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Technical Specification

Smart Cards; Transport Protocol for UICC based Applications; Stage 1 (Release 6)



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Foreword

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1 Scope

The present document defines the stage one description of the Transport Protocol, CAT_TP, for CAT applications based on TS 102 223 [1].

The Bearer Independent Protocol as defined in TS 102 223 [1] allows a CAT application on the UICC to establish a data channel with the terminal, and through the terminal either to a remote server in the network or to a remote device in the Personal Area Network (PAN). The Bearer Independent Protocol obviously inherits the properties of the bearer and the network protocols it uses and may stand on top of unreliable transport protocols (such as UDP).

The present document contains the core requirements for the CAT_TP between the card and a remote entity to ensure acknowledgement, segmentation/fragmentation, retransmission of messages, etc. The transport mechanisms specified are independent of applications and used bearers. Even if the current definition of the CAT_TP protocol is focused on the Bearer Independent Protocol, it does not prevent the CAT_TP to be used over future UICC-TE communication protocol.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

- [1] ETSI TS 102 223: "Smart Cards; Card Application Toolkit (CAT)".
- [2] ETSI TS 102 225: "Smart Cards; Secured packet structure for UICC based applications".
- [3] ETSI TS 102 226: "Smart Cards; Remote APDU structure for UICC based applications".

3 Definitions and abbreviations

3.1 Definitions

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

bearer independent protocol: mechanism by which the terminal provides the UICC with access to the data bearers supported by the terminal and the network, as defined in TS 102 223

CAT_TP client: this is the entity which initiates a CAT_TP link to the CAT_TP server, and applies during the connection phase only

NOTE: It could be on the UICC or on the remote entity.

CAT_TP server: this is the entity which receives a CAT_TP link establishment request from a CAT_TP client, and applies during the connection phase only

NOTE: It could be on the UICC or on the remote entity.

CAT_TP entity: entity able to open a CAT_TP link, exchange CAT_TP PDUs (see annex B) and close a CAT_TP link

CAT_TP Service Data Unit: In the reference model for OSI, an amount of information whose identity is preserved when transferred between peer (N+1)-layer entities and which is not interpreted by the supporting (N)-layer entities

NOTE: Here (N)-layer is the CAT_TP layer.

Physical link: is composed of the Bearer Independent Protocol channel between the UICC and the TE and a bearer specific link between the TE and the remote entity

CAT_TP link: logical link between CAT_TP entities over which CAT_TP PDUs are exchanged

3.2 Abbreviations

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

BIP	Bearer Independent Protocol
CAT	Card Application Toolkit
CAT_TP	Card Application Toolkit Transport Protocol
ETSI	European Telecommunications Standards Institute
FFS	For Further Study
PAN	Personal Area Network
PC	Personal Computer
PDA	Personal Digital Assistant
PDU	Protocol Data Unit
SDU	Service Data Unit (in the context of the present document, a CAT_TP SDU)
TE	Terminal Equipment
WAN	Wide Area Network

4 Description

The Bearer Independent Protocol, as defined in TS 101 223 [1], provides to the UICC a standardised way to use TE bearers to communicate with remote entities in a WAN or in a PAN. The UICC and the TE exchange data together. The TE and the server exchange data together. According to figure 1, the physical link is composed of the BIP and the Bearer Specific Protocol between the TE and the remote entity. Several CAT_TP links can share a physical link.

