~~ Termination errors

9.1 Report Mobile ~~Equipment~~ Termination error +CMEE

Table 102: +CMEE parameter command syntax

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

Description

Set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the MT~~ME~~. When enabled, MT ~~ME~~-related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality.

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

Defined values

<n>:

0 disable +CME ERROR: <err> result code and use ERROR instead

1 enable +CME ERROR: <err> result code and use numeric <err> values (refer next subclause)

2 enable +CME ERROR: <err> result code and use verbose <err> values (refer next subclause)

Implementation

Mandatory for <n> values 0 and 1.

9.2 Mobile ~~Equipment~~ Termination 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):

9.3 Informative examples

An example of TA responses with all three +CMEE values when MT ~~ME~~-manufacturer identification is requested but MT ~~ME~~-is not connected to the TA:

```
AT+CMEE=0    (+CME ERROR shall not be used)
OK
AT+CGMI
ERROR
AT+CMEE=1    (use numeric <err>)
OK
```

```
AT+CGMI
+CME ERROR: 1
AT+CMEE=2   (use verbose <err>)
OK
AT+CGMI
+CME ERROR: no connection to phone
```

10.1.18 Packet Domain event reporting +CGEREP

Table 119: 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 Packet Domain 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~~ termination has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT.

```
+CGEV: NW DETACH
```

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

```
+CGEV: ME DETACH
```

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

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

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

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

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

Implementation

Optional.

10.1.19 GPRS network registration status +CGREG

Table 120: 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

`<n>:`

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>]`

`<stat>:`

0 not registered, ~~ME~~ MT is not currently searching an operator to register to
The ~~MS~~ UE is in GMM state GMM-NULL or GMM-DEREGISTERED-INITIATED.
The GPRS service is disabled, the ~~MS~~ UE is allowed to attach for GPRS if requested by the user.

1 registered, home network
The ~~MS~~ UE is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED
INITIATED on the home PLMN.

2 not registered, but MT ~~ME~~ is currently trying to attach or searching an operator to register to
The ~~MS~~ UE is in GMM state GMM-DEREGISTERED or GMM-REGISTERED-INITIATED. The GPRS
service is enabled, but an allowable PLMN is currently not available. The ~~MS~~ UE will start a GPRS attach as
soon as an allowable PLMN is available.

3 registration denied
The ~~MS~~ UE is in GMM state GMM-NULL. The GPRS service is disabled, the ~~MS~~ UE is not allowed to attach
for GPRS if requested by the user.

4 unknown

5 registered, roaming
The ~~MS~~ UE is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED on a
visited PLMN.

`<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.

11.1.1 Accept an incoming Voice Group or Voice Broadcast Call +CAJOIN

Table 124: CAJOIN parameter command syntax

Command	Possible Response(s)
`+CAJOIN=<service>, <GId> ,<GCA>`	*+CME ERROR: <err>*
`CAJOIN=?`	

Description

The execute command accepts an incoming or ongoing voice group or voice broadcast call.

See command +CALCC to get a list of current voice group or voice broadcast calls.

Defined Values

`<GId>`: a digit string that specifies the group identification for the incoming voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area identification for the incoming voice group or voice broadcast call.

<service> (tele-service):

17 voice group call

18 voice broadcast call

Implementation

Mandatory for a ~~ME~~ MT supporting AT commands only and VGCS or VBS is implemented.

11.1.2 Reject an incoming Voice Group or Voice Broadcast Call +CAREJ

Table 125: CAREJ parameter command syntax

Command	Possible Response(s)
+CAREJ=<service>, <GId>, <GCA>	*+CME ERROR: <err>*
+CAREJ=?	

Description

The execute command rejects an incoming voice group or voice broadcast call indicated by RING or +CRING, the command is applicable as long as the indication is pending.

If the call is once rejected the RING or +CRING indication is not repeated to TE although the call is still running and notifications for the call are received.

See command +CALCC to get a list of current voice group or voice broadcast calls.

Defined Values

<GId>: a digit string that specifies the group identification for the incoming voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area identification for the incoming voice group or voice broadcast call.

<service> (tele-service):

17 voice group call

18 voice broadcast call

Implementation

Mandatory for a MT ~~ME~~ supporting AT commands only and VGCS or VBS is implemented.

11.1.3 Leave an ongoing Voice Group or Voice Broadcast Call +CAHLD

Table 126: CAHLD parameter command syntax

Command	Possible Response(s)
+CAHLD	*+CME ERROR: <err>*
+CAHLD=?	

Description

The execute command forces the MT to leave the active voice group or voice broadcast call without terminating it. The command is only applicable if the MT is in group receive mode. The MT returns to idle mode.

Implementation

Mandatory for a MT ~~ME~~ supporting AT commands only and VGCS or VBS is implemented.

11.1.4 Talker Access for Voice Group Call +CAPTT

Table 127: CAPTT parameter command syntax

Command	Possible Response(s)
+CAPTT=[<mode> [,<time>]]	*+CME ERROR: <err>*
+CAPTT?	+CAPTT: <mode> *+CME ERROR: <err>*
+CAPTT=?	+CAPTT: (list of supported <mode>s), (list of supported <time>s)

Description

The execute command emulates the Push To Talk function for VGCS talker access.
If the parameter <mode> is set to value "0" i.e. "RELEASED" the PTT key is assumed to be released immediately.
If the parameter <mode> is set to value "1" i.e. "PUSHED" the PTT key is assumed to be pushed immediately for the period of <time> in seconds. If the command execution is repeated before the <time> expires the PTT timer will be loaded with the new <time> value and the PTT key remains "PUSHED" for the period of new <time> in seconds.
If the parameter <mode> is set to value "2" i.e. "PUSHED" the PTT key is assumed to be pushed immediately for an infinite period of time and can be released by <mode> value 0.
For <mode>=0 if the parameter <time> is issued it is ignored.

If the PTT timer expires after <time> seconds during <mode> "PUSHED" an unsolicited result code +CAPTT: 0 is issued to the TE.

The read command returns the current <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>:

0 status of the PTT key is RELEASED (default value)

1 status of the PTT key is PUSHED for a limited time by <time> in seconds

2 status of the PTT key is PUSHED for an infinite time

<time>:

3..255 this gives the time in seconds to wait before the PTT key is released, default value 10

Implementation

Mandatory for a MT ~~ME~~ supporting AT commands only and VGCS is implemented.

11.1.5 Voice Group Call Uplink Status Presentation +CAULEV

Table 128: CAULEV parameter command syntax

Command	Possible Response(s)
+CAULEV=[<mode>]	*+CME ERROR: <err>*
+CAULEV?	+CAULEV: <mode>,[<status>] *+CME ERROR: <err>*

+CAULEV=?	+CAULEV: (list of supported <mode>s)

Description

The set command enables or disables the presentation of uplink access status for an active VGCS call. When enabled the unsolicited response +CAULEV: <status> is returned from MT to TE whenever the call uplink status changes.

Read command returns the current uplink <status> and the selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>: status of unsolicited result response presentation

0 disabled (default)

1 enabled

<status>: network uplink access status

0 uplink free

1 uplink busy

Implementation

Mandatory for a MT ~~ME~~ supporting AT commands only and VGCS is implemented.

11.1.6 List current Voice Group and Voice Broadcast Calls +CALCC

Table 129: +CALCC action command syntax

Command	Possible response(s)
+CALCC=<mode>	+CALCC: <GId>,<GCA>,<service>,<stat>,<dir>, <ack_flag>[,<priority>] [<CR><LF>+CALCC: <GId>,<GCA>,<service>, <stat>,<dir>,<ack_flag>[,<priority>] [...]] *+CME ERROR: <err>*
+CALCC=?	+CALCC: (list of supported <mode>s)

Description

The set command returns
for <mode>=1 the active voice group or voice broadcast call and
for <mode>=0 a list of all current running voice group and voice broadcast calls for which the user has a subscription and the GId is activated on the SIM. If the command succeeds but no calls are available, OK response is returned.

Defined values

<GId>: a digit string that specifies the group identification of the voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area of the voice group or voice broadcast call.

<service> (tele-service):

17 voice group call

18 voice broadcast call

<stat> (state of the call):

0   active, i.e. user participating at the call as talker or listener

1   held, the call is running but put to background, notifications ignored

2   incoming (MT call), the user doesn't respond to notifications of this call yet

<dir>:

0   mobile originated (MO) call, the user is the originator of the call

1   mobile terminated (MT) call, the user is not the originator of the call

<ack_flag>: proposes that a predefined confirmation procedure is to be used after the call is ended

0   confirmation procedure is not required

1   confirmation procedure is required

<priority>: optional integer type parameter which identifies the priority level of the voice group or voice broadcast call, values specified in 3GPP TS 22.067 [54].

Implementation

Optional. Recommended for a MT ~~ME~~ supporting AT commands only and VGCS or VBS is implemented.

11.1.7   Voice Group or Voice Broadcast Call State Attribute Presentation +CACSP

Table 130: CACCS parameter command syntax

Command	Possible Response(s)
+CACSP=[<mode>]	*+CME ERROR: <err>*
+CACSP?	+CACSP: <mode>[,<da>,<ua>,<comm>,<oi>] *+CME ERROR: <err>*
+CACSP=?	+CACSP: (list of supported <mode>s)

Description

The set command enables or disables the presentation of unsolicited result response +CACSP: <da>,<ua>,<comm>,<oi> from MT to TE if the call control state attributes of the active voice group or voice broadcast call changes.

Read command returns the current call control state attributes <da>,<ua>,<comm>,<oi> and selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>: status of unsolicited result response presentation

0   disabled (default)

1   enabled

<da>: User connection in the downlink

0   not attached

1   attached

<ua>: User connection in the uplink

0   not attached

1   attached

<comm>: The MT assumes that communication with its peer entity is

0   not enabled in both directions

1   enabled in both directions

<oi>: The ~~MS~~ MT assumes to be

0   not the originator of the call

1   the originator of the call

Implementation

Optional. Recommended for a <u>MT</u> ~~ME~~ supporting AT commands only and VGCS or VBS is implemented.

11.1.8   NCH Support Indication +CANCHEV

Table 131: CAULEV parameter command syntax

Command	Possible Response(s)
+CANCHEV=[<mode>]	*+CME ERROR: <err>*
+CANCHEV?	+CANCHEV: <status>,<mode> *+CME ERROR: <err>*
+CANCHEV=?	+CANCHEV: (list of supported <mode>s)

Description

The set command enables or disables the presentation of unsolicited result response +CANCHEV: <status> from MT to TE if the status of the network NCH support information changes.

Read command returns in parameter <status> the network NCH support information in the selected cell and the selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>: status of unsolicited result response presentation

0   disabled (default)

1   enabled

<status>: network NCH support information

0   NCH not available

1   NCH available

Implementation

Optional. Recommended for a <u>MT</u> ~~ME~~ supporting AT commands only and VGCS or VBS is implemented.

11.1.9   Originator to Dispatcher Information +COTDI

Table 132:+COTDI action command syntax

Command	Possible response(s)
+ COTDI =<message>[,<OTDIE>[,<message>[,<OTDIE>]]]	*+CME ERROR: <err>*
+ COTDI?	[+ COTDI: <message>,<OTDIE> [,<message>,<OTDIE>]]
+ COTDI=?	+ COTDI: (list of supported <message>s)

Description

This command allows control of the Originator-to-Dispatcher Information and Compressed Originator-to-Dispatcher Information according to GSM 44.068[52] and GSM 44.069[53].

When <message> and <OTDIE> are both present the string specified in <OTDIE> is included in the corresponding group or broadcast control <message> as the value part of the Originator-to-Dispatcher Information Element or Compressed Originator-to-Dispatcher Information Element (as defined in GSM 44.068[52] and GSM 44.069[53]) into all subsequent messages of type <message>. If parameter <message> is present but parameter <OTDIE> is not present then the Originator-to-Dispatcher Information Element shall not be present in sub-sequent messages of type <message>.

The read command returns the content of <message> and of <OTDIE>. If no <OTDIE> is available, no information text shall be returned.

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

Defined values

<message>

  0   SETUP   message containing the outgoing Originator-to-Dispatcher Information Element

  1   IMMEDIATE SETUP 2   message containing the outgoing Compressed Originator-to-Dispatcher Information Element

  < OTDIE>: the Originator-to-Dispatcher Information Element or Compressed Originator-to-Dispatcher Information Element (as defined in GSM 44.068 [52] and GSM 44.069 [53]) in hexadecimal character format (for hexadecimal format, refer +CSCS).

Implementation

Optional.

11.2.1   Request VGCS or VBS service 'D'

Table 133: D command syntax

Command	Possible Response(s)
D*<SC$_1$>[*<SC$_2$>]#<GId>;	*+CME ERROR: <err>*

Description

This Dial command extension is a service request application according to 3GPP TS 22.030 [19]. No further commands may follow on the AT command line.

Responses

When the call has terminated, either as a result of an orderly termination or an error, the ME MT shall return the NO CARRIER final result code.

Possible error responses include +CME ERROR: <err> when error is related to ME MT functionality. The requested service, GId and priority level are checked against the subscriptions of the user and the status of the GId stored on the SIM. In case if no subscription is available for this service, GId or priority level or the GId is deactivated an ERROR or +CMEE ERROR result code is returned. See +CMEE ERROR extensions for VGCS, VBS and eMLPP in subclause 9.2.

Detailed error report of an unsuccessful originated call can be obtained with command Extended Error Report +CEER (if implemented).

   NOTE.   The dial string conforms to the syntax specified in 3GPP TS 22.030 [19].

Defined Values

   <SC$_1$>: Service Code is a digit string which identifies a request to use
      value 17   Voice Group Call Service
      value 18   Voice Broadcast Service

   <SC$_2$>: Service Code is a digit string which identifies a request to use eMLPP priority . Service Code values for different priority levels are specified in 3GPP TS 22.030 [19]

   <GId>: a digit string that specifies the group identification of a called party.

Implementation

Mandatory for a MT ME supporting AT commands only and VGCS or VBS is implemented.

11.2.2   Termination of an Voice Group or Voice Broadcast Call 'H'

The V.25ter 'H' or 'H0' (On-hook) command may be used to terminate an ongoing voice group or voice broadcast call. The MT responds with OK. It is an error to issue the 'H' command when there is no outstanding network request.

It is an error to issue the 'H' command if the user is in group receive mode or the user is not the originator of the call and a ERROR or +CME ERROR result code is returned to the TE.

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

Implementation

Mandatory for a MT ME supporting AT commands only and VGCS or VBS is implemented.

11.3.1   VGCS subscriptions and GId status +CGCS

Table 134: +CGCS action command syntax

Command	Possible response(s)
+CGCS=<GId>,<status>	*+CME ERROR: <err>*
+CGCS?	+CGCS: <GId>,<status><CR><LF> [+CGCS: <GId>,<status><CR><LF> [...]] *+CME ERROR: <err>*
+CGCS=?	+CGCS: (list of supported <GId>s), (list of supported <status>s)

Description

This command works with SIM Card and when the GSM Application is selected in UICC. Function with USIM is for further study. The set command is used to edit the status of the GId EF$_{VGCSS}$ on the SIM. The read command returns all subscribed GIds in EF$_{VGCS}$ and their status in EF$_{VGCSS}$ from the SIM.

Defined values

    <GId> integer type, group Id as specified in 3GPP TS 22.030 [19]

    <status>: integer type, value

       0   deactivated

       1   activated

Implementation

Mandatory for a ~~ME~~ MT supporting AT commands only and supporting VGCS.

11.3.2   VBS subscriptions and GId status +CBCS

Table 135: +CBCS action command syntax

Command	Possible response(s)
+CBCS=<GId>,<status>	*+CME ERROR: <err>*
+CBCS?	+CBCS: <GId>,<status><CR><LF> [+CBCS: <GId>,<status><CR><LF> [...]] *+CME ERROR: <err>*
+CBCS=?	+CBCS: (list of supported <GId>s),(list of supported <status>s)

Description

This command works with SIM Card and when the GSM Application is selected in UICC. Function with USIM is for further study. The set command is used to edit the status of the GId EF$_{VBSS}$ on the SIM. The read command returns all subscribed GIds in EF$_{VBS}$ and their status in EF$_{VBSS}$ from the SIM.

Defined values

    <GId> integer type, group Id as specified in 3GPP TS 22.030 [19]

    <status>: integer type, value

       0   deactivated

       1   activated

Implementation

Mandatory for a ~~ME~~ MT supporting AT commands only and supporting VBS.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **27.007** CR **082** | ⌘ | ev | **-** | ⌘ | Current version: | **3.10.0** ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network ☐   Core Network ☐

Title: ⌘	Alignment of UE architecture with 23.101	
Source: ⌘	T2	
Work item code: ⌘	TEI	**Date:** ⌘ 2002-02-05
Category: ⌘	**F**	**Release:** ⌘ R99

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP <u>TR 21.900</u>.

Use <u>one</u> of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘	Alignment of the abstract architecture with the General UMTS Architecture specification 23.101
Summary of change: ⌘	Corrections made to use the correct terms ME, MT, TA and UE. The term ME has been replaced by MT and MS by UE, when applicable. UE abbreviation added. Reference to 23.101 added.
Consequences if not approved: ⌘	Inconsistent specifications and incorrect UE architecture

Clauses affected: ⌘	1, 2, 3.2, 4.1, 5, 5.1- 5.7, 5.9, 5.10, 6.1- 6.5, 6.7- 6.12, 6.17- 6.19, 6.21- 6.23, 6.27,7, 7.1-7.9, 7.11- 7.13, 7.15- 7.22, 8, 8.1- 8.23, 8.25- 8.42, 9, 9.1- 9.3, 10.1.18, 10.1.19, 11.1.1- 11.1.8, 11.2.1, 11.2.2

Other specs Affected: ⌘	☐ Other core specifications	⌘	
	☐ Test specifications		
	☐ O&M Specifications		

Other comments: ⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

# 1	Scope

The present document specifies a profile of AT commands and recommends that this profile be used for controlling Mobile ~~Equipment (ME)~~Termination (MT) functions and GSM/UMTS 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]. The present document has also the syntax details used to construct these extended GSM/UMTS 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~~ MT of networks other than GSM/UMTS. ITU-T T.31 [11] and T.32 [12] fax AT commands may be used for GSM/UMTS fax transmission from TE. GSM/UMTS Short Message Service AT commands are defined in 3GPP TS 27.005 [24]. GPRS AT commands are defined in clause 10 of this specification. The present document assumes an abstract architecture comprising a TE (e.g. a computer) and a MT~~E~~ 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, MT~~E~~ and TE as three separate entities;

- TA integrated under the MT~~E~~ cover, and the TE implemented as a separate entity;

- TA integrated under the TE cover, and the MT~~E~~ implemented as a separate entity;

- TA and MT~~E~~ integrated under the TE cover as a single entity.

The commands described in the present document may be observed on the link between the TE and the TA. However, most of the commands retrieve information about the MT~~E~~, not about the TA.
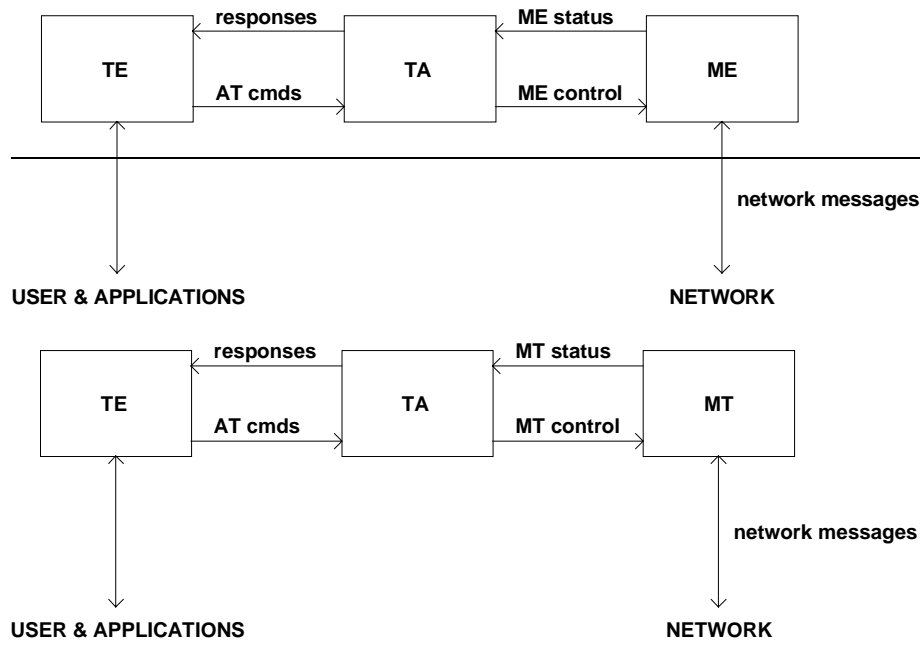
Figure 1: Setup

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 MT~~E~~ is dependent on the interface in the MT~~E~~.

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1]   3GPP TS 22.002: "3rd Generation Partnership Project; Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[2]   3GPP TS 22.003: "3rd Generation Partnership Project; Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[3]   3GPP TS 22.081: "3rd Generation Partnership Project; Line identification supplementary services - Stage 1".

[4]   3GPP TS 22.082: "3rd Generation Partnership Project; Call Forwarding (CF) supplementary services - Stage 1".

[5]   3GPP TS 22.083: "3rd Generation Partnership Project; Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[6]   3GPP TS 22.088: "3rd Generation Partnership Project; Call Barring (CB) supplementary services - Stage 1".

[7]   3GPP TS 23.003: "3rd Generation Partnership Project; Numbering, addressing and identification".

[8]   3GPP TS 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]   3GPP TS 24.022: "3rd Generation Partnership Project; 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]   3GPP TS 22.030: "3rd Generation Partnership Project; Man Machine Interface (MMI) of the Mobile Station (MS)".

[20]   3GPP TS 05.08: "Digital cellular telecommunication system (Phase 2+); Radio subsystem link control".

[21]   3GPP TS 22.085: "3rd Generation Partnership Project; Closed User Group (CUG) supplementary services - Stage 1".

[22]   3GPP TS 22.084: "3rd Generation Partnership Project; MultiParty (MPTY) supplementary services - Stage 1".

[23]   3GPP TS 22.090: "3rd Generation Partnership Project; Unstructured Supplementary Service Data (USSD) - Stage 1".

[24]   3GPP TS 27.005: "3rd Generation Partnership Project; Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[25]   3GPP TS 23.038: "3rd Generation Partnership Project; Alphabet and language specific information".

[26]   3GPP TS 22.024: "3rd Generation Partnership Project; Description of Charge Advice Information (CAI)".

[27]   3GPP TS 22.086: "3rd Generation Partnership Project; Advice of Charge (AoC) supplementary services - Stage 1".

[28]   3GPP TS 11.11: "Digital cellular telecommunication system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".

[29]   3GPP TS 22.034: "3rd Generation Partnership Project; High Speed Circuit Switched Data (HSCSD) - Stage 1".

[30]   3GPP TS 22.091: "3rd Generation Partnership Project; Explicit Call Transfer (ECT) supplementary service - Stage 1".

[31]   3GPP TS 22.072: "3rd Generation Partnership Project; Call Deflection (CD) supplementary service - Stage 1".

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

[33]   3GPP TS 22.022: "3rd Generation Partnership Project; Personalization of GSM Mobile Equipment (ME) Mobile functionality specification".

[34]   3GPP TS 27.060: "3rd Generation Partnership Project; 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]   3GPP TS 05.05: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".

[39]   3GPP TS 29.061: "3rd Generation Partnership Project; General Packet Radio Service (GPRS); Interworking between the Public Land Mobile Network (PLMN) supporting GPRS and Packet Data Networks (PDN)".

[40] 3GPP TS 23.081: "3rd Generation Partnership Project; Technical Specification Group Core Network; Line identification supplementary services - Stage 2".

[41] 3GPP TS 27.001: "3rd Generation Partnership Project; Technical Specification Group Core Network; General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[42] 3GPP TS 29.007: "3rd Generation Partnership Project; Technical Specification Group Core Network; General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[43] Infrared Data Association; Specification of Ir Mobile Communications (IrMC).

[44] IrDA Object Exchange Protocol.

[45] 3GPP TS 27.010: "3rd Generation Partnership Project; Terminal Equipment to User Equipment (TE-UE) multiplexer protocol User Equipment (UE)".

[46] 3GPP TS 23.107: "3rd Generation Partnership Project; Quality of Service, Concept and Architecture".

[47] 3GPP TS 23.060: "3rd Generation Partnership Project; General Packet Radio Service (GPRS) Service description; Stage 2".

[48] 3GPP TS 23.067: "3rd Generation Partnership Project; Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 2".

[49] 3GPP TS 03.68: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 2".

[50] 3GPP TS 03.69: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 2".

[51] 3GPP TS 24.067: "3rd Generation Partnership Project; Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 3".

[52] 3GPP TS 04.68: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 3".

[53] 3GPP TS 04.69: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 3".

[54] 3GPP TS 22.067: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 1".

[55] 3GPP TS 02.68: "Digital cellular telecommunication system (Phase 2+); Voice Group Call service (VGCS) - Stage 1".

[56] 3GPP TS 02.69: "Digital cellular telecommunication system (Phase 2+); Voice Broadcast Service (VBS) - Stage 1".

[57] 3GPP TS 24.008: "3rd Generation Partnership Project; Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".

[58] 3GPP TS 31.102: "3rd Generation Partnership Project; Technical Specification Group Terminals; Characteristics of the USIM Application".

[59] 3GPP TS 04.65: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (Gprs); Mobile Station (MS) – Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)".

[60] 3GPP TS 23.101: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; General UMTS Architecture "

## 3.2	Abbreviations

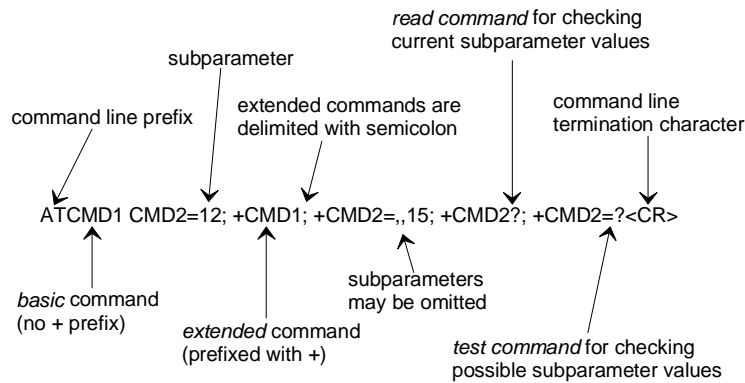For the purposes of the present document, the following abbreviations apply:

AT	ATtention; this two-character abbreviation is always used to start a command line to be sent from TE to TA
ASCI	Advanced Speech Call Items, including VGCS, VBS and eMLPP
BCD	Binary Coded Decimal
eMLPP	Enhanced Multi-Level Precedence and Pre-emption Service
ETSI	European Telecommunications Standards Institute
FTM	Frame Tunnelling Mode (refer 3GPP TS 27.001 [41] and 3GPP TS 29.007[42])
HSCSD	High Speed Circuit Switched Data
IMEI	International Mobile station Equipment Identity
IRA	International Reference Alphabet (ITU-T T.50 [13])
IrDA	Infrared Data Association
ISO	International Standards Organization
ITU-T	International Telecommunication Union - Telecommunications Standardization Sector
ME	Mobile Equipment, e.g. a GSM phone (equal to MS; Mobile Station)
MoU	Memorandum of Understanding (GSM operator joint)
MT	Mobile Termination
PCCA	Portable Computer and Communications Association
PTT	Push to Talk
RDI	Restricted Digital Information
RLP	Radio Link Protocol
SIM	Subscriber Identity Module
TA	Terminal Adaptor, e.g. a GSM data card (equal to DCE; Data Circuit terminating Equipment)
TE	Terminal Equipment, e.g. a computer (equal to DTE; Data Terminal Equipment)
TIA	Telecommunications Industry Association
UDI	Unrestricted Digital Information
UE	User Equipment
UICC	Universal Integrated Circuit Card
USIM	Universal Subscriber Identity Module
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service

## 4.1	Command line

See figure 2 for general structure of a command line. Standardized *basic* commands are found only in V.25ter [14]. GSM/UMTS commands use syntax rules of *extended* commands. 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. *Parameter type* commands also have a *read command* (trailing ?) to check the current values of subparameters. *Action type* commands do not store the values of any of their possible subparameters, and therefore do not have a read command.

