SLOVENSKI STANDARD
SIST ETS 300 642 E1:2003

01-december-2003

Digitalni celiļ ni telekomunikacijski sistem (faza 2) âï Nabor ukazov AT za GSM mobilno opremo (ME) (GSM 07.07)

Digital cellular telecommunications system (Phase 2) (GSM); AT command set for GSM Mobile Equipment (ME) (GSM 07.07)

Ta slovenski standard je istoveten z: ETS 300 642 Edition 1

ICS:

33.070.50	Globalni sistem za mobilno telekomunikacijo (GSM)	Global System for Mobile Communication (GSM)

SIST ETS 300 642 E1:2003 **en**

EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 642

September 1996

Source: ETSI TC-SMG

Reference: DE/SMG-040707P

ICS: 33.060.50

Key words: Digital cellular telecommunications system, Global System for Mobile communications (GSM)

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

Digital cellular telecommunications system (Phase 2); AT command set for GSM Mobile Equipment (ME) (GSM 07.07)

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Special Mobile Group (SMG) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS specifies a profile of AT commands and recommends that this profile be used for controlling Mobile Equipment (ME) functions and GSM network services from a Terminal Equipment (TE) through Terminal Adaptor (TA) for the Digital cellular telecommunications system. This ETS corresponds to GSM technical specification, GSM 07.07, version 4.1.0

NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the Digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TS). These TSs may have subsequently become Interim European Telecommunication Standards (I-ETSs), (Phase 1), or European Telecommunication Standards (ETSs), (Phase 2), whilst others may become ETSI Technical Reports (ETRs).

Transposition dates	
Date of adoption of this ETS:	15 September 1996
Date of latest announcement of this ETS (doa):	15 December 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	15 June 1997
Date of withdrawal of any conflicting National Standard (dow):	15 June 1997

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1 Scope

This European Telecommunications Standard (ETS) specifies a profile of AT commands and recommends that this profile be used for controlling Mobile Equipment (ME) functions and GSM network services from a Terminal Equipment (TE) through Terminal Adaptor (TA). The command prefix +C is reserved for Digital Cellular in ITU-T Recommendation V.25ter [14]. This ETS has also the syntax details used to construct these extended GSM commands. Commands from ITU-T Recommendation V.25ter [14] and existing digital cellular standards (TIA IS-99 [15] and TIA IS-135 [16]) are used whenever applicable. Some of the new commands are defined such way that they can be easily applied to ME of networks other than GSM. ITU-T T.31 [11] and ITU-T T.32 [12] fax AT commands may be used for GSM fax transmission from TE.

This ETS assumes an abstract architecture comprising a TE (e.g. a computer) and a ME interfaced by a TA (see figure 1). The span of control of the defined commands should allow to handle any physical implementation that this abstract architecture may lead to:

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

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

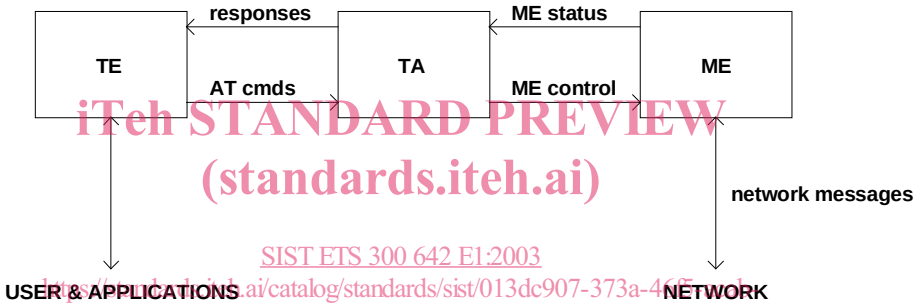

Figure 1: Setup

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

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] GSM 02.02 (ETS 300 501): "Digital cellular telecommunication system (Phase 2); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[2] GSM 02.03 (ETS 300 502): "Digital cellular telecommunication system (Phase 2); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[3] GSM 02.81 (ETS 300 514): "Digital cellular telecommunication system (Phase 2); Line identification supplementary services - Stage 1".

[4] GSM 02.82 (ETS 300 515): "Digital cellular telecommunication system (Phase 2); Call Forwarding (CF) supplementary services - Stage 1".

[5] GSM 02.83 (ETS 300 516): "Digital cellular telecommunication system (Phase 2); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[6] GSM 02.88 (ETS 300 520): "Digital cellular telecommunication system (Phase 2); Call Barring (CB) supplementary services - Stage 1".

[7] GSM 03.03 (ETS 300 523): "Digital cellular telecommunication system (Phase 2); Numbering, addressing and identification".

[8] GSM 04.08 (ETS 300 557): "Digital cellular telecommunication system (Phase 2); Mobile radio interface layer 3 specification".

[9] GSM MoU SE.13, GSM MoU Association Permanent Reference Document SE.13 (October 1994): "GSM Mobile Network Codes and Names".

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

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

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

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

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

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

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

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

[18] GSM 04.22 (ETS 300 563): "Digital cellular telecommunication system (Phase 2); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[19] GSM 02.30 (ETS 300 511): "Digital cellular telecommunication system (Phase 2); Man Machine Interface (MMI) of the Mobile Station (MS)".

[20] GSM 05.08 (ETS 300 578): "Digital cellular telecommunication system (Phase 2); Radiosubsystem link control".

[21] GSM 02.85 (ETS 300 518): "Digital cellular telecommunication system (Phase 2); Closed User Group (CUG) supplementary services - Stage 1".

[22] GSM 02.84 (ETS 300 517): "Digital cellular telecommunication system (Phase 2); MultiParty (MPTY) supplementary services - Stage 1".

