Part 1

MCT - Basic concept

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1. Scope

The purpose of this specification is to depict the basic concept for Multifunctional CardTerminals (MCT). An MCT may be designed as an integrated unit or an external device and equipped with one or more interfaces for contact oriented chipcards with asynchronous and synchronous transmission.

2. Normative references

Deutsche Telekom, GMD, RWTÜV, TeleTrusT Deutschland: 1995
CT-API 1.1 - Application independent CardTerminal Application Programming Interface for ICC applications

TeleTrusT Deutschland: 1995
CT-BCS - Application independent CardTerminal Basic Command Set for ICC applications

ISO/IEC 7810: DIS 1995
Identification cards - Physical characteristics

ISO/IEC 7816-2: 1988
Identification cards - Integrated circuit(s) cards with contacts
Part 2 - Dimensions and location of contacts

ISO/IEC 7816-4: 1995
Identification cards - Integrated circuit(s) cards with contacts
Part 4 - Inter-industry commands for interchange

CEN ENV 1375-1: 1994
Identification card systems - Intersector integrated circuit(s) card additional formats - Part 1: ID-000 card size and physical characteristics

CEN prEN 1332-5: 1994 (Draft)
Identification card systems - Man-machine interface - Part 5: Key pads

3. Abbreviations

API = Application Programming Interface
CIE = Card Interface Environment
CT = CardTerminal
HTSI = Host Transport Service Interface
ICC = Integrated Circuit(s) Card
MCT = Multifunctional CardTerminal
SDA = Serial Data Access
VD = Verification Data
2WB = 2 Wire Bus
3WB = 3 Wire Bus

4. Basic concept

4.1 The card interface environment

The application system in a PC or workstation uses an application independent interface for the integration of IC card technology. At the interface called the CardTerminal Application Programmimg Interface CT_API, 3 basic functions are provided:

- initiate the communication channel (CT_API function CT_init),
- send a command and return the response (CT_API function CT_data), and
- close the communication channel (CT_API function CT_close).

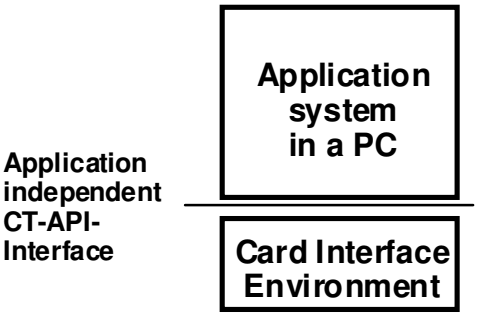


Fig. 1: Application system with card interface environment

The IC card commands and the CardTerminal commands are passed to the receiving entity using the CT_data function of the CT_API interface. For controlling the CardTerminal, the application independent Card-Terminal Basic Command Set CT-BCS shall be used.

Higher level APIs (e.g. security APIs) may be present above the CT_API. These, however, are not within the scope of this specification.

The Card Interface Environment consists of

- a hardware component, the MCT, and

- a software component, the HTSI module (Host Transport Service Interface module).

Between the HTSI module and the MCT there is the MCT interface, whose characteristics is dependent on the MCT.

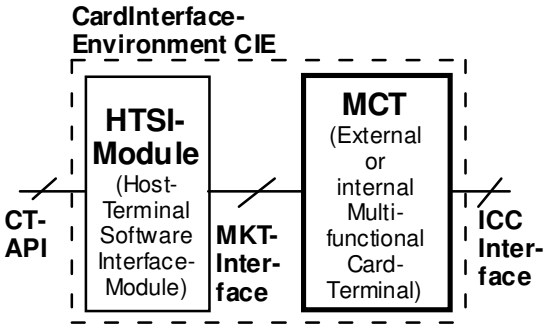
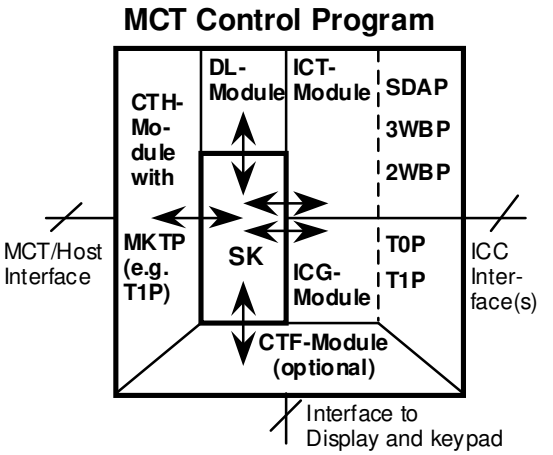


Fig. 2: Card Interface Environment

The components of the card interface environment are provided by the MCT manufacturer. The application system can therefore be equipped with various MCTs without specific adaptions.

4.2 Logical components of the MCT control program

An MCT is equipped with an MCT control program whose logical structure is shown in Fig. 3.