Figure 2: Basic structure of a command line

If verbose responses are enabled with command `V1` and all commands in a command line has been performed successfully, result code `<CR><LF>OK<CR><LF>` is sent from the TA to the TE. If numeric responses are enabled with command `V0`, result code `0<CR>` is sent instead.

If verbose responses are enabled with command `V1` and subparameter values of a command are not accepted by the TA (or command itself is invalid, or command cannot be performed for some reason), result code `<CR><LF>ERROR<CR><LF>` is sent to the TE and no subsequent commands in the command line are processed. If numeric responses are enabled with command `V0`, result code `4<CR>` is sent instead. ERROR (or 4) response may be replaced by `+CME ERROR: <err>` (refer clause 9) when command was not processed due to an error related to M~~E~~T operation.

5 General commands

ITU-T Recommendation V.25ter [14] includes "Generic DCE Control" commands with the prefix `+G`. These commands are for the identification of the TA. Four of those commands are adapted here to be the identification commands of the M~~E~~T. Syntax is otherwise similar but the prefix is `+CG`. TIA IS-99 [15] uses same commands for base station identification.

5.1 Request manufacturer identification +CGMI

Table 1: +CGMI action command syntax

Command	Possible response(s)
+CGMI	`<manufacturer>`
	`+CME ERROR: <err>`
+CGMI=?	

Description

Execution command causes the TA to return one or more lines of information text `<manufacturer>`, determined by the ~~ME~~ MT manufacturer, which is intended to permit the user of the TA to identify the manufacturer of the ~~ME~~ MT to which it is connected to. Typically, the text will consist of a single line containing the name of the manufacturer, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

> `<manufacturer>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.2 Request model identification +CGMM

Table 2: +CGMM action command syntax

Command	Possible response(s)
+CGMM	`<model>` *+CME ERROR: <err>*
+CGMM=?	

Description

Execution command causes the TA to return one or more lines of information text `<model>`, determined by the MTE manufacturer, which is intended to permit the user of the TA to identify the specific model of the MTE to which it is connected to. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide more information if desired. Refer to subclause 9.2 for possible `<err>` values.

Defined values

    `<model>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.3 Request revision identification +CGMR

Table 3: +CGMR action command syntax

Command	Possible response(s)
+CGMR	`<revision>` *+CME ERROR: <err>*
+CGMR=?	

Description

Execution command causes the TA to return one or more lines of information text `<revision>`, determined by the MTE manufacturer, which is intended to permit the user of the TA to identify the version, revision level or date, or other pertinent information of the MTE to which it is connected to. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

    `<revision>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.4 Request product serial number identification +CGSN

Table 4: +CGSN action command syntax

Command	Possible response(s)
+CGSN	`<sn>`
	`+CME ERROR: <err>`
+CGSN=?	

Description

Execution command causes the TA to return one or more lines of information text `<sn>`, determined by the MTE manufacturer, which is intended to permit the user of the TA to identify the individual MTE to which it is connected to. Typically, the text will consist of a single line containing the IMEI (International Mobile station Equipment Identity; refer 3GPP TS 23.003 [7]) number of the MTE, but manufacturers may choose to provide more information if desired. Refer subclause 9.2 for possible `<err>` values.

Defined values

> `<sn>`: the total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

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

Implementation

Optional.

5.5 Select TE character set +CSCS

Table 5: +CSCS parameter command syntax

Command	Possible response(s)
+CSCS=[`<chset>`]	
+CSCS?	+CSCS: `<chset>`
+CSCS=?	+CSCS: (list of supported `<chset>`s)

Description

Set command informs TA which character set `<chset>` is used by the TE. TA is then able to convert character strings correctly between TE and MTE character sets.

When TA-TE interface is set to 8-bit operation and used TE alphabet is 7-bit, the highest bit shall be set to zero.

> NOTE 1: It is manufacturer specific how the internal alphabet of MTE is converted to/from the TE alphabet.

Read command shows current setting and test command displays conversion schemes implemented in the TA.

Defined values

> `<chset>` (conversion schemes not listed here can be defined by manufacturers):

"GSM"   GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems

"HEX"   character strings consist only of hexadecimal numbers from 00 to FF; e.g. "032FE6" equals three 8-bit characters with decimal values 3, 47 and 230; no conversions to the original MTE character set shall be done.

NOTE 2: If MTE is using GSM 7 bit default alphabet, its characters shall be padded with 8th bit (zero) before converting them to hexadecimal numbers (i.e. no SMS-style packing of 7-bit alphabet).

"IRA"	international reference alphabet (ITU-T T.50 [13])
"PCCP*xxx*"	PC character set Code Page *xxx*
"PCDN"	PC Danish/Norwegian character set
"UCS2"	16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99
"8859-*n*"	ISO 8859 Latin *n* (1-6) character set
"8859-C"	ISO 8859 Latin/Cyrillic character set
"8859-A"	ISO 8859 Latin/Arabic character set
"8859-G"	ISO 8859 Latin/Greek character set
"8859-H"	ISO 8859 Latin/Hebrew character set

Implementation

Mandatory when a command using the setting of this command is implemented.

5.6 Request international mobile subscriber identity +CIMI

Table 6: +CIMI action command syntax

Command	Possible response(s)
+CIMI	<IMSI> *+CME ERROR: <err>*
+CIMI=?	

Description

Execution command causes the TA to return <IMSI>, which is intended to permit the TE to identify the individual active application in the UICC (GSM or USIM) or SIM card which is attached to MTE. Refer subclause 9.2 for possible <err> values.

Defined values

<IMSI>: International Mobile Subscriber Identity (string without double quotes)

Implementation

Optional.

5.7   Multiplexing mode +CMUX

Table 7: +CMUX parameter command syntax

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

Description

This command is used to enable/disable the 3GPP TS 27.010 [45] multiplexing protocol control channel. Refer to subclause 9.2 for possible <err> values. The AT command sets parameters for the Control Channel. If the parameters are left out, the default value is used.

Read command returns the current mode and the settings.

Test command returns the supported modes and parameters.

It is recommended that the MTE/TA/TE should autobaud to the +CMUX command up to and including an interface speed of 9600 bits/s.

The OK or +CME ERROR: <err> response is returned at the speed of the +CMUX command prior to entering <mode>.

It is recommended that whenever the multiplexer control channel is released the MTE/TA/TE should assume an interface rate of up to and including 9600 bits/s for auto bauding purposes irrespective of any previous higher speed having been selected.

If a +CMUX command is issued whilst in any multiplexer mode then that +CMUX command shall be ignored and the MET/TA shall return an +CME ERROR: <err> response.

Defined values

<operation> (multiplexer Transparency Mechanism)

0   Basic option

1   Advanced option

<subset>:

This parameter defines the way in which the multiplexer **control channel** is set up. A virtual channel may subsequently be set up differently but in the absence of any negotiation for the settings of a virtual channel, the virtual channel shall be set up according to the control channel <subset> setting.

0   UIH frames used only

1   UI frames used only

2   I frames used only

Default value: 0

`<port_speed>` (transmission rate):

1 9 600 bit/s

2 19 200 bit/s

3 38 400 bit/s

4 57 600 bit/s

5 115 200 bit/s

6 230 400 bits/s

`<N1>` (maximum frame size):

1- 32768

default Value : 31 (64 if Advanced option is used)

`<T1>` (acknowledgement timer in units of ten milliseconds):

1-255, where 10 is default (100 ms)

`<N2>` (maximum number of re-transmissions):

0-100, where 3 is default

`<T2>` (response timer for the multiplexer control channel in units of ten milliseconds):

2-255, where 30 is default (300 ms)

NOTE: T2 must be longer than T1.

`<T3>` (wake up response timer in seconds):

1-255, where 10 is default

`<k>` (window size, for Advanced operation with Error Recovery options):

1-7, where 2 is default

Implementation

Mandatory, if 3GPP TS 27.010 [45] supported in the MTE/TA.

5.9 PCCA STD-101 [17] select wireless network +WS46

PCCA STD-101 [17] includes a command to select the cellular network (Wireless Data Service; WDS) to operate with the MT/TA. PCCA calls this as WDS-Side Stack Selection. This command may be used when MT/TA is asked to indicate the networks in which it can operate.

Table 8: +WS46 parameter command syntax

Command	Possible response(s)
+WS46=[<n>]	
+WS46?	<n>
+WS46=?	(list of supported <n>s)

Description

Set command selects to WDS side stack <n> to be used by the MT/TA. Read command shows current setting and test command displays side stacks implemented in the MT/TA.

Defined values

<n>:

12 GSM digital cellular

refer PCCA STD-101 [17] for other values

Implementation
Mandatory in PCCA STD-101, but optional for GSM/UMTS.

5.10 Informative examples

When beginning to build a communication link, a general TE application controlling a TA needs to determine the TA and the MTE to which it is connected. V.25ter [14] has seven commands for TA identification from which four are mandatory to be implemented in a TA. An example of this command sequence requesting manufacturer (+GMI), model (+GMM), revision (+GMR) and serial number (+GSN) information would be:

```
AT+GMI
Manufacturer ABC
OK
AT+GMM
GSM Ultimate Data Device
OK
AT+GMR
1.00
OK
AT+GSN
987612345-123
OK
```

The maximum lengths of the information responses are defined to be 2048 characters, but it is recommended that they are kept as simple as in the example. The serial number command is defined as optional. Another optional command is Global Object Identification command (+GOI) which should return the object identifiers of ITU-T Recommendation X.208 as numeric strings delimited by periods. The Complete Capabilities List command (+GCAP) should indicate the major capability areas of the TA. The support of different areas is presented in the response of +GCAP command. Each area may be presented by the selection command name of a specific capability area (e.g. +FCLASS for fax support) or some other predefined response. For instance, a GSM TA with fax capabilities could respond as follows:

```
AT+GCAP
+GCAP: +CGSM,+FCLASS,+W
OK
```

The first supported area in the response is presented with +CGSM. It is the response text to show that some or all GSM commands of the present document are supported. Second response text (+FCLASS) informs that some fax or voice capabilities are present, and the third text (+W) about the presence of wireless commands as specified by PCCA STD-101 [17]. Command +FCLASS=? (refer e.g. ITU-T T.31 [11] and T.32 [12]) should be used to query the supported fax capabilities and +WS46=? to query the wireless data services available:

```
AT+FCLASS=?;+WS46=?
0,1,2,2.0
(12)
OK
```

The TA of this example supports GSM data services, and fax service class 1 (TIA-578-A), 2 (manufacturer specific) and 2.0 (ITU-T T.32 [12]/ TIA-592).

The present document defines commands for MTE identification which are similar to those for TA identification in V.25ter [14], for an example:

```
AT+CGMI
Mobile Manufacturer XYZ
OK
AT+CGMM
GSM Phone 1234
OK
AT+CGMR
1.00
OK
AT+CGSN
123456121234561
OK
```

Manufacturer, model and version commands work similarly as for TA, except that the serial number query returns the International Mobile Station Equipment Identity (IMEI) number. IMEI is fifteen digits long and consists of a type approval code, a final assembly code, a serial number and a spare digit (refer 3GPP TS 23.003 [7]). When the TA is implemented inside MTE, the responses for both TA and MTE queries will most likely follow the responses of MTE identification.

6.1 Select type of address +CSTA

Table 9: +CSTA parameter command syntax

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

Description

Set command selects the type of number for further dialling commands (D) according to GSM/UMTS specifications. Test command returns values supported by the TA as a compound value.

Defined values

<type>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

Implementation

Mandatory when other than default value allowed.

6.2 ITU-T V.25ter [14] dial command D

V.25ter [14] dial command D lists characters that may be used in a dialling string for making a call or controlling supplementary services in accordance with 3GPP TS 22.030 [19]. Their use in GSM/UMTS is listed in this subclause,

as well as new dial modifiers applicable only to GSM/UMTS are introduced. For a MTE supporting AT commands only, it is mandatory to support the control of supplementary services in accordance with 3GPP TS 22.030 [19] through the dial command or through the specific supplementary service commands (+CCFC, +CLCK, etc.), where 3GPP TS 22.030 [19] identifies the supplementary services as mandatory.

V.25ter dialling digits

1 2 3 4 5 6 7 8 9 0 * # + A B C (implementation of these characters is mandatory for GSM/UMTS)

D (implementation of this character is optional for GSM/UMTS, and it is ignored)

V.25ter modifier characters

, (implementation of this character is mandatory for GSM/UMTS, but it may be ignored)

T P (implementation of these characters is mandatory for GSM/UMTS, but they are ignored)

! W @ (implementation of these characters is optional for GSM/UMTS, and they are ignored)

V.25ter semicolon character

In GSM/UMTS, when semicolon character is given after dialling digits (or modifiers), a voice call originated to the given address. TA returns to command state immediately (or after possible +COLP result code; refer subclause "Connected line identification presentation +COLP"). Refer Annex G for a detailed example.

GSM/UMTS modifier characters

> (refer subclause "Direct dialling from phonebooks")

I or i (override the CLIR supplementary service subscription default value for this call; I = invocation (restrict CLI presentation) and i = suppression (allow CLI presentation); refer subclause "Calling line identification restriction +CLIR")

G or g (control the CUG supplementary service information for this call; uses index and info values set with command +CCUG; refer subclause "Closed user group +CCUG")

6.3 Direct dialling from phonebooks

GSM/UMTS ME MT/TA and SIM/UICC can contain phonebooks which have a phone number and an alphanumeric field for each phonebook entry location. The use of V.25ter [14] dialling command ensures that direct dialling from MTE/TA and SIM/UICC phonebook is possible through ordinary communications software which just gives the phone number field to be filled and then use the D command to originate the call. Available memories may be queried with Select Phonebook Storage test command +CPBS=?, and location range for example with Read Phonebook Entries test command +CPBR=?.

Execute commands

1. D><str>[I][G][;] originate call to phone number which corresponding alphanumeric field is <str> (if possible, all available memories should be searched for the correct entry).

2. D>mem<n>[I][G][;] originate call to phone number in memory *mem* entry location <n> (available memories may be queried with Select Phonebook Storage test command +CPBS=?; *mem* could be e.g. ME).

3. D><n>[I][G][;] originate call to phone number in entry location <n> (it is manufacturer specific which memory storage of MTE, SIM and TA is used; command Select Phonebook Memory Storage +CPBS setting is recommended to be used).

Semicolon character shall be added when voice call is originated. CLIR and CUG per call base modifiers may also be present.

Responses

Possible error responses include +CME ERROR: <err> when error is related to MTE functionality. Refer subclause 9.2 for possible error values. Otherwise TA responses can have values defined by V.25ter [14] and commands Service Reporting Control +CR and Connected Line Identification Presentation +COLP. Detailed error report of an unsuccessful originated call failed in a GSM/UMTS network error can be obtained with command Extended Error Report +CEER (if implemented).

Defined values

<str>: string type value, which should equal to an alphanumeric field in at least one phonebook entry in the searched memories; used character set should be the one selected with Select TE Character Set +CSCS

<n>: integer type memory location should be in the range of locations available in the memory used

Implementation

Mandatory when direct dialling is implemented. Also phonebook commands implementation is required.

6.4   Call mode +CMOD

Table 10: +CMOD parameter command syntax

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

Description

Set command selects the call mode of further dialling commands (D) or for next answering command (A). Mode can be either single or alternating (in the present document, terms "alternating mode" and "alternating call" refer to all GSM/UMTS bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call). When single mode is selected the call originating and hangup procedures are similar to procedures specified in ITU-T Recommendations V.25ter [14], T.31 [11] and T.32 [12]. In GSM/UMTS there can be voice followed by data (refer 3GPP TS 22.002 [1]), alternating voice/data (refer 3GPP TS 22.002 [1]) and alternating voice/fax calls (refer 3GPP TS 22.003 [2]). Refer next two subclauses for alternating call control methods.

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

> NOTE: +CMOD shall be set to zero after a successfully completed alternating mode call. It shall be set to zero also after a failed answering. The power-up, factory (&F) and user resets (Z) shall also set the value to zero. This reduces the possibility that alternating mode calls are originated or answered accidentally.

Defined values

<mode>:

0   single mode

1   alternating voice/fax (teleservice 61)

2   alternating voice/data (bearer service 61)

3   voice followed by data (bearer service 81)

also all other values below 128 are reserved by the present document

Implementation

Mandatory when alternating mode calls are implemented in the TA.

6.5   Hangup call +CHUP

Table 11: +CHUP action command syntax

Command	Possible response(s)
+CHUP	
+CHUP=?	

Description

Execution command causes the TA to hangup the current GSM/UMTS call of the MT~~E~~.

> NOTE: The purpose of this command is not to replace the V.25ter [14] command H, but to give an assured procedure to terminate an alternating mode call. Refer next subclause.

Implementation

Mandatory when alternating mode calls implemented in the TA.

6.7 Select bearer service type +CBST

Table 12: +CBST parameter command syntax

Command	Possible response(s)
+CBST=[<speed>[,<name>[,<ce>]]]	
+CBST?	+CBST: <speed>,<name>,<ce>
+CBST=?	+CBST: (list of supported <speed>s),(list of supported <name>s),(list of supported <ce>s)

Description

Set command selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated (refer 3GPP TS 22.002 [1]). Values may also be used during mobile terminated data call setup, especially in case of single numbering scheme calls (refer +CSNS).

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

NOTE: The default values of the subparameters are manufacturer specific since they depend on the purpose of the device and data services provided by it. Not all combinations of these subparameters are supported by GSM/UMTS (refer 3GPP TS 22.002 [1]).

<speed>:

0	autobauding (automatic selection of the speed; this setting is possible in case of 3.1 kHz modem and non-transparent service)
1	300 bps (V.21)
2	1200 bps (V.22)
3	1200/75 bps (V.23)
4	2400 bps (V.22bis)
5	2400 bps (V.26ter)
6	4800 bps (V.32)
7	9600 bps (V.32)
12	9600 bps (V.34)
14	14400 bps (V.34)
15	19200 bps (V.34)
16	28800 bps (V.34)
17	33600 bps (V.34)
34	1200 bps (V.120)
36	2400 bps (V.120)
38	4800 bps (V.120)
39	9600 bps (V.120)
43	14400 bps (V.120)
47	19200 bps (V.120)
48	28800 bps (V.120)
49	38400 bps (V.120)
50	48000 bps (V.120)
51	56000 bps (V.120)
65	300 bps (V.110)
66	1200 bps (V.110)
68	2400 bps (V.110 or X.31 flag stuffing)
70	4800 bps (V.110 or X.31 flag stuffing)
71	9600 bps (V.110 or X.31 flag stuffing)
75	14400 bps (V.110 or X.31 flag stuffing)
79	19200 bps (V.110 or X.31 flag stuffing)
80	28800 bps (V.110 or X.31 flag stuffing)
81	38400 bps (V.110 or X.31 flag stuffing)
82	48000 bps (V.110 or X.31 flag stuffing)

83	56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM)
84	64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)
115	56000 bps (bit transparent)
116	64000 bps (bit transparent)
120	32000 bps (PIAFS32k)
121	64000 bps (PIAFS64k)
130	28800 bps (multimedia)
131	32000 bps (multimedia)
132	33600 bps (multimedia)
133	56000 bps (multimedia)
134	64000 bps (multimedia)

also all other values below 128 are reserved by the present document.

`<name>`:

0	data circuit asynchronous (UDI or 3.1 kHz modem)
1	data circuit synchronous (UDI or 3.1 kHz modem)
2	PAD Access (asynchronous) (UDI)
3	Packet Access (synchronous) (UDI)
4	data circuit asynchronous (RDI)
5	data circuit synchronous (RDI)
6	PAD Access (asynchronous) (RDI)
7	Packet Access (synchronous) (RDI)

also all other values below 128 are reserved by the present document.

`<ce>`:

0	transparent
1	non-transparent
2	both, transparent preferred
3	both, non-transparent preferred

Implementation

Mandatory when data calls implemented.

6.8   Radio link protocol +CRLP

Table 13: +CRLP parameter command syntax

Command	Possible response(s)
+CRLP=[<iws>[,<mws>[,<T1>[,<N2>[,<ver>[,<T4>]]]]]]	
+CRLP?	+CRLP: <iws>,<mws>,<T1>,<N2>[,<ver1>[,<T4>]] [<CR><LF>+CRLP: <iws>,<mws>,<T1>,<N2>[,<ver2>[,<T4>]] [...]]
+CRLP=?	+CRLP: (list of supported <iws>s),(list of supported <mws>s), (list of supported <T1>s),(list of supported <N2>s)[,<ver1> [,(list of supported <T4>s)]] [<CR><LF>+CRLP: (list of supported <iws>s),(list of supported <mws>s),(list of supported <T1>s),(list of supported <N2>s) [,<ver1>[,(list of supported <T4>s)]] [...]]

Description

Radio link protocol (RLP) parameters used when non-transparent data calls are originated may be altered with set command. Available command subparameters depend on the RLP versions implemented by the device (e.g. `<ver>` may not be available if device supports only versions 0 and 1).

> NOTE 1: If radio link protocol is not used, but some other error correcting protocol (for transparent data calls), V.25ter [14] Error Control Selection test command `+ES=?` may be used to indicate the presence of the protocol.

Read command returns current settings for each supported RLP version `<verx>`. Only RLP parameters applicable to the corresponding `<verx>` are returned.

Test command returns values supported ~~by the TA~~ as a compound value. If M~~T~~E/TA supports several RLP versions `<verx>`, the RLP parameter value ranges for each `<verx>` are returned in a separate line.

Defined values

`<ver>`, `<verx>`: RLP version number in integer format; when version indication is not present it shall equal 0

> NOTE 2: Versions 0 and 1 share the same parameter set. Read and test commands shall return only one line for this set (where `<verx>` is not present).

`<iws>`, `<mws>`, `<T1>`, `<N2>`, `<T4>`: IWF to MS window size, MS to IWF window size, acknowledgement timer T1, retransmission attempts N2, re-sequencing period T4 in integer format (default values and value ranges depend on RLP version; refer 3GPP TS 24.022 [18]): T1 and T4 are in units of 10 ms.

Implementation

Mandatory when RLP implemented.

6.9   Service reporting control +CR

Table 14: +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/UMTS 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>`:

<u>0</u>   disables reporting

1   enables reporting

`<serv>`:

ASYNC	asynchronous transparent
SYNC	synchronous transparent
REL ASYNC	asynchronous non-transparent
REL SYNC	synchronous non-transparent
GPRS [<L2P>]	GPRS

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 15: +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 MTE manufacturer, which should offer the user of the TA an extended report of the reason for

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

- the 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 cause information given by GSM/UMTS 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 16: +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 or notification for VBS/VGCS calls 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 [,<priority>[,<subaddr>,<satype>]]   asynchronous transparent

SYNC [,<priority>[,<subaddr>,<satype>]]   synchronous transparent

REL ASYNC [,<priority>[,<subaddr>,<satype>]]   asynchronous non-transparent

REL SYNC [,<priority>[,<subaddr>,<satype>]]   synchronous non-transparent

FAX [,<priority>[,<subaddr>,<satype>]]   facsimile (TS 62)

VOICE [,<priority>[,<subaddr>,<satype>]]   normal voice (TS 11)

VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]]   voice followed by data (BS 81) (*XXX* is ASYNC,
          SYNC, REL ASYNC or REL SYNC)

ALT VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]]   alternating voice/data, voice first (BS 61)

ALT *XXX*/VOICE [,<priority>[,<subaddr>,<satype>]]   alternating voice/data, data first (BS 61)

ALT VOICE/FAX [,<priority>[,<subaddr>,<satype>]]   alternating voice/fax, voice first (TS 61)

ALT FAX/VOICE [,<priority>[,<subaddr>,<satype>]]   alternating voice/fax, fax first (TS 61)

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

VGC <GCA>, <GId>, <ackflag> [,<priority>]   voice group call (TS 91)

VBC <GCA>, <GId>, <ackflag> [,<priority>]   voice broadcast call (TS 92)

The optional <priority> indicates the eMLPP priority level of the incoming call by paging, notification or setup message. The priority level values are as defined in eMLPP specification 3GPP TS 22.067 [57].

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer 3GPP TS 24.008 [57] subclause 10.5.4.8)

<PDP_type> ,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.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.

<GCA> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call area.

<GId> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call identification.The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0 no confirmation procedure is required.

Implementation

Mandatory when data or fax circuit mode calls implemented or for a MT/TAE supporting AT commands only and eMLPP or VGCS or VBS is implemented.

6.12 HSCSD device parameters +CHSD

Table 17: +CHSD action command syntax

Command	Possible response(s)
+CHSD	+CHSD: <mclass>,<maxRx>,<maxTx>,<sum>,<codings>
	+CME ERROR: <err>
+CHSD=?	

Description

Execution command returns information about HSCSD features (refer 3GPP TS 22.034 [29]) supported by the MTE/TA. Refer subclause 9.2 for possible `<err>` values.

The return information is only applicable in GERAN.

Defined values

`<mclass>`: integer type; multislot class

`<maxRx>`: integer type; maximum number of receive timeslots that MTE can use

`<maxTx>`: integer type; maximum number of transmit timeslots that MET can use

`<sum>`: integer type; total number of receive and transmit timeslots that MTE can use at the same time (per TDMA frame). The following applies in a HSCSD call: $1 \leq$ (receive slots) + (transmit slots) $\leq$ `<sum>`

`<codings>` is a sum of integers each representing a supported channel coding (e.g. value 5 indicates that 4,8k and 9,6k channel codings are supported):

1 4,8k full rate data traffic channel

4 9,6k full rate data traffic channel

8 14,4k full rate data traffic channel

16 28,8k full rate data traffic channel (only possible when 14.4k is supported)

32 32,0k full rate data traffic channel (only possible in a two-timeslot configuration)

64 43,2k full rate data traffic channel (only possible when 14.4k is supported)

Implementation

Mandatory when HSCSD implemented.

This command is not applicable to UTRAN single mode UE.

6.17 HSCSD automatic user initiated upgrading + CHSU

Table 18: +CHSU parameter command syntax

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

Description

Set command controls whether or not automatic user initiated service level upgrading shall be used for non-transparent HSCSD calls. "Automatic" means that, if enabled, the MTE/TA shall use the UP bit in the received RLP frames to determine when to initiate user initiated service level upgrading (i.e. when to modify the +CHSN parameters <wAiur> and/or <wRx> for the current call). Refer to 3GPP TS 27.001 for details on the interpretation of the UP bit(s).

NOTE1: The validity of the UP bit in the RLP frames depends on the result of the RLP negotiations. The UP bit shall only be used if the result of the RLP negotiations were successful with respect to the UP bit.

NOTE2: This command is only applicable in GERAN.

Defined values

<mode>:

0   disables use of UP bit for upgrading

1   enables use of UP bit for upgrading

Implementation

Optional

This command is not applicable to UTRAN single mode UE.