3 Abbreviations and definitions

3.1 Abbreviations

For the purposes of this ETS 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
BCD	Binary Coded Decimal
ETSI	European Telecommunications Standards Institute
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)
PCCA	Portable Computer and Communications Association
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

3.2 Definitions

For the purposes of this ETS the following syntactical definitions apply (refer also clause 4):

<CR> Carriage return character, which value is specified with command S3.

<LF> Linefeed character, which value is specified with command S4.

<...> Name enclosed in angle brackets is a syntactical element. Brackets themselves do not appear in the command line.

[...] Optional subparameter of a command or an optional part of TA information response is enclosed in square brackets. Brackets themselves do not appear in the command line. When subparameter is not given in *parameter type* commands, new value equals to its previous value. In *action type* commands, action should be done on the basis of the recommended default setting of the subparameter.

underline Underlined defined subparameter value is the recommended default setting of this subparameter. In *parameter type* commands, this value should be used in factory settings which are configured by V.25ter [14] command `&F0`. In *action type* commands, this value should be used when subparameter is not given.

4 AT command syntax

This clause summarizes general aspects on AT commands and issues related to them. For further information refer ITU-T Recommendation V.25ter [14].

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 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.

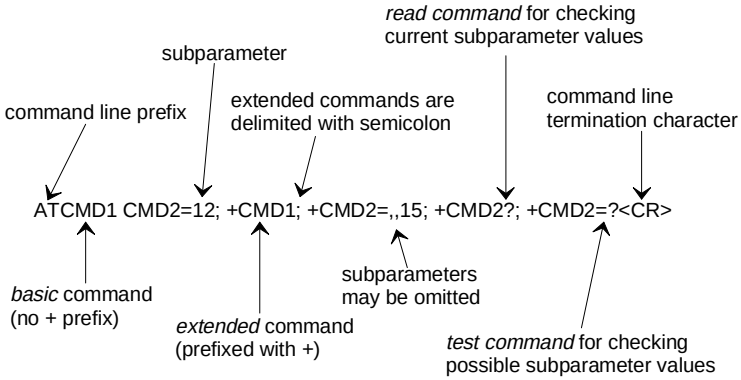

Figure 2: Basic structure of a command line

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 operation.

4.2 Information responses and result codes

The TA response for the example command line of figure 2 could be as shown in figure 3. Here, verbose response format is enabled with command `V1`. If numeric format `V0` would have been used, `<CR><LF>` headers of *information response*s would have been left out and *final result code* changed to `0<CR>`.

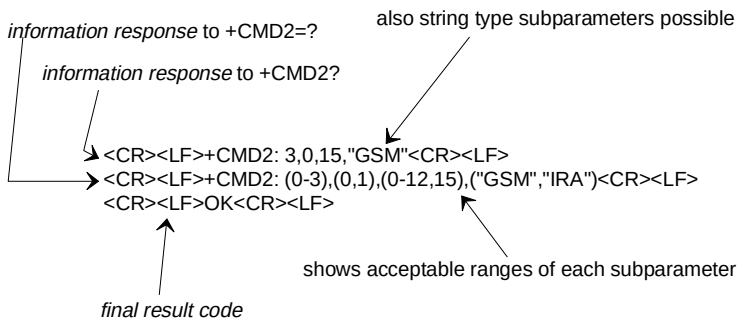

Figure 3: Response to a command line

So called *intermediate result code*s inform about progress of TA operation (e.g. connection establishment `CONNECT`), and so called *unsolicited result code*s indicate occurrence of an event not directly associated with issuance of a command from TE (e.g. ring indication `RING`).

4.3 ITU-T V.25ter [14] TE-TA interface commands

Table 1 summarizes V.25ter [14] commands relating to command line and response formatting, and TA-TE interface operation. All are applicable to GSM terminals.

Table 1: V.25ter commands relating to TE-TA interface

Command	Section	Impl.	Use in GSM
`S3=[<value>]`	6.2.1	mand.	command line termination character (mandatory default setting IRA 13)
`S4=[<value>]`	6.2.2	mand.	response formatting character (recommended default IRA 10)
`S5=[<value>]`	6.2.3	mand.	command line editing character (recommended default IRA 8)
`E[<value>]`	6.2.4	mand.	command echo (recommended default 1 i.e. TA echoes commands back)
`Q[<value>]`	6.2.5	mand.	result code suppression (recommended default 0 i.e. TA transmits result codes)
`V[<value>]`	6.2.6	mand.	TA response format (recommended default 1 i.e. verbose format)
`X[<value>]`	6.2.7	mand.	defines `CONNECT` result code format; values manufacturer specific
`&C[<value>]`	6.2.8	mand.	determines how ITU-T V.24 circuit 109 (or equivalent) relates to the detection of received line signal from remote end (recommended default 1 i.e. 109 operation relates to detection of received signal)
`&D[<value>]`	6.2.9	mand.	determines how TA responds when ITU-T V.24 circuit 108/2 (or equivalent) is changed from ON to OFF condition during on-line data state
`+IPR=[<value>]`	6.2.10	opt.	fixed TE data rate (recommended default 0 i.e. automatic detection)
`+ICF=[<format>[,<parity>]]`	6.2.11	opt.	TE-TA character framing (recommended default 3,3 i.e. eight data bits, no parity, 1 stop bit)
`+IFC=[<by_te>[,<by_ta>]]`	6.2.12	opt.	TE-TA local flow control (recommended default 2,2 i.e. TE uses ITU-T V.24 circuit 133 (or equivalent), and TA circuit 106 (or equivalent))
`+ILRR=[<value>]`	6.2.13	opt.	determines whether the used local TE-TA data rate is informed using intermediate result code `+ILRR: <rate>` before going on-line data state after call answering or originating