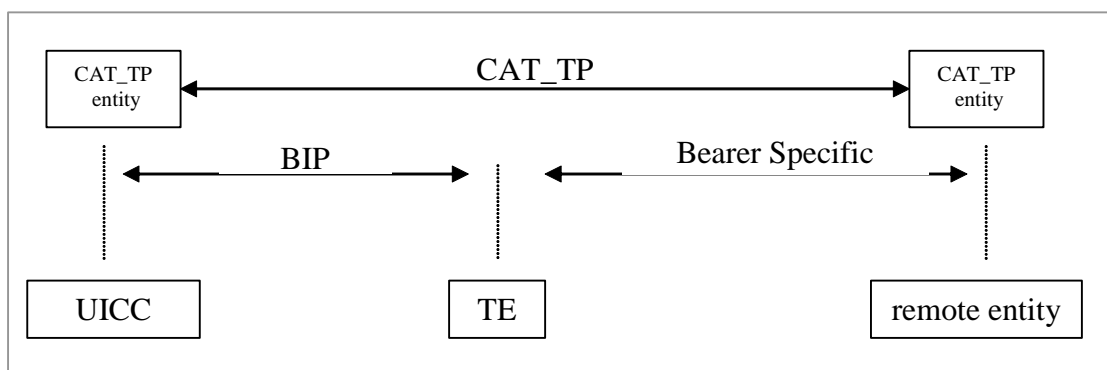


Figure 1: Data exchanges overview

Without the CAT_TP, the CAT Application is unable to know if the remote entity has received the data sent. Moreover, without CAT_TP, the remote entity possibly receives data without transport information such as the emitter identity, packet numbering or transmission status, etc.

The CAT_TP aims to provide the possibly missing transport functionalities.

5 Requirements

5.1 Transport requirements

5.1.1 General requirements

- The CAT_TP shall allow enhancement without compromising backward compatibility.
- The CAT_TP flexibility shall be considered for the best efficiency for applications and bearers. (e.g. to gain bandwidth, performances, by activating/deactivating some of the CAT_TP features).
- Deployed protocols shall be considered as a possible stage 2 solution.
- A negotiation mechanism, between CAT_TP entities, shall be available for all CAT_TP negotiable features (e.g. receive/transmit buffers, acknowledgement mechanisms...) in order to achieve CAT_TP interoperability.
- Sets of valid combinations of CAT_TP negotiable features shall be defined. There shall be a limited number of sets.
- The CAT_TP shall provide full-duplex communication.

5.1.2 Physical link requirements

This subclause is left FFS.

5.1.3 CAT_TP link requirements

The CAT_TP shall allow a connection oriented mode. A CAT_TP connectionless mode need is FFS.

5.1.4 CAT_TP connection mechanisms requirements

5.1.4.1 Definition

The CAT_TP connection oriented mode provides functions to open and to close CAT_TP links. The connection set-up is the request from CAT_TP client to CAT_TP server to establish a CAT_TP link with CAT_TP specific parameters, and optional parameters for physical link establishment. This mechanism includes the closing of CAT_TP link. The connection set up could be achieved by the UICC or by the remote entity.

5.1.4.2 Functional requirements

- The connection set-up shall be done with specific PDUs.
- After the issuance of the link establishment request, the CAT_TP client shall wait for a link establishment response in a finite time.
- Upon the connection set-up, an error handling mechanism shall be available on the CAT_TP client side.
- Several connection set-ups shall be able to be performed on the same physical link. This ends up with several CAT_TP links established at the same time on the same physical link.
- During the CAT_TP connection set up, it shall be possible to choose between using already open physical links or opening a new one depending of the optionally given physical link parameters.
- The CAT_TP client shall negotiate with the CAT_TP server the maximum PDU size and the maximum SDU size.
- At any moment, the CAT_TP client or CAT_TP server shall be able to close a CAT_TP connection.

5.1.5 Segmentation mechanism requirements

5.1.5.1 Definition

This mechanism is the split of a SDU into several PDUs.

5.1.5.2 Purpose

In case a SDU is larger than the maximum PDUs size negotiated during the connection step (emission and reception), a segmentation and re-assembly mechanisms shall be used.

5.1.5.3 Functional requirements

- Both CAT_TP entities shall support this segmentation and re-assembly requirements.
- There shall be an available mechanism to handle several out of sequence PDUs belonging to one SDU.
- There shall be an available mechanism to handle several PDUs from different SDUs.