6.18 HSCSD non-transparent asymmetry configuration +CHSA

Table 19: +CHSA parameter command syntax

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

Description

Set command controls the preferred asymmetry bias for non-transparent ECSD calls. Downlink biased asymmetry means that 8-PSK modulation is preferred downlink and GMSK modulation uplink. Uplink based asymmetry means that 8-PSK modulation is preferred uplink and GMSK downlink. Changing of <mode> affects the current call only if <topRx> (refer +CHSN) was non-zero when call was established.

Test command returns values supported by the MTE/TA as compound values. The <mode> subparameter range indirectly indicates the MS UE Type; range (0-1) indicates UEMS Type A and range (0-2) indicates UEMS Type B.

NOTE1: ECSD is also controlled by +CHSD, +CHSN and +CHST.

NOTE2: This command is only applicable in GERAN.

Defined values

<mode>:

0   No preference

1   Downlink biased asymmetry

2   Uplink biased asymmetry

Implementation

Mandatory when non-transparent ECSD is implemented.

This command is not applicable to UTRAN single mode UE.

6.19   Single numbering scheme +CSNS

Table 20: +CSNS parameter command syntax

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

Description

Set command selects the bearer or teleservice to be used when mobile terminated single numbering scheme call is established. Parameter values set with +CBST command shall be used when <mode> equals to a data service.

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

Defined values

<mode>:

0   voice

1   alternating voice/fax, voice first (TS 61)

2   fax (TS 62)

3   alternating voice/data, voice first (BS 61)

4   data

5   alternating voice/fax, fax first (TS 61)

6   alternating voice/data, data first (BS 61)

7   voice followed by data (BS 81)

Implementation

Optional.

6.21   V.120 rate adaption protocol +CV120

Table 21: +CV120 parameter command syntax

Command	Possible response(s)
+CV120=[<rah>[,<mfm>[,<mode>[,<llineg>[,<assign>[,<negtype>]]]]]]	
+CV120?	+CV120: <rah>,<mfm>,<mode>,<llineg>,<assign>,<negtype>

`+CV120=?`	`+CV120: (list of supported <rah>s),(list of supported <mfm>s),(list of supported <mode>s),(list of supported <llineg>s),(list of supported <assign>s),(list of supported <negtype>s)`

Description

Set command sets the values of the V.120 protocol parameters (defined in CCITT V.120) that are carried in the GSM BC and/or LLC information elements.

Read command returns current settings for the V.120 parameters.

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

Defined values

`<rah>`

0 rate adaption header not included

1 rate adaption header included (mandatory for protocol sensitive modes).

`<mfm>`

0 multiple frame establishment not supported, only UI frames allowed

1 multiple frame establishment supported, both I and UI frames allowed.

`<mode>`

0 bit transparent mode of operation

1 protocol sensitive mode of operation.

`<llineg>`

0 no negotiation, LLI = 256 only

1 negotiation allowed. Note - <negtype> indicates the connection over which the negotiation is performed.

`<assign>`

0 message originator is "default assignee"

1 message originator is "assignor only".

`<negtype>`

0 negotiation is done using logical link zero

1 negotiation is done with USER INFORMATION messages on a temporary signalling connection.

GSM/UMTS does not support all the possible modes of V.120 operation. However, in order to accommodate possible future additions, the complete set of parameters is included in the command.

The permitted values are: 1, 1 or 0, 1, 0, 0, 0.

A recommended set of default values is: 1, 1, 1, 0, 0, 0.

Implementation

Mandatory, if the MT/TA~~E~~ supports V.120 interworking.

6.22 Settings date format +CSDF

Table 22: +CSDF parameter command syntax

Command	Possible response(s)
+CSDF=[[<mode>] [,<auxmode>]]	*+CME ERROR: <err>*
+CSDF?	+CSDF:<mode>[,<auxmode>]
	+CME ERROR: <err>
+CSDF=?	+CSDF:(list of supported <mode>s) [, (list of supported <auxmode>s)]
	+CME ERROR: <err>

Description

This command sets the date format via MMI of the date information presented to the user, which is specified by use of the <mode> parameter. The <mode> affects the date format on the phone display and doesn't affect the date format of the AT command serial interface. The command also sets the date format of the TE-TA interface, which is specified by use of the <auxmode> parameter (e.g. the <auxmode> affects the <time> of +CCLK and +CALA). If the parameter is omitted ("+CSDF =","+CSDF =<mode>","+CSDF=,<auxmode>"),then this sets the default value.

Defined values

<mode>:

NOTE: It is manufacturer specific which modes that are supported.

1   DD-MMM-YYYY

NOTE: Presentation of MMM is language dependent.

2   DD-MM-YY

3   MM/DD/YY

4   DD/MM/YY

5   DD.MM.YY

6   YYMMDD

7   YY-MM-DD

8-255   Manufacturer specific

<auxmode>:

1   yy/MM/dd (default)

2   yyyy/MM/dd

also all other values are reserved by the present document

NOTE: The <time> format of +CCLK and +CALA "yy/MM/dd,hh:mm:ss±zz" when <auxmode>=1 and it is "yyyy/MM/dd,hh:mm:ss±zz" when <auxmode>=2. If the MTE does not support time zone information then the three last characters may be omitted (see +CCLK command).

Implementation

Optional

6.23 Silence Command +CSIL

Table 23: +CSIL parameter command syntax

Command	Possible response(s)
+CSIL=[<mode>]	*+CME ERROR: <err>*
+CSIL?	+CSIL:<mode>
	+CME ERROR: <err>
+CSIL=?	+CSIL:(list of supported <mode>s)
	+CME ERROR: <err>

Description

Set command enables/disables the silent mode. When the phone is in silent mode, all sounds from MTS are suppressed except voice.

Read command reads the current setting.

Test command lists the supported modes.

Defined values

<mode>:

0 Silent mode off

1 Silent mode on

Implementation

Optional

6.27 Informative examples

The alternating mode call handling (voice and fax, or voice and data) and the data call setup commands are defined such that the dialling command of V.25ter [14] (D) still always originates a call. The purpose is to support all current TE applications using the dialling command as default. Fax calls are controlled following the rules of ITU-T T.31 [11] and T.32 [12] standards.

An example where a voice call is originated:

```
ATD+1 812 555673I;  (type of address defaults to 145, CLI presentation is restricted for this call)
OK                  (call setup was successful)
```

An example where a voice call is attempted from a phonebook:

```
ATD>"Doe Joe"G;  (enable CUG control for this call)
+CME ERROR: 22   (entry "Doe Joe" is not found)
```

Also supplementary services may be controlled using dial command according to 3GPP TS 22.030 [19]. An example of call forwarding on no reply for telephony with the adjustment of the no reply condition timer on 25 seconds:

```
ATD**61*+1812555673*11*25#
OK                  (modification was successful)
```

Two new commands are created for controlling the alternating mode calls. First one, Call Mode (+CMOD), selects between single and alternating mode. Because this is a crucial command, it is defined that the value is set back to zero (single mode) after every successfully originated alternating mode call. Also on power-up and factory or user resets, the value is set to zero. The second new command, Hangup Call (+CHUP), is not a replacement of V.25ter [14] command H, but a command which reliably disconnects the call in GSM/UMTS network. This is defined because the H command is used to switch from fax or data mode to voice mode.

The setting of GSM/UMTS bearer service (data circuit duplex asynchronous and synchronous, PAD access circuit asynchronous, or data packet duplex synchronous), is done with Select Bearer Service Type (+CBST). It chooses one of the four mentioned bearer services, the data rate of the service (or actually the modulation when modem IWFs are used), and enables or disables RLP. Command Radio Link Protocol (+CRLP) is used to set the RLP parameters in the radio path.

Service Reporting Control command (+CR) is defined similarly as the reporting of modulation, V.18, error control, and data compression which are V.25ter [14] features used to show information about the type of the established connection before the CONNECT intermediate result code. +CR command has one subparameter which specifies whether the intermediate result code +CR: <serv> is returned or not. The result code should be returned before any V.25ter [14] reporting result codes. An example of setting up an asynchronous 9600 bit/s modem connection with service reporting:

```
AT+CBST=7,0,1      (asynchronous modem 9600 bit/s and RLP)
OK
AT+CR=1            (enable reporting)
OK
ATD1234567890
+CR: REL ASYNC
CONNECT 9600
```

As GSM/UMTS network offers more information about the reason of the failure in call originating and answering than normal PSTN, it is useful to add an extra command to return this information to the TE. This information should not be returned always after unsuccessful call originating or answering, because many TE applications look for just the regular NO CARRIER, BUSY, NO ANSWER and CONNECT messages. Action command Extended Error Report (+CEER) does not have any subparameters, and it returns the cause of the latest call setup failure. This information may be the textual presentation of the GSM/UMTS network failure code (refer GSM specification 04.08 [8] Annex H), or some other information defined by the MT/TA manufacturer.

7 Network service related commands

This clause describes GSM/UMTS network related commands, which are not covered in call control clause of the present document. Commands include GSM/UMTS supplementary service handling, MSISDN query, MTE and network facility locking, and network registration information query.

7.1 Subscriber number +CNUM

Table 24: +CNUM action command syntax

Command	Possible response(s)
+CNUM	+CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]] [<CR><LF>+CNUM: [<alpha2>],<number2>,<type2>[,<speed>,<service> [,<itc>]] [...]] *+CME ERROR: <err>*
+CNUM=?	

Description

Action command returns the MSISDNs related to the subscriber (This information can be stored in the SIM/UICC or in the MTE. When storing information in the SIM/UICC, if a SIM card is inserted or if a UICC with an active GSM application is present, the information is stored in the EF MSISDN under DF_Telecom. If the UICC with an active USIM application is present, the information is stored in the EF_MSISDN under ADF_USIM.). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line. Refer subclause 9.2 for possible <err> values.

Defined values

<alpha*x*>: optional alphanumeric string associated with <number*x*>; used character set should be the one selected with command Select TE Character Set +CSCS

<number*x*>: string type phone number of format specified by <type*x*>

<typex>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

<speed>: as defined in subclause 6.7

<service> (service related to the phone number):

0   asynchronous modem

1   synchronous modem

2   PAD Access (asynchronous)

3   Packet Access (synchronous)

4   voice

5   fax

also all other values below 128 are reserved by the present document

<itc> (information transfer capability):

0   3,1 kHz

1   UDI

Implementation

Optional.

7.2   Network registration +CREG

Table 25: +CREG parameter command syntax

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

Description

Set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the MTE network registration status, or code +CREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

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 MTE. Location information elements <lac> and <ci> are returned only when <n>=2 and MTE is registered in the network. Refer subclause 9.2 for possible <err> values.

Defined values

`<n>`:

0   disable network registration unsolicited result code

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

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

`<stat>`:

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

1   registered, home network

2   not registered, but MTE 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.

7.3   Operator selection +COPS

Table 26: +COPS parameter command syntax

Command	Possible response(s)
`+COPS=[<mode>[,<format>` `[,<oper>]]]`	*+CME ERROR: <err>*
`+COPS?`	`+COPS: <mode>[,<format>,<oper>]` *+CME ERROR: <err>*
`+COPS=?`	`+COPS:` [list of supported (`<stat>`,long alphanumeric `<oper>` ,short alphanumeric `<oper>`,numeric `<oper>`)s] [,,(list of supported `<mode>`s),(list of supported `<format>`s)] *+CME ERROR: <err>*

Description

Set command forces an attempt to select and register the GSM/UMTS network operator. `<mode>` is used to select whether the selection is done automatically by the MTE or is forced by this command to operator `<oper>` (it shall be given in format `<format>`). If the selected operator is not available, no other operator shall be selected (except `<mode>`=4). The selected operator name format shall apply to further read commands (+COPS?) also. `<mode>`=2 forces an attempt to deregister from the network. The selected mode affects to all further network registration (e.g. after `<mode>`=2, MTE shall be unregistered until `<mode>`=0 or 1 is selected). Refer subclause 9.2 for possible `<err>` values. This command should be abortable when registration/deregistration attempt is made.

Read command returns the current mode and the currently selected operator. If no operator is selected, `<format>` and `<oper>` are omitted.

Test command returns a list of quadruplets, each representing an operator present in the network. Quadruplet consists of an integer indicating the availability of the operator `<stat>`, long and short alphanumeric format of the name of the operator, and numeric format representation of the operator. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in order: home network, networks referenced in SIM/UICC, and other networks.

It is recommended (although optional) that after the operator list TA returns lists of supported `<mode>`s and `<format>`s. These lists shall be delimited from the operator list by two commas.

Defined values

`<mode>`:

0   automatic (`<oper>` field is ignored)

1   manual (`<oper>` field shall be present)

2   deregister from network

3   set only `<format>` (for read command +COPS?), do not attempt registration/deregistration (`<oper>` field is ignored); this value is not applicable in read command response

4   manual/automatic (`<oper>` field shall be present); if manual selection fails, automatic mode (`<mode>`=0) is entered

`<format>`:

0   long format alphanumeric `<oper>`

1   short format alphanumeric `<oper>`

2   numeric `<oper>`

`<oper>`: string type; `<format>` indicates if the format is alphanumeric or numeric; long alphanumeric format can be upto 16 characters long and short format up to 8 characters (refer GSM MoU SE.13 [9]); numeric format is the GSM Location Area Identification number (refer GSM 04.08 [8] subclause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A [10], plus a two BCD digit network code, which is administration specific; returned `<oper>` shall not be in BCD format, but in IRA characters converted from BCD; hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 2)(network code digit 1)

`<stat>`:

0   unknown

1   available

2   current

3   forbidden

Implementation

Optional.

7.4 Facility lock +CLCK

Table 27: +CLCK action command syntax

Command	Possible response(s)
+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	*+CME ERROR: <err>* **when <mode>=2 and command successful:** +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>,<class2> [...]]
+CLCK=?	+CLCK: (list of supported <fac>s) *+CME ERROR: <err>*

Description

Execute command is used to lock, unlock or interrogate a MTE or a network facility <fac>. Password is normally needed to do such actions. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Refer subclause 9.2 for possible <err> values. This command should be abortable when network facilities are set or interrogated.

Call barring facilities are based on GSM/UMTS supplementary services (refer 3GPP TS 22.088 [6]). The interaction of these with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standard.

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

Defined values

<fac> values reserved by the present document:

"CS"   CNTRL (lock CoNTRoL surface (e.g. phone keyboard))

"PS"   PH-SIM (lock PHone to SIM/UICC card) (MTE asks password when other than current SIM/UICC card inserted; MTE may remember certain amount of previously used cards thus not requiring password when they are inserted)

"PF"   lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PH-FSIM) (ME MT asks password when other than the first SIM/UICC card is inserted)

"SC"   SIM (lock SIM/UICC card) (SIM/UICC asks password in MTE power-up and when this lock command issued)

"AO"   BAOC (Barr All Outgoing Calls) (refer 3GPP TS 22.088 [6] clause 1)

"OI"   BOIC (Barr Outgoing International Calls) (refer 3GPP TS 22.088 [6] clause 1)

"OX"   BOIC-exHC (Barr Outgoing International Calls except to Home Country) (refer 3GPP TS 22.088 [6] clause 1)

"AI"   BAIC (Barr All Incoming Calls) (refer 3GPP TS 22.088 [6] clause 2)

"IR"   BIC-Roam (Barr Incoming Calls when Roaming outside the home country) (refer 3GPP TS 22.088 [6] clause 2)

"NT"   barr incoming calls from numbers Not stored to TA memory

"NM"   barr incoming calls from numbers Not stored to MTE memory

"NS"   barr incoming calls from numbers Not stored to SIM/UICC memory

"NA"   barr incoming calls from numbers Not stored in Any memory

"AB" All Barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)

"AG" All outGoing barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)

"AC" All inComing barring services (refer 3GPP TS 22.030 [19]) (applicable only for <mode>=0)

"FD" SIM card or active application in the UICC (GSM or USIM) fixed dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as <passwd>)

"PN" Network Personalization (refer 3GPP TS 22.022 [33])

"PU" network sUbset Personalization (refer 3GPP TS 22.022 [33])

"PP" service Provider Personalization (refer 3GPP TS 22.022 [33])

"PC" Corporate Personalization (refer 3GPP TS 22.022 [33])

<mode>:

0 unlock

1 lock

2 query status

<status>:

0 not active

1 active

<passwd>: string type; shall be the same as password specified for the facility from the MTE user interface or with command Change Password +CPWD

<classx> is a sum of integers each representing a class of information (default 7):

1 voice (telephony)

2 data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4 fax (facsimile services)

8 short message service

16 data circuit sync

32 data circuit async

64 dedicated packet access

128 dedicated PAD access

Implementation

The call barring supplementary service control is mandatory for MT/TAE supporting AT commands only and not supporting the control through dial command D.

7.5 Change password +CPWD

Table 28: +CPWD action command syntax

Command	Possible response(s)
+CPWD=<fac>,<oldpwd>,<newpwd>	+CME ERROR: <err>

+CPWD=?	+CPWD: list of supported (<fac>,<pwdlength>)s
	+CME ERROR: <err>

Description

Action command sets a new password for the facility lock function defined by command Facility Lock +CLCK. Refer subclause 9.2 for possible <err> values.

Test command returns a list of pairs which present the available facilities and the maximum length of their password.

Defined values

<fac>:

"P2"   SIM PIN2

refer Facility Lock +CLCK for other values

<oldpwd>, <newpwd>: string type; <oldpwd> shall be the same as password specified for the facility from the MTE user interface or with command Change Password +CPWD and <newpwd> is the new password; maximum length of password can be determined with <pwdlength>

<pwdlength>: integer type maximum length of the password for the facility

Implementation
Optional.

7.6   Calling line identification presentation +CLIP

Table 29: +CLIP parameter command syntax

Command	Possible response(s)
+CLIP=[<n>]	
+CLIP?	+CLIP: <n>,<m>
+CLIP=?	+CLIP: (list of supported <n>s)

Description

This command refers to the GSM/UMTS supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. Set command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

When the presentation of the CLI at the TE is enabled (and calling subscriber allows), +CLIP: <number>,<type>[,<subaddr>,<satype>[,[<alpha>][,<CLI validity>]]] response is returned after every RING (or +CRING: <type>; refer subclause "Cellular result codes +CRC") result code sent from TA to TE. It is manufacturer specific if this response is used when normal voice call is answered.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the CLIP service according 3GPP TS 22.081 [3] (given in <m>).Test command returns values supported by the TA as a compound value.

Defined values

<n> (parameter sets/shows the result code presentation status in the MT/TA):

0   disable

1   enable

<m> (parameter shows the subscriber CLIP service status in the network):

  0   CLIP not provisioned

  1   CLIP provisioned

  2   unknown (e.g. no network, etc.)

  `<number>`: string type phone number of format specified by `<type>`

  `<type>`: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

  `<subaddr>`: string type subaddress of format specified by `<satype>`

  `<satype>`: type of subaddress octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.8)

  `<alpha>`: optional string type alphanumeric representation of `<number>` corresponding to the entry found in
  phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

  `<CLI validity>`:

0   CLI valid

1   CLI has been withheld by the originator.

2   CLI is not available due to interworking problems or limitations of originating network.

When CLI is not available (`<CLI validity>`=2), `<number>` shall be an empty string ("") and `<type>` value will
not be significant. Nevertheless, MT/TA may return the recommended value **128** for <type> ((TON/NPI unknown in
accordance with GSM 04.08 [8] subclause 10.5.4.7).

When CLI has been withheld by the originator, (`<CLI validity>`=1) and the CLIP is provisioned with the
"override category" option (refer 3GPP TS 22.081[3] and 3GPP TS 23.081[40]), <number> and <type> is provided.
Otherwise, MT/TA shall return the same setting for <number> and <type> as if the CLI was not available.

Implementation

Optional.

7.7   Calling line identification restriction +CLIR

Table 30: +CLIR parameter command syntax

Command	Possible response(s)
+CLIR=[<n>]	
+CLIR?	+CLIR: <n>,<m>
+CLIR=?	+CLIR: (list of supported <n>s)

Description

This command refers to CLIR-service according to 3GPP TS 22.081 [3] that allows a calling subscriber to enable or
disable the presentation of the CLI to the called party when originating a call.

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as
a default adjustment for all following outgoing calls. This adjustment can be revoked by using the opposite command..
If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according
3GPP TS 22.081 [3].

Read command gives the default adjustment for all outgoing calls (given in <n>), and also triggers an interrogation of
the provision status of the CLIR service (given in <m>). Test command returns values supported ~~by the TA~~ as a
compound value.

  NOTE: On a per call base CLIR functionality is explained in subclause "ITU-T V.25ter [14] dial command".

Defined values

<n> (parameter sets the adjustment for outgoing calls):

<u>0</u> presentation indicator is used according to the subscription of the CLIR service

1 CLIR invocation

2 CLIR suppression

<m> (parameter shows the subscriber CLIR service status in the network):

0 CLIR not provisioned

1 CLIR provisioned in permanent mode

2 unknown (e.g. no network, etc.)

3 CLIR temporary mode presentation restricted

4 CLIR temporary mode presentation allowed

Implementation

Optional.

7.8   Connected line identification presentation +COLP

Table 31: +COLP parameter command syntax

Command	Possible response(s)
+COLP=[<n>]	
+COLP?	+COLP: <n>,<m>
+COLP=?	+COLP: (list of supported <n>s)

Description

This command refers to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

When enabled (and called subscriber allows), +COLP:
<number>,<type>[,<subaddr>,<satype> [,<alpha>]] intermediate result code is returned from MT/TA to TE before any +CR or V.25ter [14] responses. It is manufacturer specific if this response is used when normal voice call is established.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the COLP service according 3GPP TS 22.081 [3] (given in <m>).

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

Defined values

<n> (parameter sets/shows the result code presentation status in the MT/TA):

<u>0</u> disable

1 enable

<m> (parameter shows the subscriber COLP service status in the network):

0 COLP not provisioned

1 COLP provisioned

2 unknown (e.g. no network, etc.)

`<number>`, `<type>`, `<subaddr>`, `<satype>`, `<alpha>`: refer +CLIP

Implementation

Optional.

7.9 Called line identification presentation +CDIP

Table 32: +CDIP parameter command syntax

Command	Possible response(s)
+CDIP=[<n>]	
+CDIP?	+CDIP: <n>,<m>
+CDIP=?	+CDIP: (list of supported <n>s)

Description

This command related to a network service that provides "multiple called numbers (called line identifications) service" to an MT. This command enables a called subscriber to get the called line identification of the called party when receiving a mobile terminated call. Set command enables or disables the presentation of the called line identifications at the TE.

When the presentation of the called line identification at the TE is enabled,
+CDIP:`<number>`,`<type>`[,`<subaddr>`,`<satype>`] response is returned after every RING (or +CRING: `<type>`; refer subclause "Cellular result codes +CRC") result code sent from MT/TA to TE. It is manufacturer specific if this response is used when normal voice call is answered.

Read command gives the status of `<n>`, and also triggers an interrogation of the provision status of the "multiple called numbers" service. Test command returns values supported ~~by the TA~~ as a compound value.

Defined values

`<n>` (parameter sets/shows the result code presentation status in the MT/TA):

0 disable

1 enable

`<m>` (parameter shows the subscriber "multiple called numbers" service status in the network):

0 "multiple called numbers service" is not provisioned

1 "multiple called numbers service" is provisioned

2 unknown (e.g. no network, etc.)

`<number>`: string type phone number of format specified by `<type>`

`<type>`: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

`<subaddr>`: string type subaddress of format specified by `<satype>`

`<satype>`: type of subaddress octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.8)

Implementation

Optional.

7.11 Call forwarding number and conditions +CCFC

Table 33: +CCFC action command syntax

Command	Possible response(s)
+CCFC=<reason>,<mode> [,<number>[,<type> [,<class> [,<subaddr>[,<satype> [,<time>]]]]]]	*+CME ERROR: <err>* **when <mode>=2 and command successful:** +CCFC: <status>,<class1>[,<number>,<type> [,<subaddr>,<satype>[,<time>]]][<CR><LF>+CCFC: <status>,<class2>[,<number>,<type> [,<subaddr>,<satype>[,<time>]]] [...]]
+CCFC=?	+CCFC: (list of supported <reason>s)

Description

This command allows control of the call forwarding supplementary service according to 3GPP TS 22.082 [4]. Registration, erasure, activation, deactivation, and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>.

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

Defined values

<reason>:

0 unconditional

1 mobile busy

2 no reply

3 not reachable

4 all call forwarding (refer 3GPP TS 22.030 [19])

5 all conditional call forwarding (refer 3GPP TS 22.030 [19])

<mode>:

0 disable

1 enable

2 query status

3 registration

4 erasure

<number>: string type phone number of forwarding address in format specified by <type>

<type>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.8); default 128

<class*x*> is a sum of integers each representing a class of information (default 7):

1 voice (telephony)

2 data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4 fax (facsimile services)

8 short message service

16 data circuit sync

32 data circuit async

64 dedicated packet access

128 dedicated PAD access

<time>:

1...30 when "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded, default value 20

<status>:

0 not active

1 active

Implementation

Mandatory for MT/TAE supporting AT commands only and not supporting the control through dial command D.

7.12 Call waiting +CCWA

Table 34: +CCWA parameter command syntax

Command	Possible response(s)
+CCWA=[<n>[,<mode>[,<class>]]]	*+CME ERROR: <err>* **when <mode>=2 and command successful** +CCWA: <status>,<class1> [<CR><LF>+CCWA: <status>,<class2> [...]]
+CCWA?	+CCWA: <n>
+CCWA=?	+CCWA: (list of supported <n>s)

Description

This command allows control of the Call Waiting supplementary service according to 3GPP TS 22.083 [5]. Activation, deactivation and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable/enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>] to the TE when call waiting service is enabled. Command should be abortable when network is interrogated.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

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

Defined values

<n> (sets/shows the result code presentation status in the MT/TA):

0 disable

1 enable

`<mode>` (when `<mode>` parameter is not given, network is not interrogated):

0 disable

1 enable

2 query status

`<classx>` is a sum of integers each representing a class of information (default 7):

1 voice (telephony)

2 data (refers to all bearer services; with `<mode>`=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4 fax (facsimile services)

8 short message service

16 data circuit sync

32 data circuit async

64 dedicated packet access

128   dedicated PAD access

`<status>`:

0 not active

1 active

`<number>`: string type phone number of calling address in format specified by `<type>`

`<type>`: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

`<alpha>`: optional string type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

`<CLI validity>`:

0 CLI valid

1 CLI has been withheld by the originator.

2 CLI is not available due to interworking problems or limitations of originating network.

When CLI is not available (`<CLI validity>`=2), `<number>` shall be an empty string ("") and `<type>` value will not be significant. Nevertheless, MT/TA may return the recommended value **128** for <type> ((TON/NPI unknown in accordance with GSM 04.08 [8] subclause 10.5.4.7).

When CLI has been withheld by the originator, (`<CLI validity>`=1) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081[3] and 3GPP TS 23.081[40]), <number> and <type> is provided. Otherwise, TA shall return the same setting for <number> and <type> as if the CLI was not available.

Implementation

Optional.

7.13 Call related supplementary services +CHLD

Table 35: +CHLD action command syntax

Command	Possible response(s)
+CHLD=[<n>]	*+CME ERROR: <err>*
+CHLD=?	[+CHLD: (list of supported <n>s)]

Description

This command allows the control of the following call related services:

- a call can be temporarily disconnected from the MTE but the connection is retained by the network;

- multiparty conversation (conference calls);

- the served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030 [19]. Refer subclause 9.2 for possible <err> values.

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; refer 3GPP TS 22.083 [5] clause 2), MPTY (MultiParty; refer 3GPP TS 22.084 [22]) and ECT (Explicit Call Transfer; refer 3GPP TS 22.091 [29]). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

NOTE: Call Hold, MultiParty and Explicit Call Transfer are only applicable to teleservice 11.