CTF = CT Function	MKTP = MKT Protocol
CTH = CT/Host	SDAP = SDA Protocol
DL = Download	SK = System Kernel
ICG = Inter-ind. Command Gateway	T0P = T=0-Protocol
	T1P = T=1-Protocol
ICT = Inter-ind. Command Transformation	2WBP = 2WB Protocol
	3WBP = 3WB Protocol

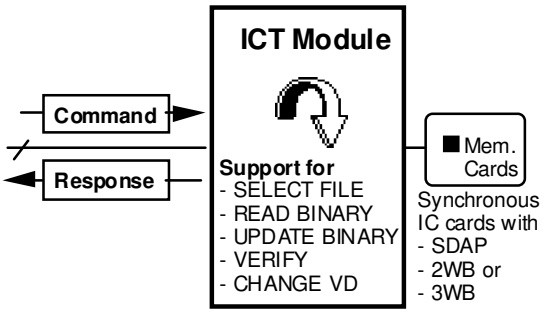
Fig.3: Logical structure of the MCT control program

The ICG module has only a forwarding function (gateway) for commands directed to processor csrds using the transmission protocol T=0 or T=1.

The ICT module in the MCT is constructed in such a way that ISO/IEC 7816 Inter-industry Commands can be used at the CT_API interface for the communication with memory IC cards supporting one of the protocols shown in fig.3. This

- facilitates the co-existence of memory and processor IC cards, and
- allows to work with various memory IC cards using the same commands from the viewpoint of the application system.

Fig. 4 shows which inter-industry commands are supported by the ICT module.



Notes:
1. The commands SELECT FILE, READ BINARY and UPDATE BINARY are the inter-industry commands for basic functions .
2. The commands VERIFY and CHANGE VD are security related inter-industry commands and only applicable to cards supporting the related security function (e.g. PIN presentation).

Fig. 4: ICT module

4.3 MCT types

MCTs may be designed as

- an integrated system component (e.g. card reader integrated in the keyboard, card reader in a disc slot, card reader in a PCMCIA module) or

- a separate external device.

MCTs as a separate device may have the following additional functional units:

- display and key pad

- contact units for more than one IC card in normal format according to ISO/IEC 7816-2
- contact units for IC cards in plug-in format.

This results in the concept of an MCT family as shown in the table below (it should be noted that other combinations of units are also possible).

MCT Family				
Functions / Type	Basic functions and one contact unit	Display *and* key pad	2nd contact unit for normal sized IC card	One or more contact units for plug-in IC cards
MKT - I	+			
MKT - IN	+		+	
MKT - E	+			
MKT - D	+	+		
MKT - DN	+	+	+	
MKT - DP	+	+		+
MKT - N	+		+	
MKT - P	+			+

I = Internal basic version
E = External basic version
D = Version with display and key pad
N = Version with 2nd contact unit for normal IC cards
P = Version with contact units for plug-in-cards

Tab. 1: MCT family

Note:
MCTs with other optional features such as security module or biometric identification unit are not within the scope of this specification.

4.4 Access to several MCTs

As certain applications work with more than one IC card (e.g. doctor card and patient card), it may be necessary to connect e.g. 2 MCTs. If MCTs are used that require different HTSI modules or CTI-API libraries (see CT-API specification), access to the different HTSI modules is possible by using 'well known identifiers' (manufacturers' identification with HTSI identifier) in the CT-API function names.

5. Special properties

5.1 Display and key pad

The size of the display, if available, should allow at least 2 lines with 16 characters. The

character set shall include upper and lower case letters, digits and the usual special characters.
If a key pad is available, the following rules shall be observed:

When a 12 key pad is used the 11th and 12th key are to be reserved for

- abort key and
- validation key

respectively.

When a 16 key pad is used

- an abort key
- a correction key and
- a validation key

are to be provided in addition to the numeral keys. An ergonomic model is recommended. The position of the keys shall be in compliance with the standard CEN prEN 1332-5.

5.2 Power supply

The power supply for CardTerminals with more ICC interfaces has to be arranged so that at least two IC cards can be provided with power simultaneously. Details on power consumption of IC cards can be found in the document 'CT-ICC interface'.

5.3 IC card sizes

CardTerminals with one ICC interface shall support the usual card size (ID-1, see ISO/IEC 7816-2). If a second or further ICC interfaces are available, these can be designed either as

- ID-1 interfaces or

- ID-000 interfaces (interfaces for plug-in cards).

Fig. 5 shows the relation between IC cards size ID-1 (defined in ISO/IEC 7810) and ID-000 (defined in ENV 1375-1).

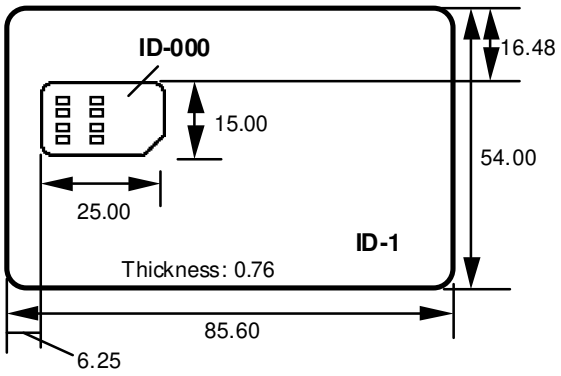


Fig. 5: Relation between IC Cards ID-1 and ID-000

5.4 Downloading

To be able to update the MCT control program, to load display messages for the display (if available) or to eliminate errors, MCTs shall support a download function. The download procedure requires as minimum protection the ability to prevent unauthorised changes of the MCT control program (see also annex CT-BCS specification). One way to realise this is to perform the downloading with a separate download program that is provided by or which can operate from remote. It shall be possible to check the integrity and completeness of the load data by the download module in the MCT.