It is recommended (although optional) that test command returns a list of operations which are supported. The call number required by some operations shall be denoted by "x" (e.g. +CHLD: (0,1,1x,2,2x,3)).

Defined values

<n>: integer type; equals to numbers entered before SEND button in 3GPP TS 22.030 [19] subclause 4.5.5.1

NOTE: The "directory number" case shall be handled with dial command D, and the END case with hangup command H (or +CHUP). The 4*"directory number" case is handled with +CTFR command.

Implementation

Optional.

7.15 Unstructured supplementary service data +CUSD

Table 36: +CUSD parameter command syntax

Command	Possible response(s)
+CUSD=[<n>[,<str>[,<dcs>]]]	*+CME ERROR: <err>*
+CUSD?	+CUSD: <n>
+CUSD=?	+CUSD: (list of supported <n>s)

Description

This command allows control of the Unstuctured Supplementary Service Data (USSD) according to 3GPP TS 22.090 [23]. Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session.

When `<str>` is given, a mobile initiated USSD-string or a response USSD-string to a network initiated operation is sent to the network. The response USSD-string from the network is returned in a subsequent unsolicited +CUSD result code.

NOTE: In case of successful mobile initiated operation, MT/TA implemented according to a version prior to 6 of this standard, waits the USSD response from the network and sends it to the TE before the final result code. This will block the AT command interface for the period of the operation. Such MT/TA does not support `<n>` value 2.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

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

Defined values

`<n>`:

0 disable the result code presentation into the TEA

1 enable the result code presentation into the TEA

2 cancel session (not applicable to read command response)

`<str>`: string type USSD-string (when `<str>` parameter is not given, network is not interrogated):

- if `<dcs>` indicates that 3GPP TS 23.038 [25] 7 bit default alphabet is used:

  - if TE character set other than `"HEX"` (refer command Select TE Character Set +CSCS): MTE/TA converts GSM alphabet into current TE character set according to rules of 3GPP TS 27.005 [24] Annex A

  - if TE character set is `"HEX"`: MTE/TA converts each 7-bit character of GSM alphabet into two IRA character long hexadecimal number (e.g. character Π (GSM 23) is presented as 17 (IRA 49 and 55))

- if `<dcs>` indicates that 8-bit data coding scheme is used: MTE/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65))

`<dcs>`: 3GPP TS 23.038 [25] Cell Broadcast Data Coding Scheme in integer format (default 0)

`<m>`:

0 no further user action required (network initiated USSD-Notify, or no further information needed after mobile initiated operation)

1 further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation)

2 USSD terminated by network

3 other local client has responded

4 operation not supported

5 network time out

Implementation

Optional.

7.16   Advice of Charge +CAOC

Table 37: +CAOC parameter command syntax

Command	Possible response(s)
+CAOC[=<mode>]	[+CAOC: <ccm>]
	+CME ERROR: <err>
+CAOC?	+CAOC: <mode>
+CAOC=?	[+CAOC: (list of supported <mode>s]

Description

This refers to Advice of Charge supplementary service (3GPP TS 22.024 [26] and 3GPP TS 22.086 [27]) that enables subscriber to get information about the cost of calls. With <mode>=0, the execute command returns the current call meter value from the MT̶E.

The command also includes the possibility to enable an unsolicited event reporting of the CCM information. The unsolicited result code +CCCM: <ccm> is sent when the CCM value changes, but not more that every 10 seconds. Deactivation of the unsolicited event reporting is made with the same command.

Refer subclause 9.2 for possible <err> values.

NOTE: Advice of Charge values stored in the SIM card or in the active application in the UICC (GSM or USIM) (ACM, ACMmax, PUCT) can be accessed with generic or restricted SIM access command (+CSIM or +CRSM)).Those values can be more readily accessed with commands +CACM, +CAMM and +CPUC.

The Read command indicates whether the unsolicited reporting is activated or not. Read command is available when the unsolicited result code is supported.

It is recommended (although optional) that the test command returns the supported mode values.

Defined values

<mode>:

0   query CCM value

1   deactivate the unsolicited reporting of CCM value

2   activate the unsolicited reporting of CCM value

<ccm>: string type; three bytes of the current call meter value in hexadecimal format (e.g. "00001E" indicates decimal value 30); value is in home units and bytes are similarly coded as ACMmax value in the SIM card or in the active application in the UICC (GSM or USIM)

Implementation

Optional.

7.17   Supplementary service notifications +CSSN

Table 38: +CSSN parameter command syntax

Command	Possible response(s)
+CSSN=[<n>[,<m>]]	
+CSSN?	+CSSN: <n>,<m>
+CSSN=?	+CSSN: (list of supported <n>s),(list of supported <m>s)

Description

This command refers to supplementary service related network initiated notifications. The set command enables/disables the presentation of notification result codes from MT/TA to TE.

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code +CSSI: <code1>[,<index>] is sent to TE before any other MO call setup result codes presented in the present document or in V.25ter [14]. When several different <code1>s are received from the network, each of them shall have its own +CSSI result code.

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code +CSSU: <code2>[,<index>[,<number>,<type>[,<subaddr>,<satype>]]] is sent to TE. In case of MT call setup, result code is sent after every +CLIP result code (refer command "Calling line identification presentation +CLIP") and when several different <code2>s are received from the network, each of them shall have its own +CSSU result code.

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

Defined values

<n> (parameter sets/shows the +CSSI result code presentation status ~~in~~to the TE~~A~~):

0   disable

1   enable

<m> (parameter sets/shows the +CSSU result code presentation status to~~in~~ the TE~~A~~):

0   disable

1   enable

<code1> (it is manufacturer specific, which of these codes are supported):

0   unconditional call forwarding is active

1   some of the conditional call forwardings are active

2   call has been forwarded

3   call is waiting

4   this is a CUG call (also <index> present)

5   outgoing calls are barred

6   incoming calls are barred

7   CLIR suppression rejected

8   call has been deflected

<index>: refer "Closed user group +CCUG"

<code2> (it is manufacturer specific, which of these codes are supported):

0   this is a forwarded call (MT call setup)

1   this is a CUG call (also <index> present) (MT call setup)

2   call has been put on hold (during a voice call)

3   call has been retrieved (during a voice call)

4   multiparty call entered (during a voice call)

5   call on hold has been released (this is not a SS notification) (during a voice call)

6   forward check SS message received (can be received whenever)

7   call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call)

8   call has been connected with the other remote party in explicit call transfer operation (also number and subaddress parameters may be present) (during a voice call or MT call setup)

9   this is a deflected call (MT call setup)

10   sdditional incoming call forwarded

<number>: string type phone number of format specified by <type>

<type>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.8)

Implementation

Optional.

7.18   List current calls +CLCC

Table 39:+CLCC action command syntax

Command	Possible response(s)
+CLCC	[+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>[, <number>,<type>[,<alpha>[,<priority>]]] [<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty>[, <number>,<type>[,<alpha>[,<priority>]]] [...]]] *+CME ERROR: <err>*
+CLCC=?	

Description

Returns list of current calls of MTE. If command succeeds but no calls are available, no information response is sent to TE. Refer subclause 9.2 for possible <err> values.

Defined values

<idx>: integer type; call identification number as described in 3GPP TS 22.030 [19] subclause 4.5.5.1; this number can be used in +CHLD command operations

<dir>:

0   mobile originated (MO) call

1   mobile terminated (MT) call

<stat> (state of the call):

0   active

1   held

2   dialing (MO call)

3   alerting (MO call)

4 incoming (MT call)

5 waiting (MT call)

`<mode>` (bearer/teleservice):

0 voice

1 data

2 fax

3 voice followed by data, voice mode

4 alternating voice/data, voice mode

5 alternating voice/fax, voice mode

6 voice followed by data, data mode

7 alternating voice/data, data mode

8 alternating voice/fax, fax mode

9 unknown

`<mpty>`:

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

1 call is one of multiparty (conference) call parties

`<number>`: string type phone number in format specified by `<type>`

`<type>`: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

`<alpha>`: string type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set `+CSCS`

`<priority>`: optional digit type parameter indicating the eMLPP priority level of the call, values specified in 3GPP TS 22.067 [54]

Implementation

Optional. Recommended when +CHLD command is implemented.

7.19 Preferred operator list +CPOL

Table 40:+CPOL parameter command syntax

Command	Possible response(s)
+CPOL=[<index>][, <format>[,<oper>]]	*+CME ERROR: <err>*
+CPOL?	+CPOL: <index1>,<format>,<oper1> [<CR><LF>+CPOL: <index2>,<format>,<oper2> [...]] *+CME ERROR: <err>*
+CPOL=?	+CPOL: (list of supported <index>s),(list of supported <format>s)*+CME ERROR: <err>*

Description

This command is used to edit the user preferred list of networks in the active application on the UICC (GSM or USIM) or preferred list of networks in the SIM card. Execute command writes an entry in the SIM list of preferred operators (EF$_{PLMNsel}$), when the SIM card is present or when the UICC is present with an active GSM application. When UICC is present with an active USIM application, execute commands writes an entry in the User controlled PLMN selector with Access Technology list (EF$_{PLMNwAcT}$), only the PLMN field could be entered, the Access Technologies for each PLMN in this list is not accesible with this command (Note: new command for accessing the Access Technologies for each PLMN in this list is FFS). If <index> is given but <oper> is left out, entry is deleted. If <oper> is given but <index> is left out, <oper> is put in the next free location. If only <format> is given, the format of the <oper> in the read command is changed. Refer subclause 9.2 for possible <err> values.

NOTE:	MTE may also update this list automatically when new networks are selected.

Read command returns all used entries from the active application in the UICC (GSM or USIM) user preferred list of networks or SIM card list of preferred operators.

Test command returns the whole index range supported by the active application in the UICC (GSM or USIM) user preferred list of networks or SIM card.

Defined values

<index*n*>: integer type; the order number of operator in the active application in the UICC (GSM or USIM) user preferred list of networks or SIM card preferred operator list

<format>:

0	long format alphanumeric <oper>

1	short format alphanumeric <oper>

2	numeric <oper>

<oper*n*>: string type; <format> indicates if the format is alphanumeric or numeric (see +COPS)

Implementation

Optional.

# 7.20	Read operator names +COPN

Table 41:+COPN action command syntax

Command	Possible response(s)
+COPN	+COPN: <numeric1>,<alpha1> [<CR><LF>+COPN: <numeric2>,<alpha2> [...]] *+CME ERROR: <err>*
+COPN=?	

Description

Execute command returns the list of operator names from the MTE. Each operator code <numeric*n*> that has an alphanumeric equivalent <alpha*n*> in the MTE memory shall be returned. Refer subclause 9.2 for possible <err> values.

Defined values

<numeric*n*>: string type; operator in numeric format (see +COPS)

<alpha*n*>: string type; operator in long alphanumeric format (see +COPS)

Implementation

Optional.

7.21   eMLPP Priority Registration and Interrogation +CAEMLPP

Table 42: CAEMLPP parameter command syntax

Command	Possible Response(s)
+CAEMLPP=<priority>	*+CME ERROR: <err>*
+CAEMLPP?	+CAEMLPP: <default_priority>,<max_priority> *+CME ERROR: <err>*
+CAEMLPP=?	

Description

The execute command is used to change the default priority level of the user in the network. The requested priority level is checked against the eMLPP subscription of the user stored on the active application in the UICC (GSM or USIM) or SIM card EF$_{eMLPP}$. If the user doesn't have subscription for the requested priority level an ERROR or +CMEE ERROR result code is returned.

The read command triggers an interrogation of the provision of the maximum priority level which the service subscriber is allowed to use and default priority level activated by the user.

If the service is not provisioned, a result code including the SS-Status (?) parameter is returned.

Defined Values

<priority>: integer type parameter which identifies the default priority level to be activated in the network, values specified in 3GPP TS 22.067 [54]

<default_priority>: integer type parameter which identifies the default priority level which is activated in the network, values specified in 3GPP TS 22.067 [54]

<max_priority>: integer type parameter which identifies the maximum priority level for which the service subscriber has a subscription in the network, values specified in 3GPP TS 22.067 [54]

Implementation

Mandatory for a MT/TAE supporting AT commands only and supplemantery service eMLPP is implemented.

7.22   Informative examples

This subclause includes all the GSM/UMTS supplementary service related commands, additional commands to lock MTE and SIM/UICC capabilities, and commands to check the network registration status.

An example where MSISDNs of a ME are queried, calls are forwarded to different numbers when mobile is busy (CFB) or when it does not answer (CFNRy). The status of CFNRy is read:

```
AT+CNUM
+CNUM: ,"+358501234567",145,,4          (voice number)
OK
AT+CCFC=1,1,"931123456"                  (enable CFB)
OK
AT+CCFC=2,1,"921654321"                  (enable CFNRy)
OK
AT+CCFC=1,2                              (query CFNRy)
+CCFC: 1,7,"+35821654321",145,,,20      (forward after 20 seconds)
OK
```

An example of Call Waiting (+CCWA), Call Related Supplementary Services (+CHLD), and Connected Line Identification Presentation (+COLP) usage:

```
AT+CCWA=1,1;+COLP=1          (enable call waiting and COLP result codes)
OK
ATD9311234567;              (originate a voice call)
```

```
+COLP: "+358311234567",145
OK
...conversation...
+CCWA: "+358317654321",145    (another call is waiting)
AT+CHLD=2                     (put first call on hold and answer the second one)
OK
...conversation...
AT+CHLD=1                     (release the second (active) call and recover the first (held) call)
OK
ATH                           (release the first call)
OK
```

Call barring supplementary services are combined in one command, Facility Lock (+CLCK), which is also used to restrict MTE and SIM/UICC functionality Some of the facilities require a password when enabled or disabled. An additional command, Change Password (+CPWD), is defined for changing the password of different barring and restriction facilities. An example where locking status of outgoing international calls is interrogated and then barred, and the password of the SIM/UICC card lock (Personal Identity Number, PIN) is changed:

```
AT+CLCK="OI",2
+CLCK: 0,7
OK
AT+CLCK="OI",1,"1234"
OK
AT+CPWD="SC","4321","1234"
OK
```

Operator Selection (+COPS) command is used for querying the status of all GSM/UMTS operators detected in the area, and switching between operators.

Following example illustrates a network selection sequence in Finland. Two operators are found, the status of Tele is unknown and Radiolinja is currently selected. Read command shows that automatic selection mode is on and that Radiolinja is selected. Then an attempt is made to access Tele, but it is denied (shown by +CME ERROR).

```
AT+COPS=?
+COPS: (2,"RADIOLINJA","RL","24405"),(0,"TELE","TELE","24491")
OK
AT+COPS?
+COPS: 0,0,"RADIOLINJA"
OK
AT+COPS=1,0,"TELE"
+CME ERROR: 3
```

When a terminal wanders between countries (i.e. networks), an application may follow this e.g. with the following scenario:

```
AT+CREG=1                          (enable +CREG: <stat> unsolicited result code)
OK
AT+CREG?
+CREG: 1,1                         (MTE is registered in home PLMN)
OK
AT+COPS=3,2;+COPS?;+COPS=3,0;+COPS?
+COPS: 0,2,"24405"                 (get the country...
+COPS: 0,0,"RADIOLINJA"            ...and operator name)
OK
...user wanders to another PLMN...
+CREG: 2                           (deregistered, roaming ongoing)
+CREG: 5                           (registered again, not home PLMN)
AT+COPS=3,2;+COPS?;+COPS=3,0;+COPS?
+COPS: 0,2,"24001"                 (get the country...
+COPS: 0,0,"TELIA MOBITEL"         ...and operator name)
OK
...user loses connection, no other PLMNs around...
+CREG: 0
```
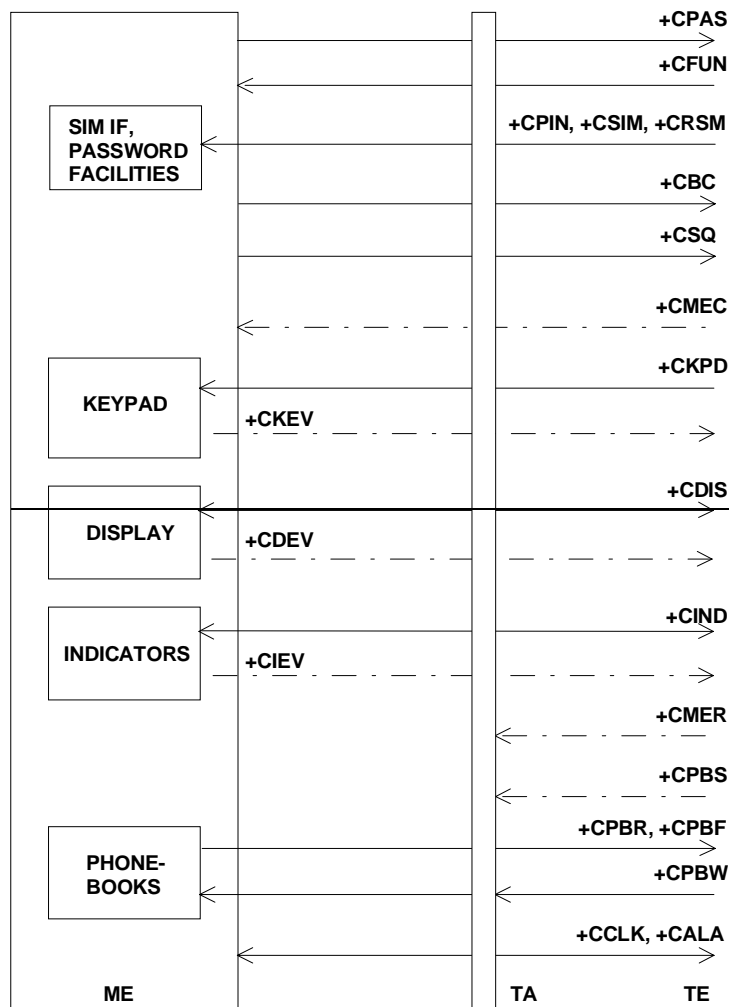
An example of eMLPP Supplementary Service usage for a ptp voice call:

```
ATD*752#+436644101453;             (originate a voice call with the priority level 2, see for priority level definitions GSM 02.30)
OK                                 (call setup was successful)
```

8 Mobile ~~Equipment~~ Termination control and status commands

This clause includes commands for M~~E~~T power, keypad, display and indicator handling. Also commands for selecting, reading and writing of phonebooks, and setting real-time clock facilities are specified. Two commands are specified for accessing SIM/UICC database records in a general way.

Figure 3 illustrates the effect of these commands. Command Phone Activity Status +CPAS indicates the current general activity status of the ~~ME~~MT. Command Set Phone Functionality +CFUN is used to set the ~~ME~~ MT to different power consumption states. Command Enter PIN +CPIN is used to enter ~~ME~~ passwords which are needed before any other functionality of the M~~E~~T can be used (e.g. SIM PIN, PUK). Commands Generic SIM Access +CSIM and Restricted SIM Access +CRSM can be used to access all data in SIM/UICC. Commands Battery Charge +CBC and Signal Quality +CSQ are same as in TIA IS-135 [16] and they are used to query the battery charge of the M~~E~~T and the current RSSI of the M~~E~~T. Command Mobile ~~Equipment~~ Termination Control Mode +CMEC is used to select the controlling unit of M~~E~~T keypad, display and indicators. Controlling commands for the TE are Keypad Emulation +CKPD, Display Control +CDIS and Indicator Control +CIND. If corresponding event reporting is enabled with command Mobile ~~Equipment~~ Termination Event Reporting +CMER, +CKEV is the result code of a keypad event, +CDEV is the result code of a display event, and +CIEV is the result code of an indicator event. Phonebook commands are Select Phonebook Memory Storage +CPBS, Read Phonebook Entries +CPBR, Find Phonebook Entries +CPBF and Write Phonebook Entry +CPBW. Additional command Clock +CCLK can be used to control the real-time clock of the M~~E~~T if available. Command Alarm +CALA sets possible alarm clock facilities of the M~~E~~T.
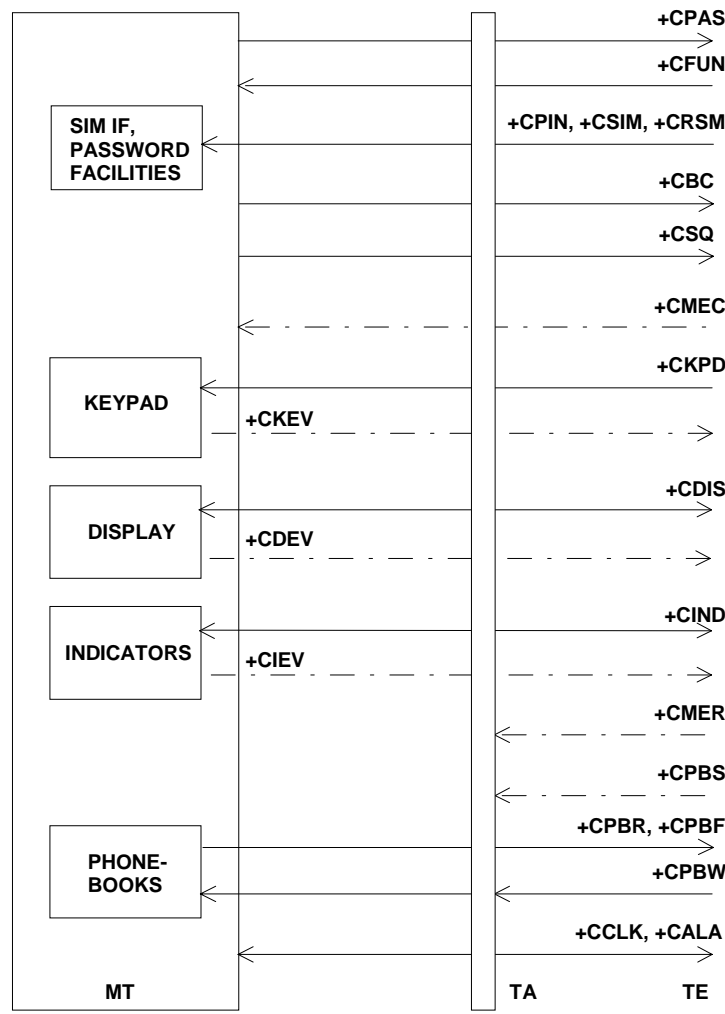
Figure 3: Mobile equipment termination control and status commands

8.1 Phone activity status +CPAS

Table 43: +CPAS action command syntax

Command	Possible response(s)
+CPAS	+CPAS: <pas> *+CME ERROR: <err>*
+CPAS=?	+CPAS: (list of supported <pas>s) *+CME ERROR: <err>*

Description

Execution command returns the activity status <pas> of the MTE. It can be used to interrogate the MTE before requesting action from the phone. Refer subclause 9.2 for possible <err> values.

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

Defined values

<pas>:

0 ready (MTE allows commands from TA/TE)

1 unavailable (MTE does not allow commands from TA/TE)

2 unknown (MTE is not guaranteed to respond to instructions)

3 ringing (MTE is ready for commands from TA/TE, but the ringer is active)

4 call in progress (MTE is ready for commands from TA/TE, but a call is in progress)

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

also all other values below 128 are reserved by the present document.

Implementation

Mandatory when MTE can be operated from TE (refer subclause "Mobile ~~Equipment~~ Termination control mode +CMEC").

8.2 Set phone functionality +CFUN

Table 44: +CFUN parameter command syntax

Command	Possible response(s)
+CFUN=[<fun>[,<rst>]]	*+CME ERROR: <err>*
+CFUN?	+CFUN: <fun>
	+CME ERROR: <err>
+CFUN=?	+CFUN: (list of supported <fun>s), (list of supported <rst>s)
	+CME ERROR: <err>

Description

Set command selects the level of functionality <fun> in the MTE. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn. Level of functionality between these may also be specified by manufacturers. When supported by manufacturers, MTE resetting with <rst> parameter may be utilized. Refer subclause 9.2 for possible <err> values.

NOTE: It is manufacturer specific does this command affect network registration. Command Operator Selection +COPS is used to force registration/deregistration.

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

Defined values

<fun>:

0 minimum functionality

1 full functionality

2 disable phone transmit RF circuits only

3 disable phone receive RF circuits only

4 disable phone both transmit and receive RF circuits

5...127 reserved for manufacturers as intermediate states between full and minimum functionality

<rst>:

0 do not reset the MTE before setting it to <fun> power level

NOTE: This shall be always default when <rst> is not given.

1 reset the MTE before setting it to <fun> power level

Implementation

Optional.

8.3   Enter PIN +CPIN

Table 45: +CPIN parameter command syntax

Command	Possible response(s)
+CPIN=<pin>[,<newpin>]	*+CME ERROR: <err>*
+CPIN?	+CPIN: <code>
	+CME ERROR: <err>
+CPIN=?	

Description

Set command sends to the MTE a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH-SIM PIN, etc.). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken towards MTE and an error message, +CME ERROR, is returned to TE. Refer subclause 9.2 for possible <err> values.

If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the active application in the UICC (GSM or USIM) or SIM card.

NOTE: Commands which interact with MTE that are accepted when MTE is pending SIM PIN, SIM PUK, or PH-SIM are: +CGMI, +CGMM, +CGMR, +CGSN, D112; (emergency call), +CPAS, +CFUN, +CPIN, +CDIS (read and test command only), and +CIND (read and test command only).

Read command returns an alphanumeric string indicating whether some password is required or not.

Defined values

<pin>, <newpin>: string type values

<code> values reserved by the present document:

READY   ~~ME~~ MT is not pending for any password

SIM PIN   MT ~~ME~~ is waiting UICC/SIM PIN to be given

SIM PUK   MT ~~ME~~ is waiting UICC/SIM PUK to be given

PH-SIM PIN   MT ~~ME~~ is waiting phone-to-SIM/UICC card password to be given

PH-FSIM PIN   MT ~~ME~~ is waiting phone-to-very first SIM/UICC card password to be given

PH-FSIM PUK   MT ~~ME~~ is waiting phone-to-very first SIM/UICC card unblocking password to be given

SIM PIN2   MT ~~ME~~ is waiting active application in the UICC (GSM or USIM) or SIM card PIN2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered right after the failure, it is recommended that ~~ME~~ MT does not block its operation)

SIM PUK2   MT ~~ME~~ is waiting active application in the UICC (GSM or USIM) or SIM card PUK2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered right after the failure, it is recommended that MT ~~ME~~ does not block its operation)

PH-NET PIN   MT ~~ME~~ is waiting network personalization password to be given

PH-NET PUK   MT ~~ME~~ is waiting network personalization unblocking password to be given

PH-NETSUB PIN   MT ~~ME~~ is waiting network subset personalization password to be given

PH-NETSUB PUK   MT ~~ME~~ is waiting network subset personalization unblocking password to be given

PH-SP PIN   MT ~~ME~~ is waiting service provider personalization password to be given

PH-SP PUK   MT ~~ME~~ is waiting service provider personalization unblocking password to be given

PH-CORP PIN   MT ~~ME~~ is waiting corporate personalization password to be given

PH-CORP PUK   MT ~~ME~~ is waiting corporate personalization unblocking password to be given

Implementation

Mandatory for MT ~~ME~~ not supporting the +CKPD command and supporting AT commands only.

8.4 Battery charge +CBC

Table 46: +CBC action command syntax

Command	Possible response(s)
+CBC	+CBC: <bcs>,<bcl> *+CME ERROR: <err>*
+CBC=?	+CBC: (list of supported <bcs>s),(list of supported <bcl>s)

Description

Execution command returns battery connection status <bcs> and battery charge level <bcl> of the MT~~ME~~. Refer subclause 9.2 for possible <err> values.

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

<bcs>:

0   MT ~~ME~~ is powered by the battery

1   MT ~~ME~~ has a battery connected, but is not powered by it

2   MT ~~ME~~ does not have a battery connected

3   Recognized power fault, calls inhibited

<bcl>:

0   battery is exhausted, or MT ~~ME~~ does not have a battery connected

1...100 battery has 1-100 percent of capacity remaining

Implementation

Optional.

8.5 Signal quality +CSQ

Table 47: +CSQ action command syntax

Command	Possible response(s)
+CSQ	+CSQ: <rssi>,<ber> *+CME ERROR: <err>*

| +CSQ=? | +CSQ: (list of supported <rssi>s),(list of supported <ber>s) |

Description

Execution command returns received signal strength indication <rssi> and channel bit error rate <ber> from the MT~~ME~~. Refer subclause 9.2 for possible <err> values.

Test command returns values supported ~~by the TA~~ as compound values.

Defined values

<rssi>:

0   -113 dBm or less

1   -111 dBm

2...30 -109... -53 dBm

31 -51 dBm or greater

99 not known or not detectable

<ber> (in percent):

0...7   as RXQUAL values in the table in GSM 05.08 [20] subclause 8.2.4

99 not known or not detectable

Implementation

Optional.

8.6   Mobile ~~Equipment~~ Termination control mode +CMEC

Table 48: +CMEC parameter command syntax

Command	Possible response(s)
+CMEC=[<keyp>[,<disp>[,<ind>]]]	*+CME ERROR: <err>*
+CMEC?	+CMEC: <keyp>,<disp>,<ind>
+CMEC=?	+CMEC: (list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s)

Description

Set command selects the equipment, which operates MT ~~ME~~ keypad, writes to MT ~~ME~~ display and sets MT ~~ME~~ indicators. If operation mode is not allowed by the MT~~ME~~, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the modes supported ~~by the TA~~ as compound values.

Defined values

<keyp>:

0 MT ~~ME~~ can be operated only through its keypad (execute command of +CKPD cannot be used)

1 MT ~~ME~~ can be operated only from TE (with command +CKPD)

2 MT ~~ME~~ can be operated from both MT ~~ME~~ keypad and TE

<disp>:

0 only MT ~~ME~~ can write to its display (command +CDIS can only be used to read the display)

1 only TE can write to MT ~~ME~~ display (with command +CDIS)

2 MT ~~ME~~ display can be written by both MT ~~ME~~ and TE

<ind>:

0 only MT ~~ME~~ can set the status of its indicators (command +CIND can only be used to read the indicators)

1 only TE can set the status of MT ~~ME~~ indicators (with command +CIND)

2 MT ~~ME~~ indicators can be set by both MT ~~ME~~ and TE

Implementation

Mandatory when any of keypad, display or indicator commands is implemented.

8.7 Keypad control +CKPD

Table 49: +CKPD action command syntax

Command	Possible response(s)
+CKPD=<keys>[,<time>[,<pause>]]	*+CME ERROR: <err>*
+CKPD=?	

Description

Execution command emulates MT ~~ME~~ keypad by giving each keystroke as a character in a string <keys>. <time>*0.1 seconds is the time to stroke each key and <pause>*0.1 seconds is the length of pause between two strokes. If emulating fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. This command should be accepted (OK returned) before actually starting to press the keys. Thus unsolicited result codes of key pressings and display events can be returned (refer subclause "Mobile ~~Equipment~~ Termination event reporting +CMER").

Defined values

<keys>: string of characters representing keys as listed in the following table (based on PCCA STD-101 Annex table I-3). Colon character (IRA 58) followed by one character can be used to indicate a manufacturer specific key not listed here. All characters from a semicolon character (IRA 59) to the next single semicolon character are treated as alpha entries and are not converted to key equivalents. All semicolon characters inside alpha entries should be duplicated in the TE and stripped to one before entering to the MT~~ME~~. Pause character (IRA 87 or 119) can be used to pause between key pressings for a time specified by <pause>. All IRA values not listed here are reserved.

Table 50: Character codes

Char	IRA (dec)	Comment (+ some known key symbols)
#	35	hash (number sign)
%	37	percent sign (P)
*	42	star (*)
0... 9	48... 57	number keys
:	58	escape character for manufacturer specific keys
;	59	escape character for string entering
<	60	left arrow
>	62	right arrow
@	64	alpha key (α/ABC)
A/a	65/97	channel A (A)
B/b	66/98	channel B (B)

Char	IRA (dec)	Comment (+ some known key symbols)
C/c	67/99	clear display (C/CLR)
D/d	68/100	volume down
E/e	69/101	connection end (END)
F/f	70/102	function (FCN)
L/l	76/108	phone lock (LOCK)
M/m	77/109	menu (MENU)
P/p	80/112	power (PWR)
Q/q	81/113	quiet/mute (MUTE)
R/r	82/114	recall last number (R/RCL/MR)
S/s	83/115	connection start (SEND)
T/t	84/116	store/ memory (STO/M/M+)
U/u	85/117	volume up
V/v	86/118	down arrow
W/w	87/119	pause character
X/x	88/120	auxiliary (AUX)
Y/y	89/121	delete last character (C)
[	91	soft key 1
]	93	soft key 2
^	94	up arrow

`<time>, <pause>:`

0...255   0... 25.5 seconds (default values are manufacturer specific, but should be so long that a normal ~~ME~~ MT can handle keystrokes correctly)

Implementation

Mandatory for MT ~~ME~~ not supporting the +CPIN command and supporting AT commands only.

8.8   Display control +CDIS

Table 51: +CDIS parameter command syntax

Command	Possible response(s)
`+CDIS=[<text>[,<text>[,...]]]`	`+CME ERROR: <err>`
`+CDIS?`	`+CDIS: <text>[,<text>[,...]]`
	`+CME ERROR: <err>`
`+CDIS=?`	`+CDIS: <length>[,<length>[,...]]`
	`+CME ERROR: <err>`

Description

Set command is used to write the contents of MT ~~ME~~ text type display elements. An element can consist of one character or several characters. The order of element parameters `<text>` should follow the rule: first is the element in upper left corner, second is the next element to the right and so on. The last element is the element in lower right corner. The number of elements is MT ~~ME~~ specific. If MT ~~ME~~ does not allow writing to its display or MT ~~ME~~ is not currently reachable, `+CME ERROR: <err>` is returned. Refer subclause 9.2 for `<err>` values. If certain element is not writable, setting of it should be ignored. If element parameter is empty field, element shall remain in the previous value.

   NOTE 1:   This command cannot be used to write to a display which sum of element lengths exceed the length of the command line buffer of the TA.

Read command returns the contents of MT ~~ME~~ display elements. If `<text>` field is empty (not empty string), MT ~~ME~~ does not allow the reading of corresponding element. If MT ~~ME~~ is not currently reachable, `+CME ERROR: <err>` is returned. Refer subclause 9.2 for `<err>` values.

Test command returns maximum length of each display element. If <u>MT</u> <s>ME</s> does not offer the length of elements, `<length>` fields should be empty. If <u>MT</u> <s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for `<err>` values.

NOTE 2: <u>MT</u> <s>ME</s> manufacturer should offer the order and maximum length of elements.

Defined values

`<text>`: string type parameter using character set specified by command Select TE Character Set +CSCS

`<length>`: integer type parameter giving the maximum length of corresponding `<text>` parameter

Implementation

Optional.

8.9 Indicator control +CIND

Table 52: +CIND parameter command syntax

Command	Possible response(s)
+CIND=[<ind>[,<ind>[,...]]]	*+CME ERROR: <err>*
+CIND?	+CIND: <ind>[,<ind>[,...]]
	+CME ERROR: <err>
+CIND=?	+CIND: (<descr>,(list of supported <ind>s)) [,(<descr>,(list of supported <ind>s))[,...]]
	+CME ERROR: <err>

Description

Set command is used to set the values of <u>MT</u> <s>ME</s> indicators. `<ind>` value 0 means that the indicator is off (or in state which can be identified as "off"-state), 1 means that indicator is on (or in a state which is more substantial than "off"-state), 2 is more substantial than 1, and so on. If the indicator is a simple on/off style element, it has values 0 and 1. The number of elements is <u>MT</u> <s>ME</s> specific. If <u>MT</u> <s>ME</s> does not allow setting of indicators or <u>MT</u> <s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for `<err>` values. If certain indicator is not writable, setting of it should be ignored. If parameter is empty field, indicator shall remain in the previous value.

Read command returns the status of <u>MT</u> <s>ME</s> indicators. If <u>MT</u> <s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for `<err>` values.

Test command returns pairs, where string value `<descr>` is a maximum 16 character description of the indicator and compound value is the allowed values for the indicator. If <u>MT</u> <s>ME</s> is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for `<err>` values.

NOTE: <u>MT</u> <s>ME</s> manufacturer should offer the description of supported indicators not listed here and their value ranges and default values.

Defined values

`<ind>`: integer type value, which shall be in range of corresponding `<descr>`

`<descr>` values reserved by the present document and their `<ind>` ranges:

`"battchg"` battery charge level (0-5)

`"signal"` signal quality (0-5)

`"service"` service availability (0-1)

`"sounder"` sounder activity (0-1)

"message"	message received (0-1)
"call"	call in progress (0-1)
"vox"	transmit activated by voice activity (0-1)
"roam"	roaming indicator (0-1)
"smsfull"	a short message memory storage in the MT has become full (1), or memory locations are available (0); i.e. the range is (0-1)

Implementation

Optional.

8.10 Mobile ~~Equipment~~ Termination event reporting +CMER

Table 53: +CMER parameter command syntax

Command	Possible response(s)
+CMER=[<mode>[,<keyp>[,<disp>[,<ind>[,<bfr>]]]]]	+CME ERROR: <err>
+CMER?	+CMER: <mode>,<keyp>,<disp>,<ind>,<bfr>
+CMER=?	+CMER: (list of supported <mode>s),(list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s),(list of supported <bfr>s)

Description

Set command enables or disables sending of unsolicited result codes from TA to TE in the case of key pressings, display changes, and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1, 2 or 3 is entered. If setting is not supported by the MT~~ME~~, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the modes supported ~~by the TA~~ as compound values.

Defined values

<mode>:

0 buffer unsolicited result codes in the TA; if TA result code buffer is full, codes can be buffered in some other place or the oldest ones can be discarded

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

3 forward unsolicited result codes directly to the TE; TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode

<keyp>:

0 no keypad event reporting

1 keypad event reporting using result code +CKEV: <key>,<press>. <key> indicates the key (refer IRA values defined in table in subclause "Keypad control +CKPD") and <press> if the key is pressed or released (1 for pressing and 0 for releasing). Only those key pressings, which are not caused by +CKPD shall be indicated by the TA to the TE.

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NOTE 1: When this mode is enabled, corresponding result codes of all keys currently pressed should be flushed to the TA regardless of `<bfr>` setting.

2 keypad event reporting using result code +CKEV: `<key>`,`<press>`. All key pressings shall be directed from TA to TE.

NOTE 2: When this mode is enabled, corresponding result codes of all keys currently pressed should be flushed to the TA regardless of `<bfr>` setting.

`<disp>`:

<u>0</u> no display event reporting

1 display event reporting using result code +CDEV: `<elem>`,`<text>`. `<elem>` indicates the element order number (as specified for +CDIS) and `<text>` is the new value of text element. Only those display events, which are not caused by +CDIS shall be indicated by the TA to the TE. Character set used in `<text>` is as specified by command Select TE Character Set +CSCS

2 display event reporting using result code +CDEV: `<elem>`,`<text>`. All display events shall be directed from TA to TE. Character set used in `<text>` is as specified by command Select TE Character Set +CSCS

`<ind>`:

<u>0</u> no indicator event reporting

1 indicator event reporting using result code +CIEV: `<ind>`,`<value>`. `<ind>` indicates the indicator order number (as specified for +CIND) and `<value>` is the new value of indicator. Only those indicator events, which are not caused by +CIND shall be indicated by the TA to the TE

2 indicator event reporting using result code +CIEV: `<ind>`,`<value>`. All indicator events shall be directed from TA to TE

`<bfr>`:

<u>0</u> TA buffer of unsolicited result codes defined within this command is cleared when `<mode>` 1...3 is entered

1 TA buffer of unsolicited result codes defined within this command is flushed to the TE when `<mode>` 1...3 is entered (OK response shall be given before flushing the codes)

Implementation

Mandatory when any of the keypad, display, or indicator result codes is implemented.

8.11 Select phonebook memory storage +CPBS

Table 54: +CPBS parameter command syntax

Command	Possible response(s)
+CPBS=`<storage>` [,`<password>`]	*+CME ERROR: `<err>`*
+CPBS?	+CPBS: `<storage>`[,`<used>`,`<total>`] *+CME ERROR: `<err>`*
+CPBS=?	+CPBS: (list of supported `<storage>`s)

Description

Set command selects phonebook memory storage `<storage>`, which is used by other phonebook commands. If setting fails in an ~~MT~~ <u>ME</u> error, +CME ERROR: `<err>` is returned. Refer subclause 9.2 for `<err>` values.

Read command returns currently selected memory, and when supported by manufacturer, number of used locations and total number of locations in the memory.

Test command returns supported storages as compound value.

Defined values

`<storage>` values reserved by the present document:

`"DC"` MT ~~ME~~ dialled calls list (+CPBW may not be applicable for this storage)

`"EN"` active application in the UICC (GSM or USIM) or SIM card (or MT~~ME~~) emergency number (+CPBW is not be applicable for this storage)

`"FD"` active application in the UICC (GSM or USIM) or SIM card fixdialling-phonebook

`"LD"` active application in the UICC (GSM or USIM) or SIM card last-dialling-phonebook

`"MC"` MT ~~ME~~ missed (unanswered received) calls list (+CPBW may not be applicable for this storage)

`"ME"` MT ~~ME~~ phonebook

`"MT"` combined MT ~~ME~~ and SIM/UICC phonebook

`"ON"` active application in the UICC (GSM or USIM) or SIM card (or ~~ME~~MT) own numbers (MSISDNs) list (reading of this storage may be available through +CNUM also)

`"RC"` MT ~~ME~~ received calls list (+CPBW may not be applicable for this storage)

`"SM"` SIM/UICC phonebook

`"TA"` TA phonebook

`<password>`: string type value representing the PIN2-code required when selecting PIN2-code locked `<storage>`s above, e.g. "FD".

`<used>`: integer type value indicating the number of used locations in selected memory

`<total>`: integer type value indicating the total number of locations in selected memory

Implementation

Mandatory when phonebook read, find or write command, or direct dialling (refer subclause "Direct dialling from phonebooks") is implemented.

8.12 Read phonebook entries +CPBR

Table 55: +CPBR action command syntax

Command	Possible response(s)
+CPBR=<index1> [,<index2>]	[+CPBR: <index1>,<number>,<type>,<text>[[...] <CR><LF>+CPBR: <index2>,<number>,<type>,<text>]] *+CME ERROR: <err>*
+CPBR=?	+CPBR: (list of supported <index>s),[<nlength>],[<tlength>] *+CME ERROR: <err>*

Description

Execution command returns phonebook entries in location number range `<index1>`... `<index2>` from the current phonebook memory storage selected with +CPBS. If `<index2>` is left out, only location `<index1>` is returned. Entry fields returned are location number `<indexn>`, phone number stored there `<number>` (of format `<type>`) and text `<text>` associated with the number. If all queried locations are empty (but available), no information text lines may be returnedIf listing fails in an MT ~~ME~~ error, +CME ERROR: `<err>` is returned. Refer subclause 9.2 for `<err>` values.

Test command returns location range supported by the current storage as a compound value and the maximum lengths of <number> and <text> fields. In case of SIM/UICC storage, the lengths may not be available. If <u>MT</u> ~~ME~~ is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Defined values

<index1>, <index2>, <index>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

Implementation

Optional.

8.13 Find phonebook entries +CPBF

Table 56: +CPBF action command syntax

Command	Possible response(s)
+CPBF=<findtext>	[+CPBF: <index1>,<number>,<type>,<text>[[...] <CR><LF>+CBPF: <index2>,<number>,<type>,<text>]] *+CME ERROR: <err>*
+CPBF=?	+CPBF: [<nlength>],[<tlength>] *+CME ERROR: <err>*

Description

Execution command returns phonebook entries (from the current phonebook memory storage selected with +CPBS) which alphanumeric field start with string <findtext>. Entry fields returned are location number <index*n*>, phone number stored there <number> (of format <type>) and text <text> associated with the number. If listing fails in an <u>MT</u> ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the maximum lengths of <number> and <text> fields. In case of SIM/UICC storage, the lengths may not be available. If <u>MT</u> ~~ME~~ is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Defined values

<index1>, <index2>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)

<findtext>, <text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

Implementation

Optional.

8.14 Write phonebook entry +CPBW

Table 57: +CPBW action command syntax

Command	Possible response(s)
+CPBW=[<index>][,<number> [,<type>[,<text>]]]	*+CME ERROR: <err>*
+CPBW=?	+CPBW: (list of supported <index>s),[<nlength>], (list of supported <type>s),[<tlength>] *+CME ERROR: <err>*

Description

Execution command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS. Entry fields written are phone number <number> (in the format <type>) and text <text> associated with the number. If those fields are omitted, phonebook entry is deleted. If <index> is left out, but <number> is given, entry is written to the first free location in the phonebook (the implementation of this feature is manufacturer specific). If writing fails in an <u>MT</u> ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns location range supported by the current storage as a compound value, the maximum length of <number> field, supported number formats of the storage, and the maximum length of <text> field. In case of SIM/UICC storage, the lengths may not be available. If <u>MT</u> ~~ME~~ is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. If storage does not offer format information, the format list should be empty parenthesis

Defined values

<index>: integer type values in the range of location numbers of phonebook memory

<number>: string type phone number of format <type>

<type>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7) ; default 145 when dialling string includes international access code character "+", otherwise 129

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS

<nlength>: integer type value indicating the maximum length of field <number>

<tlength>: integer type value indicating the maximum length of field <text>

Implementation

Optional.

8.15 Clock +CCLK

Table 58: +CCLK parameter command syntax

Command	Possible response(s)
+CCLK=<time>	*+CME ERROR: <err>*
+CCLK?	+CCLK: <time> *+CME ERROR: <err>*
+CCLK=?	

Description

Set command sets the real-time clock of the ~~MT~~ME. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current setting of the clock.

Defined values

<time>: string type value; format is "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48). E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to "94/05/06,22:10:00+08"

NOTE:　　If ~~MT~~ ME does not support time zone information then the three last characters of <time> are not returned by +CCLK?. The format of <time> is specified by use of the +CSDF command.

Implementation

Optional.

8.16　　Alarm +CALA

Table 59: +CALA parameter command syntax

Command	Possible response(s)
+CALA=<time>[,<n>[,<type> [,<text>[,<recurr>[,<silent >]]]]]	*+CME ERROR: <err>*
+CALA?	[+CALA: <time>,<n1>,<type>,[<text>],[<recurr>],<silent > [<CR><LF>+CALA: <time>,<n2>,<type>,[<text>],[<recurr>],<silent > [...]]] *+CME ERROR: <err>*
+CALA=?	+CALA: (list of supported <n>s),(list of supported <type>s),<tlength>,<rlength>,(list of supported <silent>s) *+CME ERROR: <err>*

Description

Set command sets an alarm time in the ~~MT~~ME. There can be an array of different types of alarms, and each alarm may cause different text to be displayed in the MT ~~ME~~ display. If setting fails in an ~~ME~~ MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

To set up a recurrent alarm for one or more days in the week, the <recurr>-parameter may be used.

When an alarm is timed out and executed, the unsolicited result code +CALV: <n> is always returned, even if the alarm is set up to be silent.

Read command returns the list of current active alarm settings in the ~~MT~~ME.

Test command returns supported array index values, alarm types, and maximum length of the text to be displayed.

Defined values

<time>: refer +CCLK,+CSDF

NOTE: If the <recurr>-parameter is used, the <time>-parameter must not contain a date.

<n>, <n1>, <n2>: integer type value indicating the index of the alarm; default is manufacturer specific

<type>: integer type value indicating the type of the alarm (e.g. sound, volume, LED); values and default are manufacturer specific

<text>: string type value indicating the text to be displayed when alarm time is reached; maximum length <tlength>

<tlength>: integer type value indicating the maximum length of <text>

<recurr>: string type value indicating day of week for the alarm in one of the following formats:

"<1..7>[,<1..7>[…]]" – Sets a recurrent alarm for one or more days in the week. The digits 1 to 7 corresponds to the days in the week, Monday (1), …, Sunday (7).
Example: The string "1,2,3,4,5" may be used to set an alarm for all weekdays.

"0" – Sets a recurrent alarm for all days in the week.

<rlength>: integer type value indicating the maximum length of <recurr>

<silent>: Integer type value indicating if the alarm is silent or not. If set to 1 the alarm will be silent and the only result from the alarm is the unsolicited result code +CALV. If set to 0 the alarm will not be silent.

Implementation

Optional.

8.17   Generic SIM access +CSIM

Table 60: +CSIM action command syntax

Command	Possible response(s)
+CSIM=<length>,<command>	+CSIM: <length>,<response> *+CME ERROR: <err>*
+CSIM=?	

Description

Set command transmits to the MT ~~ME~~ the <command> it then shall send as it is to the SIM. In the same manner the SIM <response> shall be sent back by the MT ~~ME~~ to the TA as it is. Refer subclause 9.2 for <err> values.

This command allows a direct control of the SIM by an distant application on the TE. The TE shall then take care of processing SIM information within the frame specified by GSM/UMTS.

NOTE: Compared to Restricted SIM Access command +CRSM, the definition of +CSIM allows TE to take more control over the SIM- MT ~~ME~~ interface. The locking and unlocking of the interface may be done by a special <command> value or automatically by TA/ MT ~~ME~~ (by interpreting <command> parameter). In case that TE application does not use the unlock command (or does not send a <command> causing automatic unlock) in a certain timeout value, MT ~~ME~~ may release the locking.

Defined values

<length> : integer type; length of the characters that are sent to TE in <command> or <response> (two times the actual length of the command or response)

<command> : command passed on by the MT ~~ME~~ to the SIM in the format as described in GSM 11.11 [28] (hexadecimal character format; refer +CSCS)

<response> : response to the command passed on by the SIM to the MT ~~ME~~ in the format as described in GSM 11.11 [28] (hexadecimal character format; refer +CSCS)

Implementation

Optional.

8.18 Restricted SIM access +CRSM

Table 61: +CRSM action command syntax

Command	Possible response(s)
+CRSM=<command>[,<fileid> [,<P1>,<P2>,<P3>[,<data>]]]	+CRSM: <sw1>,<sw2>[,<response>] *+CME ERROR: <err>*
+CRSM=?	

Description

By using this command instead of Generic SIM Access +CSIM TE application has easier but more limited access to the SIM database. Set command transmits to the MT ~~ME~~ the SIM <command> and its required parameters. MT ~~ME~~ handles internally all SIM- MT ~~ME~~ interface locking and file selection routines. As response to the command, MT ~~ME~~ sends the actual SIM information parameters and response data. MT ~~ME~~ error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters. Refer to subclause 9.2 for <err> values.

Coordination of command requests to SIM and the ones issued by GSM/UMTS application inside the MT ~~ME~~ is implementation dependent. However the TE should be aware of the precedence of the GSM/UMTS application commands to the TE commands.

Defined values

<command> (command passed on by the MT ~~ME~~ to the SIM; refer GSM 11.11 [28]):

176   READ BINARY

178   READ RECORD

192   GET RESPONSE

214   UPDATE BINARY

220   UPDATE RECORD

242   STATUS

all other values are reserved

NOTE 1: The MT ~~ME~~ internally executes all commands necessary for selecting the desired file, before performing the actual command.

<fileid>: integer type; this is the identifier of a elementary datafile on SIM. Mandatory for every command except STATUS

NOTE 2: The range of valid file identifiers depends on the actual SIM and is defined in GSM 11.11 [28]. Optional files may not be present at all.

<P1>, <P2>, <P3>: integer type; parameters passed on by the MT ~~ME~~ to the SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in GSM 11.11 [28]

<data>: information which shall be written to the SIM (hexadecimal character format; refer +CSCS)

<sw1>, <sw2>: integer type; information from the SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command

> <response>: response of a successful completion of the command previously issued (hexadecimal character format; refer +CSCS). STATUS and GET RESPONSE return data, which gives information about the current elementary datafield. This information includes the type of file and its size (refer GSM 11.11 [28]). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command

Implementation

Optional.

8.19   Secure control command +CSCC

Table 62: +CSCC parameter command syntax

Command	Possible response(s)
+CSCC=<mode>[,<cmd_set>[, <token>]]	+CSCC: <challenge> *+CME ERROR: <err>*
+CSCC?	+CSCC: <mode>,<cmd_set1> [<CR><LF>+CSCC: <mode>,<cmd_set2> [...]] *+CME ERROR: <err>*
+CSCC=?	+CSCC: (list of supported <mode>s),(list of supported <cmd_set>s)

Description

This command is used to enable/disable access to commands protected by security mechanism. This enables/disables access to command sets designated as "secure" such as programming of MT~~ME~~. Refer subclause 9.2 for possible <err> values.

The TE asks for a <challenge> with <mode>=1 and one specific command set (<cmd_set>), the MT ~~ME~~ replies with the <challenge>, which should be inserted into the identification algorithm in both entities (TE and MT~~ME~~). The algorithm output <token> is sent to the MT ~~ME~~ with <mode>=2 to enable the specified command set. <mode>=3 is used to disable the command set.

The read command returns the status (<mode> 2 or 3) of each supported command set.

Defined values

> <mode>:

1   request challenge token to enable access to specified command set

2   enable access to specified command set (<token> required)

3   disable access to specified command set

> <cmd_set>, <cmd_set1>, <cmd_set2>:

0   MT/TA~~S~~ code re-programming command set.

other values below 128 are reserved by the present document

<token>: string type; a variable length bit string represented with IRA characters 0 - 9 and A - F, each character representing a nibble; e.g. bit string "0110 1100 1001 1010" is represented by the IRA string "6C9A". The length of the required bit string varies depending on the value of <cmd_set>.

<challenge>: same format as token

Implementation

Optional.

8.20　Alert sound mode +CALM

Table 63: +CALM parameter command syntax

Command	Possible response(s)
+CALM=<mode>	*+CME ERROR: <err>*
+CALM?	+CALM: <mode>
	+CME ERROR: <err>
+CALM=?	+CALM: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to select the general alert sound mode of the MT~~ME~~. Refer subclause 9.2 for possible `<err>` values.

Test command returns supported values as compound value.

Defined values

　`<mode>`:

0　normal mode

1　silent mode (all sounds from MT ~~ME~~ are prevented)

2…　manufacturer specific

Implementation

Optional.

8.21　Ringer sound level +CRSL

Table 64: +CRSL parameter command syntax

Command	Possible response(s)
+CRSL=<level>	*+CME ERROR: <err>*
+CRSL?	+CRSL: <level>
	+CME ERROR: <err>
+CRSL=?	+CRSL: (list of supported <level>s)
	+CME ERROR: <err>

Description

This command is used to select the incoming call ringer sound level of the MT~~ME~~. Refer subclause 9.2 for possible `<err>` values.

Test command returns supported values as compound value.

Defined values

　`<level>`: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

Implementation

Optional.

8.22 Vibrator mode +CVIB

Table 65: +CVIB parameter command syntax

Command	Possible response(s)
+CVIB=<mode>	*+CME ERROR: <err>*
+CVIB?	+CVIB: <mode>
	+CME ERROR: <err>
+CVIB=?	+CVIB: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to enable and disable the vibrator alert feature of the MTME. It is manufacturer specific how this interacts with +CALM command. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

<mode>:

0   disable

1   enable

...15   reserved by the present document

16…   manufacturer specific

Implementation

Optional.

8.23 Loudspeaker volume level +CLVL

Table 66: +CLVL parameter command syntax

Command	Possible response(s)
+CLVL=<level>	*+CME ERROR: <err>*
+CLVL?	+CLVL: <level>
	+CME ERROR: <err>
+CLVL=?	+CLVL: (list of supported <level>s)
	+CME ERROR: <err>

Description

This command is used to select the volume of the internal loudspeaker of the MTME. Refer subclause 9.2 for possible <err> values.

Test command returns supported values as compound value.

Defined values

<level>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

Implementation

Optional.

8.25 Accumulated call meter +CACM

Table 67: +CACM parameter command syntax

Command	Possible response(s)
+CACM=[<passwd>]	*+CME ERROR: <err>*
+CACM?	+CACM: <acm>
	+CME ERROR: <err>
+CACM=?	

Description

Set command resets the Advice of Charge related accumulated call meter value in an active application in the UICC (GSM or USIM) or SIM card file EF_{ACM}. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value. If setting fails in an <u>MT</u> ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current value of ACM.

Defined values

<passwd>: string type; SIM PIN2

<acm>: string type; accumulated call meter value similarly coded as <ccm> under +CAOC

Implementation

Optional.

8.26 Accumulated call meter maximum +CAMM

Table 68: +CAMM parameter command syntax

Command	Possible response(s)
+CAMM=[<acmmax>[,<passwd>]]	*+CME ERROR: <err>*
+CAMM?	+CAMM: <acmmax>
	+CME ERROR: <err>
+CAMM=?	

Description

Set command sets the Advice of Charge related accumulated call meter maximum value in an active application in the UICC (GSM or USIM) or SIM card file EF_{ACMmax}. ACMmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM (refer +CACM) reaches ACMmax calls are prohibited (see also 3GPP TS 22.024 [26]). SIM PIN2 is usually required to set the value. If setting fails in an <u>MT</u> ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current value of ACMmax.

Defined values

<acmmax>: string type; accumulated call meter maximum value similarly coded as <ccm> under +CAOC; value zero disables ACMmax feature

<passwd>: string type; SIM PIN2

Implementation

Optional.

8.27 Price per unit and currency table +CPUC

Table 69: +CPUC parameter command syntax

Command	Possible response(s)
+CPUC=<currency>,<ppu>[,<passwd>]	*+CME ERROR: <err>*
+CPUC?	+CPUC: <currency>,<ppu>
	+CME ERROR: <err>
+CPUC=?	

Description

Set command sets the parameters of Advice of Charge related price per unit and currency table in an active application in the UICC (GSM or USIM) or SIM card file EF$_{PUCT}$. PUCT information can be used to convert the home units (as used in +CAOC, +CACM and +CAMM) into currency units. SIM PIN2 is usually required to set the parameters. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current parameters of PUCT.

Defined values

<currency>: string type; three-character currency code (e.g. "GBP", "DEM"); character set as specified by command Select TE Character Set +CSCS

<ppu>: string type; price per unit; dot is used as a decimal separator (e.g. "2.66")

<passwd>: string type; SIM PIN2

Implementation

Optional.

8.28 Call Meter maximum event +CCWE

Table 70: +CCWE parameter command syntax

Command	Possible response(s)
+CCWE=<mode>	*+CME ERROR: <err>*
+CCWE?	+CCWE: <mode>
	+CME ERROR: <err>
+CCWE=?	+CCWE: (list of supported <mode>s)
	+CME ERROR: <err>

Description

Shortly before the ACM (Accumulated Call Meter) maximum value is reached, an unsolicited result code +CCWV will be sent, if enabled by this command. The warning is issued approximately when 30 seconds call time remains. It is also issued when starting a call if less than 30 s call time remains. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current setting.

Test command returns supported settings.

Defined values

<mode>:

0 Disable the call meter warning event

1 Enable the call meter warning event

Implementation

Optional.

8.29 Power class +CPWC

Table 71: +CPWC parameter command syntax

Command	Possible response(s)
+CPWC=[<class>[,<band>]]	*+CME ERROR: <err>*
+CPWC?	+CPWC: <curr_class1>,<def_class1>,<band1>[,<curr_class2>,<def_class2>,<band2>[...]] *+CME ERROR: <err>*
+CPWC=?	+CPWC: list of supported (<band>,(list of <class>s)) pairs *+CME ERROR: <err>*

Description

This command is used to set the preferred MT ME power class for each GSM frequency band supported. The interaction of this setting with the selected bearer service (+CBST and HSCSD commands) is manufacturer specific (for example, selecting a multislot operation might reduce the power class automatically). If setting fails in an MT ME error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the currently selected output power class and default output power class for each supported frequency band (as defined by MT ME manufacturer). Parameter <band1> and its associated power class parameters refer to the currently used frequency band. For example, +CPWC: 2,1,1,5,4,0 in case of a dual-band MT ME currently using band GSM1800, for which the power class is currently set to 2, the default being class 1, and for which the currently set power class value for GSM900 is class 5 the default being class 4.

Test command returns supported bands and their power classes. For example,

+CPWC: (0,(0,4,5)),(1,(0-2)) in case of a dual-band handheld MT ME.

Defined values

    <class>, <curr_class*n*>s, <def_class*n*>s:

0 default (not applicable to <curr_class>s or <def_class*n*>s)

1… MT MS output power class as in GSM 05.05 [38]

    <band>, <band*n*>s:

0 GSM900

1 GSM1800

2 reserved for GSM1900

3 GSM 400

Implementation

Optional.

8.30 Set Language +CLAN

Table 72: +CLAN parameter command syntax

Command	Possible response(s)
+CLAN=<code>	*+CME ERROR: <err>*
+CLAN?	+CLAN: <code>
	+CME ERROR: <err>
+CLAN=?	+CLAN:(list of supported <code>s)
	+CME ERROR: <err>

Description

This command sets the language in the MT~~ME~~. The set-command must confirm the selected language with the MMI-module in the MT~~ME~~. If setting fails, a MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

The <code>-parameter is a two-letter abbreviation of the language. The language codes, as defined in ISO 639, consists of two characters, e.g. "sv", "en" etc.

The complete set of language codes to be used are manufacturer specific and should all be possible to use with the command. Some examples are described under <code>. For a complete list see ISO 639.

The read command gives the current language as output. If the language has been set to "AUTO", the read command returns the current language set from the active application in the UICC (GSM or USIM) or SIM card. Hence, the "AUTO"-code is never returned by the read-command.

Test command returns supported <code>s.

Defined values

<code>: (not all language codes are present in this list)

"AUTO"   Read language from the active application in the UICC (GSM or USIM) or SIM card. "Auto" is not returned by the read-command.

"sw"   Swedish

"fi"   Finnish

"da"   Danish

"no"   Norwegian

"de"   German

"fr"   French

"es"   Spanish

"it"   Italian

"en"   English

Implementation

Optional.

8.31 Language Event +CLAE

Table 73: +CLAE parameter command syntax

Command	Possible response(s)
+CLAE=<mode>	*+CME ERROR: <err>*
+CLAE?	+CLAE: <mode>
	+CME ERROR: <err>
+CLAE=?	+CLAE: (list of supported <mode>s)
	+CME ERROR: <err>

Description

This command is used to enable/disable unsolicited result code +CLAV: <code>. If <mode>=1, +CLAV: <code > is sent from the MT ~~ME~~ when the language in the MT ~~ME~~ is changed. If setting fails, a MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current status for <mode>.

Test command returns supported <mode>s.

Defined values

   <mode>:

0 Disable unsolicited result code +CLAE

1 Enable unsolicited result code +CLAE

   <code>: For description see +CLAN.

Implementation

Optional.

8.32 Set Greeting Text +CSGT

Table 74: +CSGT parameter command syntax

Command	Possible response(s)
+CSGT=<mode>[,<text>]	*+CME ERROR: <err>*
+CSGT?	+CSGT: <text>, <mode>
	+CME ERROR: <err>
+CSGT=?	+CSGT:(list of supported <mode>s), <ltext>
	+CME ERROR: <err>

Description

This command sets and activates the greeting text in the MT~~ME~~. The greeting text is shown in the MT ~~ME~~ display when the MT ~~ME~~ is turned on. The command can also be used to deactivate a text. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

The read command queries the current <text> and the status of the <mode> parameter

   Test command returns supported <mode>s and the maximum number of characters in <text>. For example,

+CSGT: (0-1),20

Defined values

<text>: string type; A free text that shall be displayed. The text can not include <CR>

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<mode>:

0   ***Turn off greeting text.***

1   ***Turn on greeting text***

</div>

Implementation

Optional.

8.33   Set Voice Mail Number +CSVM

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Table 75: +CSVM parameter command syntax

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Command	Possible response(s)
+CSVM=<mode>[,<number>[,<type>]]	*+CME ERROR: <err>*
+CSVM?	+CSVM:<mode>,<number>,<type> *+CME ERROR: <err>*
+CSVM=?	+CSVM: (list of supported <mode>s), (list of supported <type>s) *+CME ERROR: <err>*

Description

The number to the voice mail server is set with this command. The parameters <number> and <type> can be left out if the parameter <mode> is set to 0. If setting fails, an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the currently selected voice mail number and the status (i.e. enabled/disabled).

Test command returns supported <mode>s and <type>s.

Defined values

    <mode>:

0   **Disable the voice mail number.**

1   **Enable the voice mail number.**

   <number>: string type; **Character string <0..9,+>**

   <type>: integer type; Type of address octet. (refer GSM 04.08 subclause 10.5.4.7)

129   **ISDN / telephony numbering plan, national / international unknown**

145   **ISDN / telephony numbering plan, international number**

161   **ISDN / telephony numbering plan, national number**

128 - 255   Other values refer GSM 04.08 section 10.5.4.7

<type>: type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129

Implementation

Optional.

<div align="center">

3GPP

</div>

8.34 Ring Melody Playback +CRMP

Table 76: +CRMP action command syntax

Command	Possible response(s)
+CRMP=<call type>[,<volume>[,<type>,<index>]]	+*CME ERROR: <err>*
+CRMP=?	+CRMP: (list of supported <call type>s),(list of supported <volume>s),(<type0>),(list of supported <index>s)[<CR><LF> +CRMP: (list of supported <call type>s),(list of supported <volume>s),(<type1>),(list of supported <index>s) +*CME ERROR: <err>*

Description

Execution command causes the MT ME to playback a specific ring type. The default values for the optional parameters are the current selected in the MTME.

Test command returns the available ring melodies.

Defined values:

<call type>: integer type; manufacturer specific

<volume>: integer type value with manufacturer specific range (smallest value represents the lowest sound level)

<type>:

0   Manufacturer defined

1   User defined

<index>: integer type;

Implementation

Optional.

8.35 Master Reset +CMAR

Table 77: +CMAR action command syntax

Command	Possible response(s)
+CMAR=<phone lock code>	+*CME ERROR: <err>*
+CMAR=?	+*CME ERROR: <err>*

Description

This command requests the MT ME to reset user data. The user data in the phone will be reset to default values. If setting fails, a MT ME error, +CME ERROR: <err>, is returned. Refer subclause 9.2 for <err> values.

If the MT ME is locked and this command is used, then the MT ME will be unlocked after the master reset.

Test command returns OK

Defined values

<phone lock code > string type; Security code (Phone Lock code) must be verified before performing the master reset.

Implementation

Optional.

8.36 List all available AT commands +CLAC

Table 78: +C action command syntax

Command	Possible response(s)
+CLAC	<AT Command1> [<CR> <LF> <AT Command2>[…]]
	+CME ERROR: <err>
+CLAC=?	*+CME ERROR: <err>*

Description

Execution command causes the MT ME to return one or more lines of AT Commands.

Note: This command only returns the AT commands that are available for the user.

Defined values

<AT Command >:

Defines the AT command including the prefix AT. Text shall not contain the sequence 0<CR> or OK<CR>

Implementation

Optional.

8.37 Delete alarm +CALD

Table 79: +CALD action command syntax

Command	Possible response(s)
+CALD=<n>	*+CME ERROR: <err>*
+CALD=?	+CALD: (list of supported <n>s)
	+CME ERROR: <err>

Description

Action command deletes an alarm in the MTME. If the command fails in an MT ME error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns supported array index values.

Defined values

<n>: integer type value indicating the index of the alarm; default is manufacturer specific

Implementation

Optional.

8.38 Postpone or dismiss an alarm +CAPD

Table 80: +CAPD action command syntax

Command	Possible response(s)
+CAPD=[<sec>]	*+CME ERROR: <err>*
+CAPD=?	+CAPD: (list of supported <sec>s)
	+CME ERROR: <err>

Description

Set command postpones or dismisses a currently active alarm. If the command fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns supported <sec>-parameter values.

Defined values

<sec>: integer type value indicating the number of seconds to postpone the alarm. If <sec> is set to 0 (default), the alarm is dismissed.

Implementation

Optional.

8.39 Automatic Time Zone Update +CTZU

Table 81: +CTZU parameter command syntax

Command	Possible response(s)
+CTZU=<onoff>	*+CME ERROR: <err>*
+CTZU?	+CTZU: <onoff>
	+CME ERROR: <err>
+CTZU=?	+CTZU: (list of supported <onoff>s)
	+CME ERROR: <err>

Description

Set command enables and disables automatic time zone update via NITZ. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current settings in the MT ~~ME~~.

Test command returns supported on- and off-values.

Defined values

<onoff>: integer type value indicating:

0 – Disable automatic time zone update via NITZ (default).

1 – Enable automatic time zone update via NITZ.

Implementation

Optional.

8.40 Time Zone Reporting +CTZR

Table 82: +CTZR parameter command syntax

Command	Possible response(s)
+CTZR=<onoff>	*+CME ERROR: <err>*
+CTZR?	+CTZR: <onoff>
	+CME ERROR: <err>
+CTZR=?	+CTZR: (list of supported <onoff>s)
	+CME ERROR: <err>

Description

This set command enables and disables the time zone change event reporting. If the reporting is enabled the MT ~~ME~~ returns the unsolicited result code +CTZV: <tz> whenever the time zone is changed. If setting fails in an MT ~~ME~~ error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Read command returns the current reporting settings in the MT~~ME~~.

Test command returns supported <onoff>-values.

NOTE: The Time Zone reporting is not affected by the Automatic Time Zone setting command, +CTZU.

Defined values

<onoff>: integer type value indicating:

  0 – disable time zone change event reporting (default).

  1 – Enable time zone change event reporting.

Implementation

Optional.

8.41 Enter protocol mode+CPROT

Table 83: +CPROT parameter command syntax

Command	Possible response(s)
+CPROT=<proto>[,<version>[,<lsap1>[,...[<lsapN>]]]]	CONNECT
	NO CARRIER
	OK
	ERROR
	+CME ERROR: <err>
+CPROT=?	+CPROT: <proto1>[,(list of supported <version>s)[,(list of supported <lsap1>s)[,...[,(list of supported <lsapN>s)]]]]
	[<CR><LF>
	+CPROT : <proto2>[,(list of supported <version>s)[,(list of supported <lsap1>s)[,...[,(list of supported <lsapN>s)]]]]]
	[...]]]]]

Description

Set command informs TA that TE wants to establish a peer-to-peer protocol <proto> or upper layer connection (indicating by the <lsap>s setting) with the MT ~~ME~~ on the link from which the command was received. This command can be used in case the link between TE and MT ~~ME~~ does not provide itself such a mechanism.

If MT ~~ME~~ has succeeded in establishing a logical link between application protocols and external interface, it will send CONNECT message to the TE. Otherwise, the NO CARRIER response will be returned.

If the CONNECT response is received, TE can start sending <proto> or upper layer frames.

The connection shall always return for <proto> mode when the protocol session is ended. When the MT ~~ME~~ receives a disconnect request from its peer entity, it will process it and send OK response to the TE indicating its capability for receiving new AT commands. Since <proto> or upper layers can be accessed in other ways, TA must have pre-knowledge of the fact that connection is initiated with AT+CPROT command. This means that switch to <proto> mode must include some sort of notification to the protocol entity.

This command can be aborted by sending a <proto> or upper layer disconnection frame. In that case, ME will return in command mode by sending the OK response.

Refer subclause 9.2 for possible <err> values.

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

Defined values

<proto>

0   OBEX (refer.[44])

…15   reserved by the present document

16...   manufacturer specific

<version>:   version number of <proto>: string type

<lsap1>: defines a level of service or application protocol on the top of <proto> layer. It may refer to services or protocols defined in other standards development organizations (SDOs).

1   IrMC level 1 (Minimum Level) Only .(refer [43] subclause 2.9.4)

2   IrMC level 1 and 2 (Minimum and Access Levels) Only. .(refer [43] subclause 2.9.4)

4   IrMC level 1, 2 and 3 (Minimum, Access, Index Levels) Only- implies static index support. .(refer [43] subclause 2.9.4)

8   IrMC level 1, 2 and 4 (Minimum, Access and Sync Levels) Only-implies unique index support. .(refer [43] subclause 2.9.4)

10   IrMC level 1, 2, 3 and 4 (Minimum, Access, Index and Sync Levels)-implies support of static and unique index. .(refer [43] subclause 2.9.4)

…15   reserved by the present document

16...   manufacturer specific

<lsap2>...<lsapN>

In case <lsapN>,<lsapN+1> received in the +CPROT command identifies protocol layers, the protocol identified by N+1 shall be on the top of the protocol identified by N on a framework point of view.

0…15   reserved by the present document

16...   manufacturer specific

Implementation

Optional.

8.42　Informative examples

Phone Activity Status (+CPAS) is a general command used to detect the presence of the MT~~ME~~, if there is an incoming call, or if there is a call in progress. This command should be used before trying to operate the MT ~~ME~~ from the TE. Note that the activity status may change at any time after the execution of +CPAS, and hence the returned value may be obsolete. Detachment of the MT ~~ME~~ from the TA is indicated with a special final result code that indicates all errors related to the operation of the MT~~ME~~. Result code is +CME ERROR: <err>, where <err> is an integer or verbose value giving useful information about the reason for the command failure (refer subclause "Mobile ~~Equipment~~ Termination error result code +CME ERROR").

Set Phone Functionality (+CFUN) can be used to reset the MT ~~ME~~ or set the power consumption level of the MT ~~ME~~ by disabling certain parts of the MT ~~ME~~ (e.g. the transmit and receive RF circuits). Mobile ~~Equipment~~ Termination Control Mode (+CMEC) is a command which manages access sharing between the MT ~~ME~~ and the TE to operate the user interface of the MT~~ME~~. It has three subparameters which describe the access to keypad, display and indicators. Each subparameter has values for restricting the operation of the corresponding user interface part only to the MT ~~ME~~ or only to the TE, or to give the access for both of them.

Keypad Control command (+CKPD) is used to operate the keypad of the MT~~ME~~. Here lies the problem of different keypad types between manufacturers, and also between their MT ~~ME~~ models. The keypresses are sent to the MT ~~ME~~ as a string type subparameter of this command. Each character in that string represents a key which will be logically pressed. A special character (colon) followed by any character can be used by manufacturers (or TE application programmers) to represent a key which is not defined in this profile. An escape character (semicolon) for direct string entering is also defined. All text between single semicolon characters is treated as an alphanumeric entry and is not converted to keypressings. All semicolon characters inside the text shall be duplicated in the TE and stripped back to one before entering them to the MT~~ME~~. Command has also optional second and third parameters which can be used to alter the time to strike each key, and the pause to wait between keystrokes (in tenths of a second). A special pause character (W or w) may be added in the string type subparameter for an extra pause of the same length as given by the third subparameter. In the following example alphanumeric mode is entered and a person predefined in the ~~ME~~ MT phonebook, "Ilkka", is called; each key is struck for half a second and pauses between strokes are a tenth of a second:

```
AT+CKPD="@:Ilkka:S",5,1
OK
```

Display Control command (+CDIS) is used both for writing to the display text fields and for reading the current status of the fields. Mobile ~~equipment~~ termination usually have a character set of their own, so the TA shall be able to do a conversion between the TE and the MT ~~ME~~ character sets. TE can have several character sets and the TA must be informed of the character set in use before starting to write or read the display. Character set is set with general command Select TE Character Set +CSCS. The +CDIS=? query command is a way to get information about the length of the fields. In the following example an MT ~~ME~~ is first queried about the supported conversions and the lengths of the fields. The response shows there are three ten character long and two six character long fields. Then the TE character set is set to be IRA and the current status of the display is read. The last command writes the text "Hello, I'm writing to display" in the three fields, and keeps the contents of the two other fields same (the last two commas could also be left out).

```
AT+CSCS=?;+CDIS=?
+CSCS: ("IRA","PCCP850","8859-1")
+CDIS: 10,10,10,6,6
OK
AT+CSCS="IRA"
OK
AT+CDIS?
+CDIS: "RADIOLINJA","","","Menu","Memory"
OK
AT+CDIS="IRA","Hello, I'm","writing to","display",,
OK
```

The writing is possible only when it is permitted by the Mobile ~~Equipment~~ Termination Control Mode command (and by the manufacturer). If a certain field is not writable (but is readable), writing to it should be ignored. The order of the text fields should be determined by manufacturers and follow the rule: first field is in the upper left corner, second in the next field to the right, and so on, until to the last field in the lower right corner.

Indicators can be handled with Indicator Control command (+CIND). Its query command returns a short description (abbreviation) of the purpose of the indicators and the supported values for each indicator. The setting and reading is done similarly as with Display Control command. In the following example the indicators of a phone are queried, their current value is read, and the value of message indicator is tried to set (but it is forbidden):.

```
AT+CIND=?
+CIND: ("memory",(0-2)),("call",(0,1)),("data",(0,1)),("roam",(0,1)),
("alpha",(0,1)),("message",(0,1)),("index1",(0-11)),("index2",(0-11)),
("index3",(0-11)),("signal",(0-5)),("service",(0,1)),("sel1",(0,1)),
("sel2",(0,1)),("sel3",(0,1)),("battchg",(0-5))
OK
AT+CIND?
+CIND: 1,0,0,0,0,1,0,0,0,3,1,0,0,0,5
OK
AT+CIND=,,,,,0
+CME ERROR: 10
```

The subparameter order in the command is defined by the query command order, not by the actual display order. The zero value of an indicator means that it is off (or in state which can be identified as "off"-state), value one means that the indicator is on (or in a state which is more substantial than "off"-state), value two is more substantial than one, and so on.

To this point, only operating through the TE is covered. But when <u>MT</u> ~~ME~~ can be operated also through its keypad, or there are changes in the status of the display elements, the information about these actions shall be given to the TE also. This can be solved only with unsolicited result codes which return keypad, display text and indicator events. Each event group has a result code of its own: +CKEV returns the key code and if the key pressed (1) or released (0), +CDEV returns the display text field running number (as specified by command +CDIS) and the new status of the field, and +CIEV returns the running number of the indicator (refer +CIND) and the new value of it. In the following example number key 1 is pressed, updated on the display, released, and signal strength changes its state to five:

```
+CKEV: 49,1
+CDEV: 1,"1"
+CKEV: 49,0
+CIND: 10,5
```

Mobile ~~Equipment~~ Termination Event Reporting command (+CMER) has been specified for the purpose of controlling the sending of these unsolicited result codes to the TE. Four ways are provided to handle the buffering of the result codes (see figure 4). The first is to buffer them always. The second possibility is to discard them when in on-line data mode and otherwise forward them directly to the TE. The third possibility is to buffer them in data mode and otherwise forward them to the TE. The last possibility is to send them always to the TE (some inband technique - e.g. V.80 - shall be used in data mode to send the result codes within the data). This is the first subparameter of +CMER command. Next three subparameters are used to enable or disable each of the keypad, text field and indicator result codes. Sending codes can be enabled either so that only events generated from the MT ~~ME~~ user interface are returned, or so that also events caused by Keypad, Display and Indicator Control commands are returned. The fifth subparameter controls the flushing of the buffer when the value of the first subparameter is changed to a value from one to three.

Figure 4: Mobile ~~equipment~~ termination event reporting

An example of complete setup of the TA where TE takes the control of keypad, but does not want to write to display nor control the indicators (in the start ~~ME~~ MT is powered off):

```
AT+CMEE=2;+CREG=1              (use verbose <err> values; report registration)
OK
AT+CPAS                        (query MTME status)
+CPAS: 5                       (MTME is asleep)
OK
AT+CFUN=1                      (set MTME to full functionality state)
+CME ERROR: SIM PIN required   (SIM requests PIN)
AT+CPIN="1234"
+CME ERROR: incorrect password (user entered wrong PIN)
AT+CPIN="4321"
OK                             (correct PIN)
AT+COPS=0,0                    (ask for automatic operator selection and registration)
OK
+CREG: 1                       (registered in the network)
AT+COPS?
+COPS: 0,0,"RADIOLINJA"        (get the operator name)
OK
```

```
AT+CMEC=1,0,0                          (take over the keypad, leave display to MTME)
OK
AT+CDIS=?;+CIND=?                       (query display text and indicator formats)
+CDIS: 10,10,10,6,6
+CIND: ("memory",(0-2)),("call",(0,1)),("data",(0,1)),("roam",(0,1)),
("alpha",(0,1)),("message",(0,1)),("index1",(0-11)),("index2",(0-11)),
("index3",(0-11)),("signal",(0-5)),("service",(0,1)),("sel1",(0,1)),
("sel2",(0,1)),("sel3",(0,1)),("battchg",(0-5))
OK
AT+CSCS="IRA"                          (set TE character set for display text results)
OK
AT+CMER=1,0,2,2,0                      (return display text and indicator result codes when
OK                                      in command state, in data mode discard them)
AT+CDIS?;+CIND?                        (read current state of display texts and indicators)
+CDIS: "","","    12345","Menu","Memory"   (user had pressed number buttons before
+CIND: 1,0,0,0,0,1,0,0,0,3,1,0,0,0,5        TE took control with +CMEC)
OK
AT+CKPD="C",20                        (clear main display text '12345' by holding the
OK                                     'clear' button down two seconds)
+CDEV: 3,"1234"                       (first only one character deleted)
+CDEV: 3,""                           (while holding continues, whole display is cleared)
+CDEV: 1,"RADIOLINJA"                 (operator name comes to the display)
```

The start of the previous example could go as follows when MTME has already been powered on but is waiting for the PIN:

```
AT+CMEE=2;+CREG=1                      (use verbose <err> values; report registration)
OK
AT+CPAS                               (query MTME status)
+CPAS: 0                              (MTME is ready to receive commands)
OK
AT+CPIN?                              (is MTME asking passwords?)
+CPIN: SIM PIN                        (yes, SIM PIN required)
AT+CPIN="4321"
OK                                    (correct PIN)
```

One of the most regular operations done through the MTME user interface is phonebook control. To lessen the workload of the TE, some direct commands for phonebook reading and writing are practical. Command Select Phonebook Memory Storage +CPBS query version returns supported phonebook memories, read version returns current settings, and set version selects the memory. For GSM, the normal storages are SIM, MTME and TA.

Read Phonebook Entries (+CPBR) can be used to read either one or many phonebook locations at the same time. A regular phonebook entry consists of three elements: memory index number, the phone number and its alphanumeric equivalent given by the user. Query version of this returns supported index values of the selected memory, and the maximum lengths of the number and alphanumeric elements. The query version of the Write Phonebook Entry command (+CPBW) is similar, but the action version sets or clears an entry in the phonebook. Find Phonebook Entries (+CPBF) may be used to search alphanumeric entries starting with specific string. An example where the whole phonebook of the MTME is read, index number four is cleared, and number three is written:

```
AT+CPBS=?
+CPBS: ("ME","SM")                    (MTME and SIM have phonebooks)
OK
AT+CPBS="ME"                          (select MTME memory)
OK
AT+CPBR=?                             (read index range and element lengths)
+CPBR: (1-99),30,30
OK
AT+CPBR=1,99                          (read all entries but only the ones set are returned)
+CPBR: 1,"931123456",129,"Ilkka"
+CPBR: 2,"9501234567",129,""
+CPBR: 4,"901234567",129,"Hesari"
OK
AT+CPBW=4;+CPBW=3,"921123456",,"TS"   (clear index 4 and write index 3)
OK
```

9 Mobile ~~Equipment~~ Termination errors

9.1 Report Mobile ~~Equipment~~ Termination error +CMEE

Table 84: +CMEE parameter command syntax

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

Description

Set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the MT~~ME~~. When enabled, MT~~ME~~-related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality.

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

Defined values

<n>:

0   disable +CME ERROR: <err> result code and use ERROR instead

1   enable +CME ERROR: <err> result code and use numeric <err> values (refer next subclause)

2   enable +CME ERROR: <err> result code and use verbose <err> values (refer next subclause)

Implementation

Mandatory for <n> values 0 and 1.

9.2 Mobile ~~Equipment~~ Termination 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):

9.3 Informative examples

An example of TA responses with all three +CMEE values when ~~ME~~ MT manufacturer identification is requested but ~~ME~~ MT is not connected to the TA:

```
AT+CMEE=0     (+CME ERROR shall not be used)
OK
AT+CGMI
ERROR
AT+CMEE=1     (use numeric <err>)
OK
```

```
AT+CGMI
+CME ERROR: 1
AT+CMEE=2    (use verbose <err>)
OK
AT+CGMI
+CME ERROR: no connection to phone
```

10.1.18 Packet Domain event reporting +CGEREP

Table 85: 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 Packet Domain 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~~ termination has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT.

```
+CGEV: NW DETACH
```

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

```
+CGEV: ME DETACH
```

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

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

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

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

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

Implementation

Optional.

10.1.19 GPRS network registration status +CGREG

Table 86: 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

`<n>:`

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>]`

`<stat>:`

0   not registered, MT~~E~~ is not currently searching an operator to register to
The ~~MS~~ UE is in GMM state GMM-NULL or GMM-DEREGISTERED-INITIATED.
The GPRS service is disabled, the UE~~MS~~ is allowed to attach for GPRS if requested by the user.

1   registered, home network
The ~~MS~~ UE is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED ~~INITIATED~~ on the home PLMN.

2   not registered, but MT~~E~~ is currently trying to attach or searching an operator to register to
The ~~MS~~ UE is in GMM state GMM-DEREGISTERED or GMM-REGISTERED-INITIATED. The GPRS service is enabled, but an allowable PLMN is currently not available. The ~~MS~~ UE will start a GPRS attach as soon as an allowable PLMN is available.

3   registration denied
The ~~MS~~ UE is in GMM state GMM-NULL. The GPRS service is disabled, the ~~MS~~ UE is not allowed to attach for GPRS if requested by the user.

4   unknown

5   registered, roaming
The ~~MS~~ UE is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED on a visited PLMN.

`<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.

11.1.1   Accept an incoming Voice Group or Voice Broadcast Call +CAJOIN

Table 87: CAJOIN parameter command syntax

Command	Possible Response(s)
+CAJOIN=<service>, <GId> ,<GCA>	*+CME ERROR: <err>*
CAJOIN=?	

Description

The execute command accepts an incoming or ongoing voice group or voice broadcast call.

See command +CALCC to get a list of current voice group or voice broadcast calls.

Defined Values

`<GId>`: a digit string that specifies the group identification for the incoming voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area identification for the incoming voice group or voice broadcast call.

<service> (tele-service):

17 voice group call

18 voice broadcast call

Implementation

Mandatory for a MT~~ME~~-supporting AT commands only and VGCS or VBS is implemented.

11.1.2 Reject an incoming Voice Group or Voice Broadcast Call +CAREJ

Table 88: CAREJ parameter command syntax

Command	Possible Response(s)
+CAREJ=<service>, <GId>, <GCA>	*+CME ERROR: <err>*
+CAREJ=?	

Description

The execute command rejects an incoming voice group or voice broadcast call indicated by RING or +CRING, the command is applicable as long as the indication is pending.

If the call is once rejected the RING or +CRING indication is not repeated to TE although the call is still running and notifications for the call are received.

See command +CALCC to get a list of current voice group or voice broadcast calls.

Defined Values

<GId>: a digit string that specifies the group identification for the incoming voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area identification for the incoming voice group or voice broadcast call.

<service> (tele-service):

17 voice group call

18 voice broadcast call

Implementation

Mandatory for a MT~~ME~~-supporting AT commands only and VGCS or VBS is implemented.

11.1.3 Leave an ongoing Voice Group or Voice Broadcast Call +CAHLD

Table 89: CAHLD parameter command syntax

Command	Possible Response(s)
+CAHLD	*+CME ERROR: <err>*
+CAHLD=?	

Description

The execute command forces the MT to leave the active voice group or voice broadcast call without terminating it. The command is only applicable if the MT is in group receive mode. The MT returns to idle mode.

Implementation

Mandatory for a MT~~ME~~-supporting AT commands only and VGCS or VBS is implemented.

11.1.4 Talker Access for Voice Group Call +CAPTT

Table 90: CAPTT parameter command syntax

Command	Possible Response(s)
+CAPTT=[<mode> [,<time>]]	*+CME ERROR: <err>*
+CAPTT?	+CAPTT: <mode> *+CME ERROR: <err>*
+CAPTT=?	+CAPTT: (list of supported <mode>s), (list of supported <time>s)

Description

The execute command emulates the Push To Talk function for VGCS talker access.
If the parameter <mode> is set to value "0" i.e. "RELEASED" the PTT key is assumed to be released immediately.
If the parameter <mode> is set to value "1" i.e. "PUSHED" the PTT key is assumed to be pushed immediately for the period of <time> in seconds. If the command execution is repeated before the <time> expires the PTT timer will be loaded with the new <time> value and the PTT key remains "PUSHED" for the period of new <time> in seconds.
If the parameter <mode> is set to value "2" i.e. "PUSHED" the PTT key is assumed to be pushed immediately for an infinite period of time and can be released by <mode> value 0.
For <mode>=0 if the parameter <time> is issued it is ignored.

If the PTT timer expires after <time> seconds during <mode> "PUSHED" an unsolicited result code +CAPTT: 0 is issued to the TE.

The read command returns the current <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>:

0   status of the PTT key is RELEASED (default value)

1   status of the PTT key is PUSHED for a limited time by <time> in seconds

2   status of the PTT key is PUSHED for an infinite time

<time>:

3..255 this gives the time in seconds to wait before the PTT key is released, default value 10

Implementation

Mandatory for a MT~~ME~~-supporting AT commands only and VGCS is implemented.

11.1.5 Voice Group Call Uplink Status Presentation +CAULEV

Table 91: CAULEV parameter command syntax

Command	Possible Response(s)
+CAULEV=[<mode>]	*+CME ERROR: <err>*
+CAULEV?	+CAULEV: <mode>,[<status>] *+CME ERROR: <err>*

| +CAULEV=? | +CAULEV: (list of supported <mode>s) |

Description

The set command enables or disables the presentation of uplink access status for an active VGCS call. When enabled the unsolicited response +CAULEV: <status> is returned from MT to TE whenever the call uplink status changes.

Read command returns the current uplink <status> and the selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>: status of unsolicited result response presentation

0 disabled (default)

1 enabled

<status>: network uplink access status

0 uplink free

1 uplink busy

Implementation

Mandatory for a MTME-supporting AT commands only and VGCS is implemented.

11.1.6   List current Voice Group and Voice Broadcast Calls +CALCC

Table 92: +CALCC action command syntax

Command	Possible response(s)
+CALCC=<mode>	+CALCC: <GId>,<GCA>,<service>,<stat>,<dir>, <ack_flag>[,<priority>] [<CR><LF>+CALCC: <GId>,<GCA>,<service>, <stat>,<dir>,<ack_flag>[,<priority>] [...]] *+CME ERROR: <err>*
+CALCC=?	+CALCC: (list of supported <mode>s)

Description

The set command returns
for <mode>=1 the active voice group or voice broadcast call and
for <mode>=0 a list of all current running voice group and voice broadcast calls for which the user has a subscription and the GId is activated on the SIM. If the command succeeds but no calls are available, OK response is returned.

Defined values

<GId>: a digit string that specifies the group identification of the voice group or voice broadcast call.

<GCA>: a digit string that specifies the group call area of the voice group or voice broadcast call.

<service> (tele-service):

17 voice group call

18 voice broadcast call

<stat> (state of the call):

0   active, i.e. user participating at the call as talker or listener

1   held, the call is running but put to background, notifications ignored

2   incoming (MT call), the user doesn't respond to notifications of this call yet

<dir>:

0   mobile originated (MO) call, the user is the originator of the call

1   mobile terminated (MT) call, the user is not the originator of the call

<ack_flag>: proposes that a predefined confirmation procedure is to be used after the call is ended

0   confirmation procedure is not required

1   confirmation procedure is required

<priority>: optional integer type parameter which identifies the priority level of the voice group or voice broadcast call, values specified in 3GPP TS 22.067 [45].

Implementation

Optional. Recommended for a ~~MT~~ME-supporting AT commands only and VGCS or VBS is implemented.

11.1.7   Voice Group or Voice Broadcast Call State Attribute Presentation +CACSP

Table 93: CACCS parameter command syntax

Command	Possible Response(s)
+CACSP=[<mode>]	*+CME ERROR: <err>*
+CACSP?	+CACSP: <mode>[,<da>,<ua>,<comm>,<oi>] *+CME ERROR: <err>*
+CACSP=?	+CACSP: (list of supported <mode>s)

Description

The set command enables or disables the presentation of unsolicited result response +CACSP: <da>,<ua>,<comm>,<oi> from MT to TE if the call control state attributes of the active voice group or voice broadcast call changes.

Read command returns the current call control state attributes <da>,<ua>,<comm>,<oi> and selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>: status of unsolicited result response presentation

0   disabled (default)

1   enabled

<da>: User connection in the downlink

0   not attached

1   attached

<ua>: User connection in the uplink

0   not attached

1   attached

<comm>：The MT assumes that communication with its peer entity is

0   not enabled in both directions

1   enabled in both directions

<oi>：The ~~MS~~ MT assumes to be

0   not the originator of the call

1   the originator of the call

Implementation

Optional. Recommended for a MT~~ME~~ supporting AT commands only and VGCS or VBS is implemented.

11.1.8   NCH Support Indication +CANCHEV

Table 94: CAULEV parameter command syntax

Command	Possible Response(s)
+CANCHEV=[<mode>]	*+CME ERROR: <err>*
+CANCHEV?	+CANCHEV: <status>,<mode> *+CME ERROR: <err>*
+CANCHEV=?	+CANCHEV: (list of supported <mode>s)

Description

The set command enables or disables the presentation of unsolicited result response +CANCHEV: <status> from MT to TE if the status of the network NCH support information changes.

Read command returns in parameter <status> the network NCH support information in the selected cell and the selected <mode>.

The test command returns values supported as a compound value.

Defined Values

<mode>：status of unsolicited result response presentation

0   disabled (default)

1   enabled

<status>：network NCH support information

0   NCH not available

1   NCH available

Implementation

Optional. Recommended for a MT~~ME~~ supporting AT commands only and VGCS or VBS is implemented.

11.2.1   Request VGCS or VBS service 'D'

Table 95: D command syntax

Command	Possible Response(s)
D*<SC₁>[*<SC₂>]#<GId>;	*+CME ERROR: <err>*

Description

This Dial command extension is a service request application according to 3GPP TS 22.030 [19]. No further commands may follow on the AT command line. The requested service, GId and priority level are checked against the subscriptions of the user and the status of the GId stored on the SIM. In case if no subscription is available for this service, GId or priority level or the GId is deactivated an ERROR or +CMEE ERROR result code is returned. See +CMEE ERROR extensions for VGCS, VBS and eMLPP in subclause 9.2.

NOTE.   The dial string conforms to the syntax specified in 3GPP TS 22.030 [19].

Defined Values

$<SC_1>$: Service Code is a digit string which identifies a request to use
   value 17   Voice Group Call Service
   value 18   Voice Broadcast Service

$<SC_2>$:   Service Code is a digit string which identifies a request to use eMLPP priority . Service Code values for different priority levels are specified in 3GPP TS 22.030 [19]

$<GId>$: a digit string that specifies the group identification of a called party.

Implementation

Mandatory for a MTME-supporting AT commands only and VGCS or VBS is implemented.

11.2.2   Termination of an Voice Group or Voice Broadcast Call 'H'

The V.25ter 'H' or 'H0' (On-hook) command may be used to terminate an ongoing voice group or voice broadcast call. The MT responds with OK. It is an error to issue the 'H' command when there is no outstanding network request.

It is an error to issue the 'H' command if the user is in group receive mode or the user is not the originator of the call and a ERROR or +CME ERROR result code is returned to the TE.

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

Implementation

Mandatory for a MTME-supporting AT commands only and VGCS or VBS is implemented.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **23.227** CR **006** | ⌘ ev | **-** | ⌘ Current version: | **5.0.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title: ⌘	Alignment of UE architecture with 23.101	
Source: ⌘	T2	
Work item code: ⌘	TLM5	***Date:*** ⌘ 2002-02-05
Category: ⌘ **A**		***Release:*** ⌘ REL-5

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP <u>TR 21.900</u>.

Use <u>one</u> of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘	Alignment of the UE abstract architecture with the General UMTS Architecture specification 23.101
Summary of change: ⌘	Corrections made to use the correct terms ME, MT, TA and UE. UE, MT, ME abbreviation added. Reference to 23.101 added.
Consequences if not approved: ⌘	Inconsistent specifications and incorrect UE architecture

Clauses affected: ⌘	Introduction, 1, 2, 3.1, 3.2, 4.1,4.2, 4.4, Annex A, A.1
Other specs Affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	

How to create CRs using this form:

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.
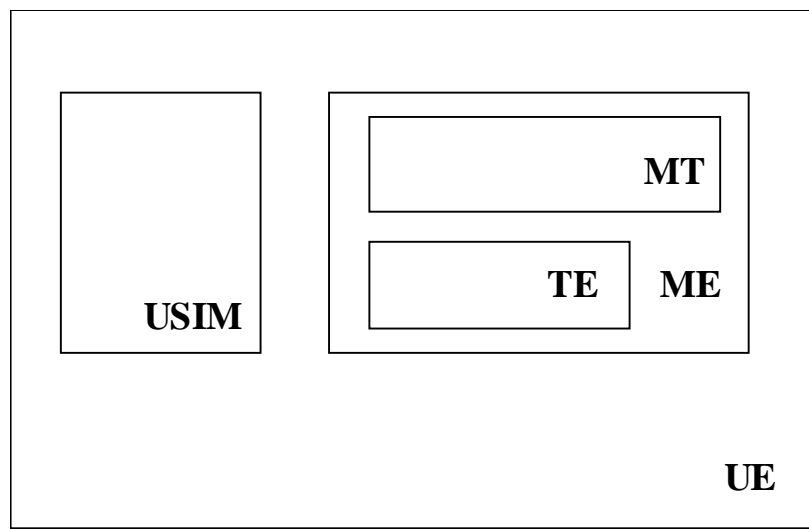
Introduction

The present rapid development of a diversity of new applications and application environments for mobile usage creates a complexity of previously unseen proportions that the ~~Mobile Equipment~~ UE has to handle. These applications and application environments co-exist and execute independently in the UE, and thus have the potential to interact with each other in a way that could be detrimental to the positive user experience and sense of user control of the UE. There is a need to control and manage the total applications/interfaces environment and MT resources so as to produce a conceptually consistent and logically whole and integrated user experience.

The present document outlines a generic model for the interaction between these applications. It further specifies a set of basic principles and requirements for these applications to co-exist on the UE. This specification may also result in presenting to the user a coherent user experience.

The present document's purpose is *not* to categorise the applications peripherals, but to try to structure the events that are internal and external to, and has to be handled by, the ~~ME~~ MT Core Functions. This means that the structure or grouping of the events should be made from a *~~ME~~ MT centric* perspective. Some applications run on the ~~ME~~ UE side have counterparts in the network. The present document addresses the interactions within the UE.

The User Equipment functional model used in this specification is defined by the model included in 23.101 [8]

```
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│                                              │
│  ┌─────────────┐   ┌──────────────────────┐  │
│  │             │   │ ┌──────────────────┐ │  │
│  │             │   │ │            MT    │ │  │
│  │             │   │ └──────────────────┘ │  │
│  │             │   │ ┌──────────────┐     │  │
│  │        USIM │   │ │        TE    │ ME  │  │
│  │             │   │ └──────────────┘     │  │
│  └─────────────┘   └──────────────────────┘  │
│                                              │
│                                      UE      │
└──────────────────────────────────────────────┘
```

Figure 1: Functional Model for the User Equipment

1   Scope

The present document defines the principles for scheduling UE resources and controlling UE interactions and resolving conflicts between independently running applications in different application execution environment (e.g. MExE, USAT etc.) and internal and external peripherals (e.g. infra-red, Bluetooth, USIM, radio interface, MMI, memory etc.).

The present document is divided in two parts: clause 4 defines a framework for event handling. Clause 5 addresses some specific issues.

Annex A contains an informative background to the problem area.

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1]   3GPP TR 21.905 "Vocabulary for 3GPP specifications"

[2]   3GPP TS 23.057: "Mobile Execution Environment (MExE); Functional description; Stage 2".

[3]   WAP, WAP Forum, "WAP Technical Specifications Suite" (http://www.wapforum.com/)

[4]   3GPP TS 31.101: "UICC-Terminal Interface; Physical and Logical Characteristics".

[5]   3GPP TS 31.102: "Characteristics of the USIM Application".

[6]   3GPP TS 31.111: "USIM Application Toolkit (USAT)".

[7]   3GPP TS 22.038: "USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1".

[8]   3GPP TS 23.101: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; General UMTS Architecture "

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in the referred documents and the following apply:

call: voice and data calls, USSD, SMS, fax, GPRS calls, supplementary services, etc.

preferences: includes authorisations, priorities, options, etc.

authorisation: permission to set up and or receive any call or only certain types of call and access rights to user data

ME MT Core Functions: software functions that contain the central logic for the MEMT, including for instance the scheduling of events

3.2 Abbreviations

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

ME:	Mobile Equipment
MExE:	Mobile Execution Environment
MM:	Mobility Management
MT:	Mobile Termination
RR:	Radio Resource
UE:	User Equipment
USAT:	USIM Application Toolkit
WAP:	Wireless Application Protocol

4 Principles for the Framework

The model presented in annex A defines a framework specifying *principles* for event handling, with the focus on issues related to application interaction. Principles for the framework are given below, using the stated definitions. The list is not necessarily complete.

4.1 Basic principles

1. Irrespective of the principles given below, emergency calls shall override all other calls.

3.2. The ~~ME~~ MT is the central resource and schedules internal and external entities according to the user's preferences and external environment.

4.2 User requirements

1. The user shall have the capability to make the ultimate decisions as elaborated below. Additionally, in the case where an UE is unmanned, none of the issues below shall render the UE inoperable such that it requires manual intervention locally at the UE to restore its use.

2. The user shall have the capability of selecting preferences interactively and/or via prior set-up in one or more user profiles. These shall be valid on a global or on a per application basis. The user's preferences shall be retained even in the event of loss of power.
   Preferences can be selected for an application when it is installed, or at any other time thereafter.
   Preferences, notably but not exclusively the priorities, can be modified at any time and this shall have effect at the earliest possible opportunity thereafter.

3. The user shall have the capability to modify authorisations assigned to applications. These shall be valid on a global or on a per application basis in one or more user profiles.

4. The user shall have the option to be advised to what extent an application has been authenticated at installation-time, and prevent the application from being installed based on this advice.
   The user shall have the option to be advised about the integrity of an application at installation-time, and prevent the application from being installed based on this advice.

5. The user shall have the capability to abort or suspend any on-going call that has been set up automatically by an application.

6. The user shall have the capability to require that the ~~ME~~ UE request permission from the user for individual calls, sets of calls (for instance all calls by a certain application) or all calls. The user shall have the capability to request the ~~ME~~ UE to record information on individual calls, sets of calls or all calls.

7. The user shall have the capability to distinguish which entity/application caused a specific event. The ~~ME~~ UE uses this information to support the user's preferences. The ~~ME~~ UE shall be able to inform the network of entity/application at set up time to support trace-ability when a call is set up.

8. The user's privacy shall be protected. Access to user data (including user profiles and any personal information in the UE) and audio functions (this would prevent for instance a mechanism that allows eavesdropping) shall not be possible without the user's prior permission.

9. The user shall have the capability to request from the ~~ME~~ UE which applications are present in the MExE environment and the (U)SIM, and whether they are running. The user shall also have the capability to request from the ~~ME~~ UE the status of other interfaces as shown in Figure 1, where implemented.

4.3   Specific requirements on applications

1. An application shall not assume that it is the only one active. For example where several applications use the same interface the application and/or the protocols used over the interface must be able to handle contention.

2. An application shall not interfere (terminate, suspend or degrade) with on-going calls set up by another application without authorisation from the user. For certain combinations of call (e.g., voice/data and USSD messages), interference can happen resulting in a level of degradation.

3. An application shall not assume that it has priority over another application, and shall comply with the user's currently selected preferences.

4.4   Specific requirements on the UE~~ME~~

1. The ~~ME~~ UE shall have the capability to authenticate the source of the application.

2. The ~~ME~~ UE shall have the capability to assure the integrity of an application.

5   Specific Interaction Requirements

The following clauses detail specific interaction requirements.

5.1   Bearer Independent Data Transfer: Radio Access bearers

Bearer Independent Data Transfer, using bearers over the Uu reference point, is a (U)SAT feature that allows a (U)SAT application to request the MT to set up and manage a data channel over a CSD, GPRS, SMS or USSD bearer using information provided by the (U)SAT application. Once the call is established, data may be transferred through that data call. The details for the (U)SIM-(U)SAT/ME interface are specified in 3GPP TS 31.101 [4], 31.102 [5], and 31.111 [6]. The Service Requirements for this are specified in 3GPP TS 22.038 [7].

5.1.1   Interaction between Core ~~ME~~ MT functions and Bearer Independent Data Transfer Service using Radio Access bearers

When a Bearer Independent Data Transfer Service is requested by a (U)SAT application, the MT shall:

*   If the MT is idle, set up the data channel as requested, indicating to the user by appropriate means, e.g., with an icon, that one or more calls are in progress and confirming to the (U)SAT application.

*   If the MT is not idle and can not service the request without negative impact on ongoing services, then the MT shall indicate to the (U)SAT application that the data channel can not be set up. However, if the user has indicated a preference for servicing such requests despite the negative impact then the MT may proceed as in the bullet point above.

*   If the user requests that the call be terminated via MMI or other interface, then the call shall be terminated and the (U)SAT application shall be informed.

*   If an external device (TE, Bluetooth device etc.) requests the same resource then that request shall be denied.

The above behaviour may be modified by a change of user preferences, for example the user may request the MT to deny access by the (U)SAT application to a data channel, or the user may request the MT to prioritise a particular external device such that a call set up by a (U)SAT application is cleared in order for the external device to be able to make a call.

5.2 Bearer Independent Data Transfer: local bearers

Bearer Independent Data Transfer, using local bearers, is a (U)SAT feature that allows a (U)SAT application to request the MT to set up and manage a data channel over local links such as Bluetooth, IrDA, RS232 or USB, using information provided by the (U)SAT application. Once the channel is open (local link), data may be transferred through the open channel. The details for the (U)SIM- (U)SAT/ME interface are specified in 3GPP TS 31.101 [4], 31.102 [5], and 31.111 [6]. The Service Requirements for this are specified in 3GPP TS 22.038 [7].

5.2.1 Interaction between Core ME functions and Bearer Independent Data Transfer Service using local bearers

When a Bearer Independent Data Transfer Service over a local link is requested by a (U)SAT application, the MT shall:

- If the MT can set up the local channel as requested, the user shall be notified by appropriate means, e.g., with an icon, that one or more channels are in progress and confirming to the (U)SAT application.

- If the MT cannot service the request without negative impact on ongoing services, then the MT shall indicate to the (U)SAT application that the data channel cannot be opened. However, if the user has indicated a preference for servicing such requests despite the negative impact then the MT may proceed as in the bullet point above.

- If the user requests that the channel be closed via MMI or other interface, then the channel shall be closed and the (U)SAT application shall be informed.

The above behaviour may be modified by a change of user preferences, for example the user may request the MT to deny access by the (U)SAT application to a data channel over a local link, or the user may request the MT to prioritise a particular external device such that a channel open by a (U)SAT application is cleared in order for the external device to be able to make open a channel.

5.2.2 Security requirements on (U)SAT Bearer Independent Data Transfer using local bearers

The local link connection, via Bluetooth, IrDA, USB or RS232, set up from a (U)SAT application shall follow the same security requirements as if the link were established by an application in the MT.

It is important that the requirements stated in 5.3 "Services and applications external to the MT" are fulfilled when a Bearer Independent Data Transfer via local link bearer is controled by a (U)SAT application.

The secret key and the authentication algorithm cannot be transferred out from the UICC, where the (U)SAT application resides, over the established local link.

5.3 Services and applications external to the MT

In the tele- and datacom community there exist today use cases for moving internal interfaces out of the MT; they are required to fulfil user expectations of what services and features 3G MTs should offer.

However, discussions on security clearly show that services should be terminated in the MT, while applications can, as today, terminate in the TE. A possible UE functionality split should not allow internal interfaces (including USIM) to be moved to external interfaces, neither using USAT local link nor other interfaces.

This is a precaution that shall be taken until suitable procedures against misuse have been found and standardised.

Annex A (informative): Interaction handling

In the present document we illustrate possible types of interaction handling for a ~~ME~~ MT that already can be required or that currently are being developed in standards and industry fora. Although it is probable that only a subset of these entities will exist at the same time, there is no way of knowing the particular combination of applications or a particular users needs relative to this in advance; ***a general way to handle the co-existence must still be defined***.

A framework, defining general rules for handling this co-existence of several external functions is outlined in the present document. The framework states requirements for the behaviour of the external functions as well as principles for the co-existence as such. As an example, several of the external functions below, or protocols used by them (e.g., the AT-commands) assume a one-to-one relation between them and the ~~ME~~ MT Core Functions, implying a lack of specified mechanisms to handle a multitask environment.

A.1   The model approach

The model below proposes a *conceptual* split, meaning that the entities and their interfaces are *logical* and need not correspond to any physical division. Before the figure is presented some clarifications and general comments are needed:

- The *~~ME~~ MT Core Functions* should be understood as the (collection of) software functions that contain the central logic for the ~~ME~~MT, including for instance the scheduling of events.

- With *external event* is meant interaction that an application/peripheral wants (requests/commands), as well as necessary handling of network signalling, user request via the keys, etc. External does not imply whether an external interface is used or not.

- Some *network signalling* is easy to refer to basic network functions, such as Location Update, while other signalling has been invoked by an application.

- The user can interact intervene *directly* via keys, etc. This is indicated with the *Manual User Interaction* entity. The user can of course do the same via, e.g., a PC or a MExE application, but the events that such actions create is here viewed like the other events that these entities can create.

- The *USIM* general *Smart Card Functions* are split into several logical entities: the Transport Layer Security, meaning "basic" 2G/3G security; the USIM Application Toolkit; USIM Application Toolkit Run AT-command; and other functions, such as the WIM, the WAP Identity Module, that is being specified.

- The *TE*, Terminal Equipment, is a PC or another piece of equipment that can run applications independently.

- An *Intelligent Peripheral* could be an advanced charger or a car hands-free installation.

- The *MExE* entities are as defined in [2].

- *Other* includes ~~ME~~ MT resident applications and allows for future applications, and, if that is needed for the model, could correspond to other external devices such as a microphone.

- The interfaces as shown in the figure are logical. In practice the applications run in the ~~ME~~MT, a TA or on its own separate platform, and the interfaces are then ~~ME~~ MT internal or external via a physical connector, IrDA, or Bluetooth.
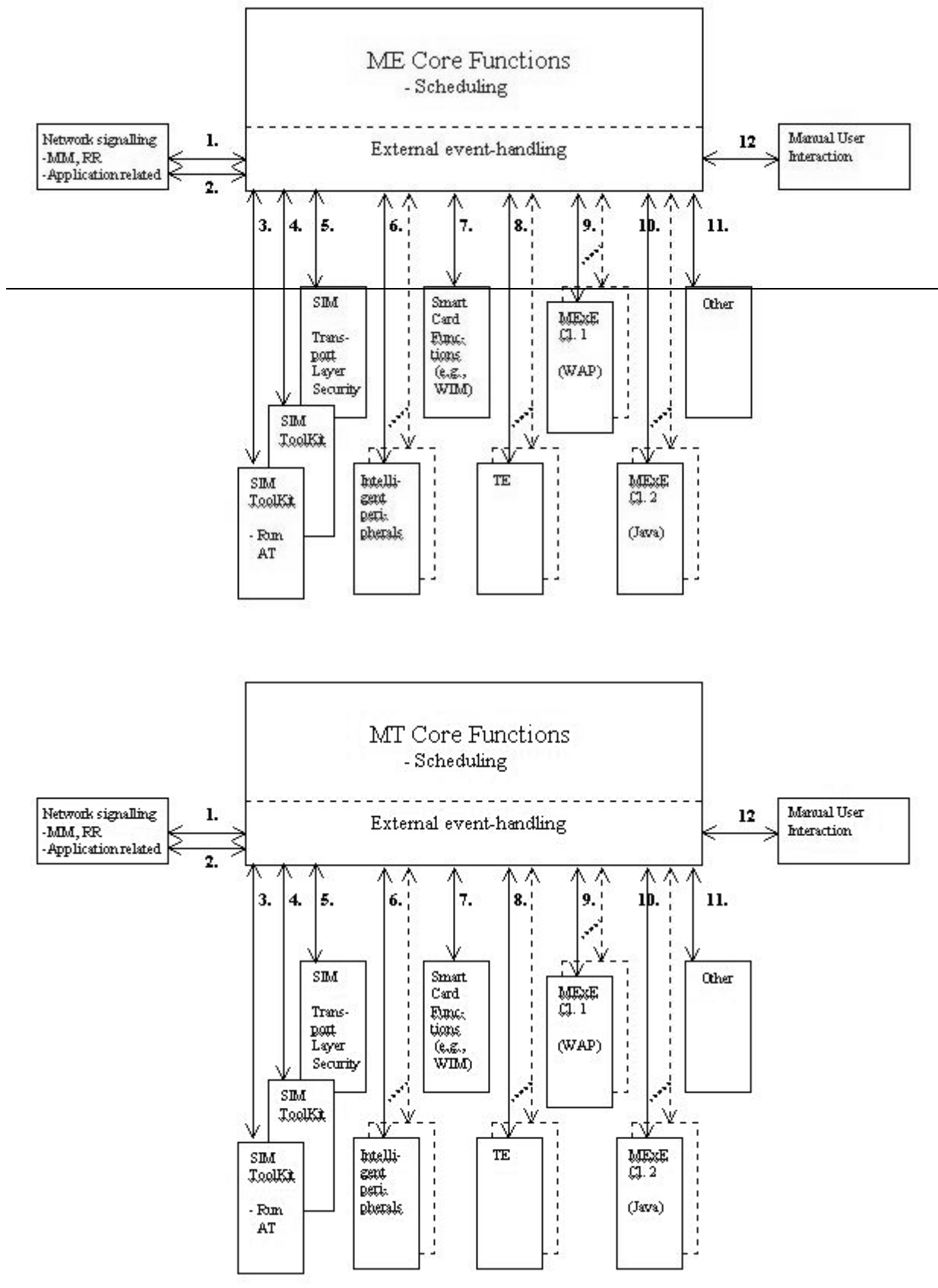
Figure A.1 Example of External events that the ~~ME~~ MT Core Functions should handle

The figure shows the extent of the complexity that the ~~ME~~ MT will be expected to handle. It is obvious that a generic framework for conflicts, error handling and interactions is needed. In particular, the following issues can be noted:

1. Priorities of the event handling – the ~~ME~~ MTdoes the scheduling and this should be according to the user's preferences.

~~3.~~2. User control – the user's wanted / required interaction; his/her knowledge and control of the events; user integrity for instance for personal data, the ~~ME~~ MT position, etc.

~~4.~~3. Trace-ability – which entity / application has caused a particular event. This information is required input to solve several of the other issues.

~~5.~~4. Consistency - in the actions of the ~~ME~~ MT Core Functions relative to the specific application. Several applications and priority levels interact.

~~6.~~5. The validity of commands – for instance call validity when the ~~ME~~ MT is in the Home PLMN or roaming.

~~7.~~6. Network signalling aspects – how does for instance a dual mode ~~ME~~ MT treat applications specific to only one of the standards.

~~8.~~7. It might be necessary to look into mechanisms for rejection and termination by the ~~ME~~ MT Core Function (upon user choice) for applications, calls etc.

~~9.~~8. Testability – the ~~ME~~ MT manufacturer must be able to as far as possible verify the behaviour of the product, and this should be taken into consideration when the framework is specified. Conformance testing, however, is only relevant to the extent that already is tested.

~~10.~~9. Security aspects – for the protection of the ~~ME~~ MT and the network mechanisms like authentication of the applications might be required.

Further, the entities have different characteristics; this can possibly be used by the framework definitions. The following can for instance be noted:

1. Several of the entities work together with network nodes, some as slaves (e.g., SIM) and others invoking commands (e.g., WAP). Others, like the intelligent peripherals, only communicate "locally".

~~3.~~2. The entities can be active or passive. In the latter case the ~~ME~~ MT has more knowledge about the expected behaviour, since they only execute functions upon request and cannot issue commands independently.

~~4.~~3. Some events refer to "basic" network handling, some to manual user interaction, and others relate to application invoked functions. "Basic" network interaction should then have priority if such a distinction can be made. Consideration should be given to incoming calls.

CR-Form-v4

CHANGE REQUEST

⌘	**23.227** CR **005**	⌘ ev	**-**	⌘ Current version:	**4.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title: ⌘	Alignment of UE architecture with 23.101	
Source: ⌘	T2	
Work item code: ⌘	TLM	***Date:*** ⌘ 2002-02-05
Category: ⌘ **F**		***Release:*** ⌘ REL-4

Use <u>one</u> of the following categories:
   F *(correction)*
   A *(corresponds to a correction in an earlier release)*
   B *(addition of feature),*
   C *(functional modification of feature)*
   D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP <u>TR 21.900</u>.

Use <u>one</u> of the following releases:
   2   *(GSM Phase 2)*
   R96 *(Release 1996)*
   R97 *(Release 1997)*
   R98 *(Release 1998)*
   R99 *(Release 1999)*
   REL-4 *(Release 4)*
   REL-5 *(Release 5)*

Reason for change: ⌘	Alignment of the UE abstract architecture with the General UMTS Architecture specification 23.101
Summary of change: ⌘	Corrections made to use the correct terms ME, MT, TA and UE. UE, MT, ME abbreviation added. Reference to 23.101 added.
Consequences if not approved: ⌘	Inconsistent specifications and incorrect UE architecture

Clauses affected: ⌘	Introduction, 1, 2, 3.1, 3.2, 4.1,4.2, 4.4, Annex A, A.1
Other specs Affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	

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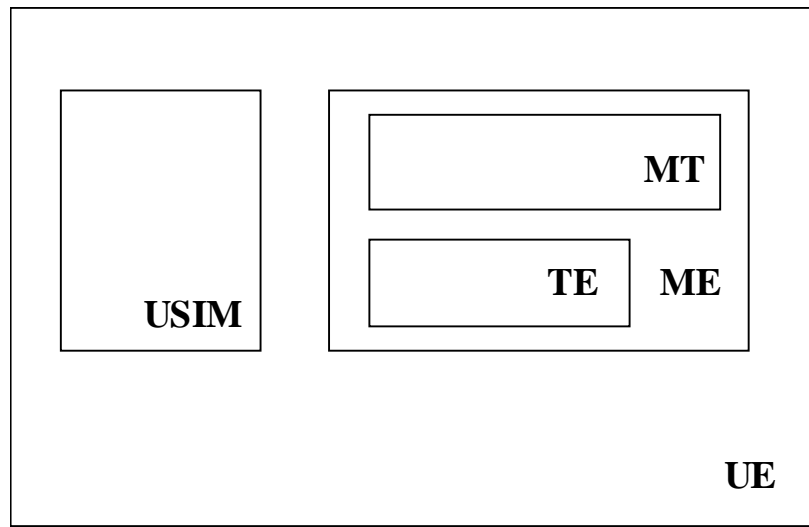
Introduction

The present rapid development of a diversity of new applications and application environments for mobile usage creates a complexity of previously unseen proportions that the ~~Mobile Equipment~~ UE has to handle.

The present document introduces a generic model approach for the ~~ME~~ UE environment; the purpose is *not* to categorise the applications peripherals, but to try to structure the events that are internal and external to, and has to be handled by, the ~~ME~~ MT Core Functions. This means that the structure or grouping of the events should be made from a *~~ME~~ MT centric* perspective. Some applications run on the ~~ME~~ UE side have counterparts in the network. The present document does not address the functions in the network.

The User Equipment functional model used in this specification is defined by the model included in 23.101 [8]

```
┌─────────────────────────────────────────────────┐
│                                                  │
│  ┌───────────┐   ┌───────────────────────────┐   │
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│  │           │   │  └─────────────────────┘   │   │
│  │           │   │  ┌───────────────┐         │   │
│  │   USIM    │   │  │        TE     │  ME     │   │
│  │           │   │  └───────────────┘         │   │
│  │           │   └───────────────────────────┘   │
│  │           │                                    │
│  └───────────┘                                    │
│                                                   │
│                                        UE         │
│                                                   │
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```

<u>Figure 1: Functional Model for the User Equipment</u>

1 Scope

The present document defines the principles for scheduling resources between applications in different application execution environment (e.g. MExE, USAT etc.) and internal and external peripherals (e.g. infra-red, Bluetooth, USIM, radio interface, MMI, memory etc.).

The present document is divided in two parts: clause 4 defines a framework for event handling. Clause 5 addresses some specific issues.

Annex A contains an informative background to the problem area.

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1]   3GPP TR 21.905 "Vocabulary for 3GPP specifications"

[2]   3GPP TS 23.057: "Mobile Execution Environment (MExE); Functional description; Stage 2".

[3]   WAP, WAP Forum, "WAP Technical Specifications Suite" (http://www.wapforum.com/)

[4]   3GPP TS 31.101: "UICC-Terminal Interface; Physical and Logical Characteristics".

[5]   3GPP TS 31.102: "Characteristics of the USIM Application".

[6]   3GPP TS 31.111: "USIM Application Toolkit (USAT)".

[7]   3GPP TS 22.038: "USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1".

[8]   3GPP TS 23.101: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; General UMTS Architecture "

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the referred documents and the following apply:

call: voice and data calls, USSD, SMS, fax, GPRS calls, supplementary services, etc.

preferences: includes authorisations, priorities, options, etc.

authorisation: permission to set up and or receive any call or only certain types of call and access rights to user data

ME MT Core Functions: software functions that contain the central logic for the MEMT, including for instance the scheduling of events

3.2 Abbreviations

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

ME:	Mobile Equipment
MExE:	Mobile Execution Environment
MM:	Mobility Management
MT:	Mobile Termination
RR:	Radio Resource
UE:	User Equipment
USAT:	USIM Application Toolkit
WAP:	Wireless Application Protocol

4 Principles for the Framework

The model presented in annex A defines a framework specifying *principles* for event handling, with the focus on issues related to application interaction. Principles for the framework are given below, using the stated definitions. The list is not necessarily complete.

4.1 Basic principles

1. Irrespective of the principles given below, emergency calls shall override all other calls.

3.2. The ~~ME~~ MT is the central resource and schedules internal and external entities according to the user's preferences and external environment.

4.2 User requirements

1. The user shall have the capability to make the ultimate decisions as elaborated below. Additionally, in the case where an UE is unmanned, none of the issues below shall render the UE inoperable such that it requires manual intervention locally at the UE to restore its use.

2. The user shall have the capability of selecting preferences interactively and/or via prior set-up in one or more user profiles. These shall be valid on a global or on a per application basis. The user's preferences shall be retained even in the event of loss of power.
    Preferences can be selected for an application when it is installed, or at any other time thereafter.
    Preferences, notably but not exclusively the priorities, can be modified at any time and this shall have effect at the earliest possible opportunity thereafter.

3. The user shall have the capability to modify authorisations assigned to applications. These shall be valid on a global or on a per application basis in one or more user profiles.

4. The user shall have the option to be advised to what extent an application has been authenticated at installation-time, and prevent the application from being installed based on this advice.
    The user shall have the option to be advised about the integrity of an application at installation-time, and prevent the application from being installed based on this advice.

5. The user shall have the capability to abort or suspend any on-going call that has been set up automatically by an application.

6. The user shall have the capability to require that the ~~ME~~ UE request permission from the user for individual calls, sets of calls (for instance all calls by a certain application) or all calls. The user shall have the capability to request the ~~ME~~ UE to record information on individual calls, sets of calls or all calls.

7. The user shall have the capability to distinguish which entity/application caused a specific event. The ~~ME~~ UE uses this information to support the user's preferences. The ~~ME~~ UE shall be able to inform the network of entity/application at set up time to support trace-ability when a call is set up.

8. The user's privacy shall be protected. Access to user data (including user profiles and any personal information in the UE) and audio functions (this would prevent for instance a mechanism that allows eavesdropping) shall not be possible without the user's prior permission.

9. The user shall have the capability to request from the ~~ME~~ UE which applications are present in the MExE environment and the (U)SIM, and whether they are running. The user shall also have the capability to request from the ~~ME~~ UE the status of other interfaces as shown in Figure 1, where implemented.

4.3 Additional requirements on applications

1. An application shall not assume that it is the only one active. For example where several applications use the same interface the application and/or the protocols used over the interface must be able to handle contention.

2. An application shall not interfere (terminate, suspend or degrade) with on-going calls set up by another application without authorisation from the user. For certain combinations of call (e.g., voice/data and USSD messages), interference can happen resulting in a level of degradation.

3. An application shall not assume that it has priority over another application, and shall comply with the user's currently selected preferences.

4.4 Additional requirements on the ~~ME~~UE

1. The ~~ME~~ UE shall have the capability to authenticate the source of the application.

2. The ~~ME~~ UE shall have the capability to assure the integrity of an application.

5 Specific Interaction Requirements

The following clauses detail specific interaction requirements.

5.1 Bearer Independent Data Transfer

Bearer Independent Data Transfer is a USIM feature that allows the USIM to request the ME to set up and manage a data channel (using a CSD, GPRS, SMS or USSD bearer) using information provided by the USIM. Once the call is established, data may be transferred through that data call. The details for the USIM/ME interface are specified in 3GPP TS 31.101 [4], 31.102 [5], and 31.111 [6]. The Service Requirements for this are specified in 3GPP TS 22.038 [7].

5.1.1 Interaction between Core ~~ME~~ MT functions and Bearer Independent Data Transfer Service

When a Bearer Independent Data Transfer Service is requested by the (U)~~SIM~~AT application, the ~~ME~~ MT shall:

- If the ~~ME~~ MT is idle, set up the data channel as requested, indicating to the user by appropriate means, e.g., with an icon, that one or more calls are in progress and confirming to the (U)~~SIM~~AT application.

- If the ~~ME~~ MT is not idle and can not service the request without negative impact on ongoing services, then the ~~ME~~ MT shall indicate to the (U)~~SIM~~AT application that the data channel can not be set up. However, if the user has indicated a preference for servicing such requests despite the negative impact then the ~~ME~~ MT may proceed as in the bullet point above.

- If the user requests that the call be terminated via MMI or other interface, then the call shall be terminated and the USIM shall be informed.

- If an external device (TE, Bluetooth device etc.) requests the same resource then that request shall be denied.

The above behaviour may be modified by a change of user preferences, for example the user may request the ~~ME~~ MT to deny access by the (U)~~SIM~~AT application to a data channel, or the user may request the ~~ME~~ MT to prioritise a particular external device such that a call set up by a (U)~~SIM~~AT application is cleared in order for the external device to be able to make a call.

5.2 Services and applications external to the MT

In the tele- and datacom community there exist today use cases for moving internal interfaces out of the MT; they are required to fulfil user expectations of what services and features 3G MTs should offer.

However, discussions on security clearly show that services should be terminated in the MT, while applications can, as today, terminate in the TE. A possible UE functionality split should not allow internal interfaces (including USIM) to be moved to external interfaces, neither using USAT local link nor other interfaces.

This is a precaution that shall be taken until suitable procedures against misuse have been found and standardised.

Annex A (informative): Interaction handling

In the present document we illustrate possible types of interaction handling for a ~~ME~~ MT that already can be required or that currently are being developed in standards and industry fora. Although it is probable that only a subset of these entities will exist at the same time, there is no way of knowing the particular combination of applications or a particular users needs relative to this in advance; ***a general way to handle the co-existence must still be defined***.

A framework, defining general rules for handling this co-existence of several external functions is outlined in the present document. The framework states requirements for the behaviour of the external functions as well as principles for the co-existence as such. As an example, several of the external functions below, or protocols used by them (e.g., the AT-commands) assume a one-to-one relation between them and the ~~ME~~ MT Core Functions, implying a lack of specified mechanisms to handle a multitask environment.

A.1   The model approach

The model below proposes a *conceptual* split, meaning that the entities and their interfaces are *logical* and need not correspond to any physical division. Before the figure is presented some clarifications and general comments are needed:

- The *~~ME~~ MT Core Functions* should be understood as the (collection of) software functions that contain the central logic for the MT~~ME~~, including for instance the scheduling of events.

- With *external event* is meant interaction that an application/peripheral wants (requests/commands), as well as necessary handling of network signalling, user request via the keys, etc. External does not imply whether an external interface is used or not.

- Some *network signalling* is easy to refer to basic network functions, such as Location Update, while other signalling has been invoked by an application.

- The user can interact intervene *directly* via keys, etc. This is indicated with the *Manual User Interaction* entity. The user can of course do the same via, e.g., a PC or a MExE application, but the events that such actions create is here viewed like the other events that these entities can create.

- The *USIM* general *Smart Card Functions* are split into several logical entities: the Transport Layer Security, meaning "basic" 2G/3G security; the USIM Application Toolkit; USIM Application Toolkit Run AT-command; and other functions, such as the WIM, the WAP Identity Module, that is being specified.

- The *TE*, Terminal Equipment, is a PC or another piece of equipment that can run applications independently.

- An *Intelligent Peripheral* could be an advanced charger or a car hands-free installation.

- The *MExE* entities are as defined in [2].

- *Other* includes MT ~~ME~~ resident applications and allows for future applications, and, if that is needed for the model, could correspond to other external devices such as a microphone.

- The interfaces as shown in the figure are logical. In practice the applications run in the ~~ME~~MT, a TA or on its own separate platform, and the interfaces are then ~~ME~~ MT internal or external via a physical connector, IrDA, or Bluetooth.
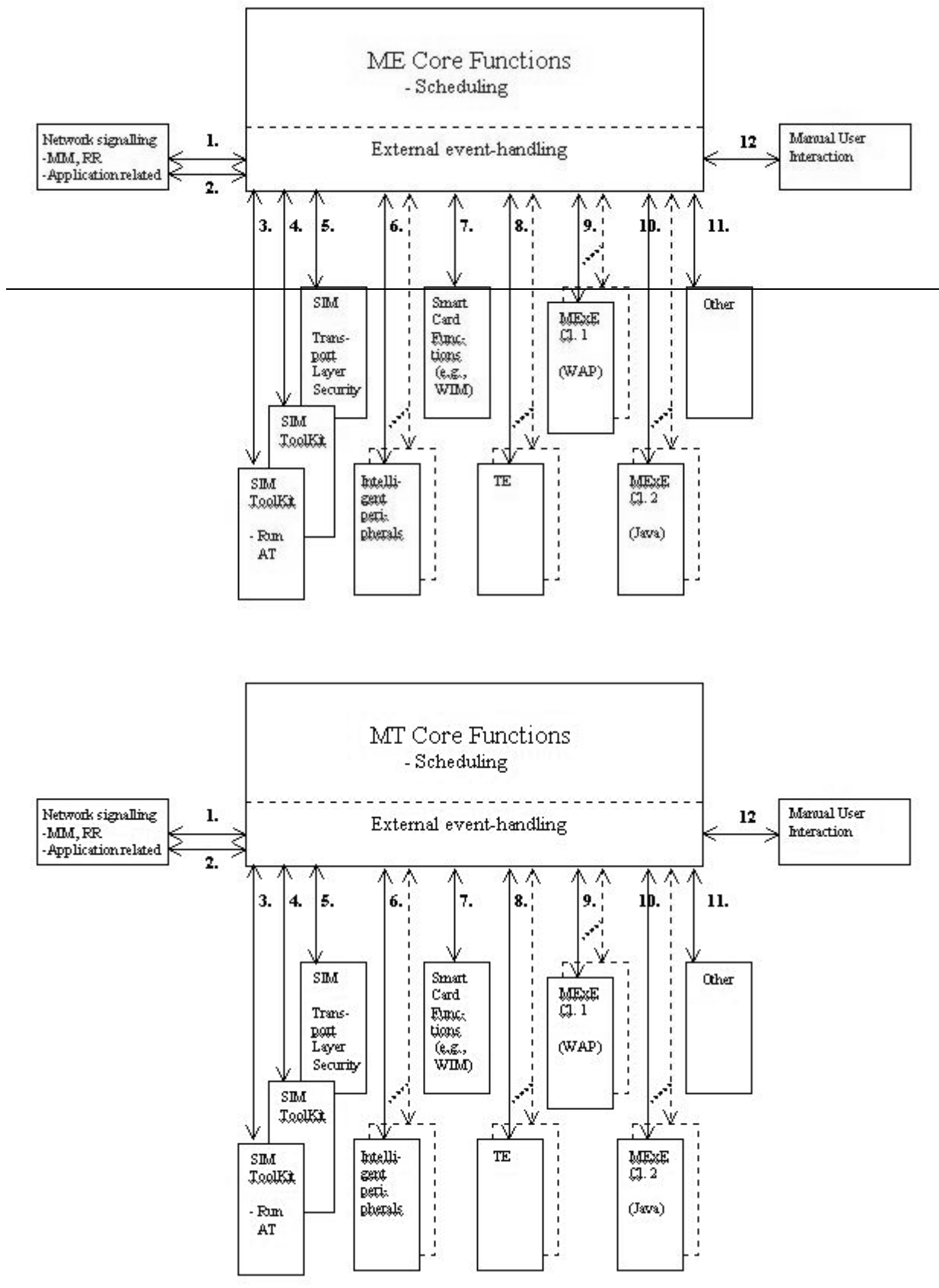
Figure A.1 Example of External events that the MT ME Core Functions should handle

The figure shows the extent of the complexity that the MT ME will be expected to handle. It is obvious that a generic framework for conflicts, error handling and interactions is needed. In particular, the following issues can be noted:

1. Priorities of the event handling – the MT ~~ME~~ does the scheduling and this should be according to the user's preferences.

~~3.~~2. User control – the user's wanted / required interaction; his/her knowledge and control of the events; user integrity for instance for personal data, the MT ~~ME~~ position, etc.

~~4.~~3. Trace-ability – which entity / application has caused a particular event. This information is required input to solve several of the other issues.

~~5.~~4. Consistency - in the actions of the MT ~~ME~~ Core Functions relative to the specific application. Several applications and priority levels interact.

~~6.~~5. The validity of commands – for instance call validity when the MT ~~ME~~ is in the Home PLMN or roaming.

~~7.~~6. Network signalling aspects – how does for instance a dual mode MT ~~ME~~ treat applications specific to only one of the standards.

~~8.~~7. It might be necessary to look into mechanisms for rejection and termination by the MT ~~ME~~ Core Function (upon user choice) for applications, calls etc.

~~9.~~8. Testability – the MT ~~ME~~ manufacturer must be able to as far as possible verify the behaviour of the product, and this should be taken into consideration when the framework is specified. Conformance testing, however, is only relevant to the extent that already is tested.

~~10.~~9. Security aspects – for the protection of the MT ~~ME~~ and the network mechanisms like authentication of the applications might be required.

Further, the entities have different characteristics; this can possibly be used by the framework definitions. The following can for instance be noted:

1. Several of the entities work together with network nodes, some as slaves (e.g., SIM) and others invoking commands (e.g., WAP). Others, like the intelligent peripherals, only communicate "locally".

~~3.~~2. The entities can be active or passive. In the latter case the MT ~~ME~~ has more knowledge about the expected behaviour, since they only execute functions upon request and cannot issue commands independently.

~~4.~~3. Some events refer to "basic" network handling, some to manual user interaction, and others relate to application invoked functions. "Basic" network interaction should then have priority if such a distinction can be made. Consideration should be given to incoming calls.

CHANGE REQUEST

⌘	**07.10** CR **A026**	⌘**rev**	**-**	⌘	Current version:	**7.1.0**	⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network ☐   Core Network ☐

Title:	⌘	Incorrect explanation of length indicator bit.
Source:	⌘	T2

Work item code: ⌘	TEI			***Date:*** ⌘	1/2/02

Category:	⌘	**A**	***Release:*** ⌘ R98

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
REL-4 *(Release 4)*
REL-5 *(Release 5)*

Reason for change:	⌘	Correction to explanation of the EA field.
Summary of change:	⌘	Change from 1 to 0 in the explanation text in the 5th paragraph in section 5.2.1.5
Consequences if not approved:	⌘	Possible misunderstanding of use of the EA field and thereby incorrect implimentation.

Clauses affected:	⌘	5.2.1.5

Other specs affected:	⌘	☐ Other core specifications	⌘	
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.2.1.5   Length Indicator

This field is present only in case when basic option is activated.

It has the following format:

Bit	1	2	3	4	5	6	7	8
	E/A	L1	L2	L3	L4	L5	L6	L7

Figure 1: Length field, first byte

The L1 to L7 bits indicates the length of the following data field. The default length is 31 bytes.

According to the rule of ISO/IEC 13239:1997, the range of the length field may be extended by use of the EA bit. When the EA bit is set to 1 in an octet, it is signifies that this octet is the last octet of the length field. When the EA bit is set to 0, it signifies that a second octet of the length field follows. The total length of the length field is in that case 15bits, L1-L15.

The second octet of the length field (only present when the EA field in the first byte is set to 0~~1~~) format:

Bit	1	2	3	4	5	6	7	8
	L8	L9	L10	L11	L12	L13	L14	L15

Figure 2: Length field, second byte

The length field shall always be present, even if the data field is empty.