5.1.6 Reliable message exchange requirements

5.1.6.1 Definition

Acknowledgement and retransmission allow reliable message exchange. The acknowledgement allows the CAT_TP receiving entity to indicate to the CAT_TP sending entity it has received the previous data with or without errors. In case of bad transmission, retransmission applies.

5.1.6.2 Purpose

This mechanism allows CAT_TP entities to exchange data in a reliable manner.

5.1.6.3 Functional requirements

- The acknowledgement and the retransmission shall be possible, if requested by CAT_TP entities:
 - At the SDU level;
 - At the PDU level;
 - For several PDUs.
- A mechanism shall be available to handle lost or corrupted (i.e. corrupted header) PDUs and SDUs (data or control messages).
- Checksum mechanism is not considered to be necessary since data integrity is considered to be handled by physical link.
- Flow control shall be considered in the CAT_TP.

5.2 Application requirements

5.2.1 Upper layer identification mechanism requirements

5.2.1.1 Purpose

This feature is needed to inform the receiving entity of the data format.

5.2.1.2 Functional requirements

There shall be a mechanism to identify an upper layer, if any. For example, it shall be able to identify the security layer as defined in TS 102 225 [2].

5.2.2 CAT_TP entities identification mechanism requirements

5.2.2.1 Purpose

This feature allows CAT_TP entities to uniquely identify each other.

5.2.2.2 Functional requirements

- There shall be a mechanism to uniquely identify a CAT_TP link established between two CAT_TP entities.
- There shall be a mechanism to uniquely identify the sending CAT-TP entity.

Annex A (informative): Working environment

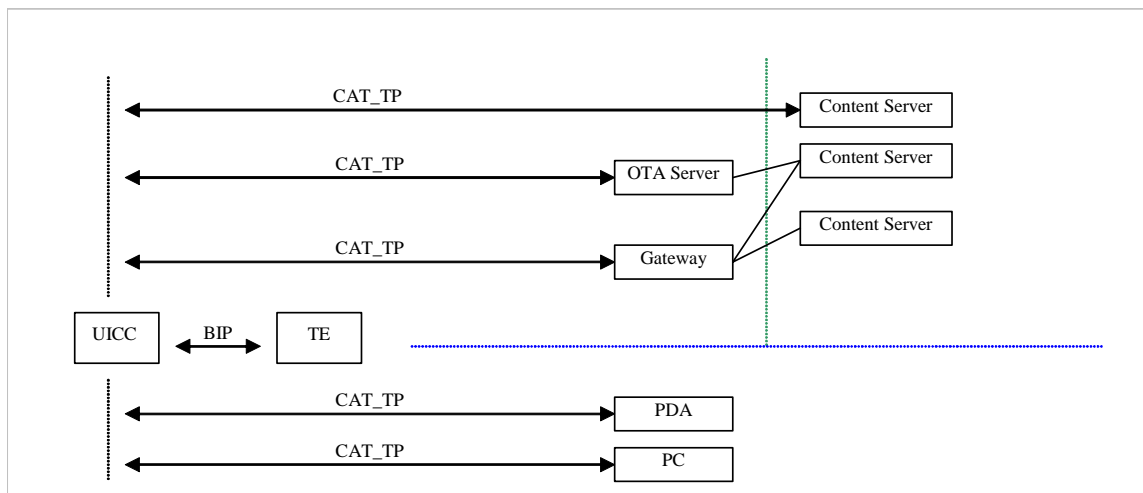


Figure A.1: Working environment description

Actors of the working environment

- UICC: Universal Integrated Circuit Card.
- TE: Terminal Equipment.
- OTA Server: Over The Air Server; manage and administrate the UICC.
- Gateway: Bridge to "Service Provider" content servers.
- Content Server: Server providing user oriented services; e.g. Bank, loyalties, etc.
- PDA: end user portable device.
- PC: end user computer.

Annex B (informative): PDU, SDU description

Regarding the OSI model, PDUs and SDUs shall be interpreted as follow.

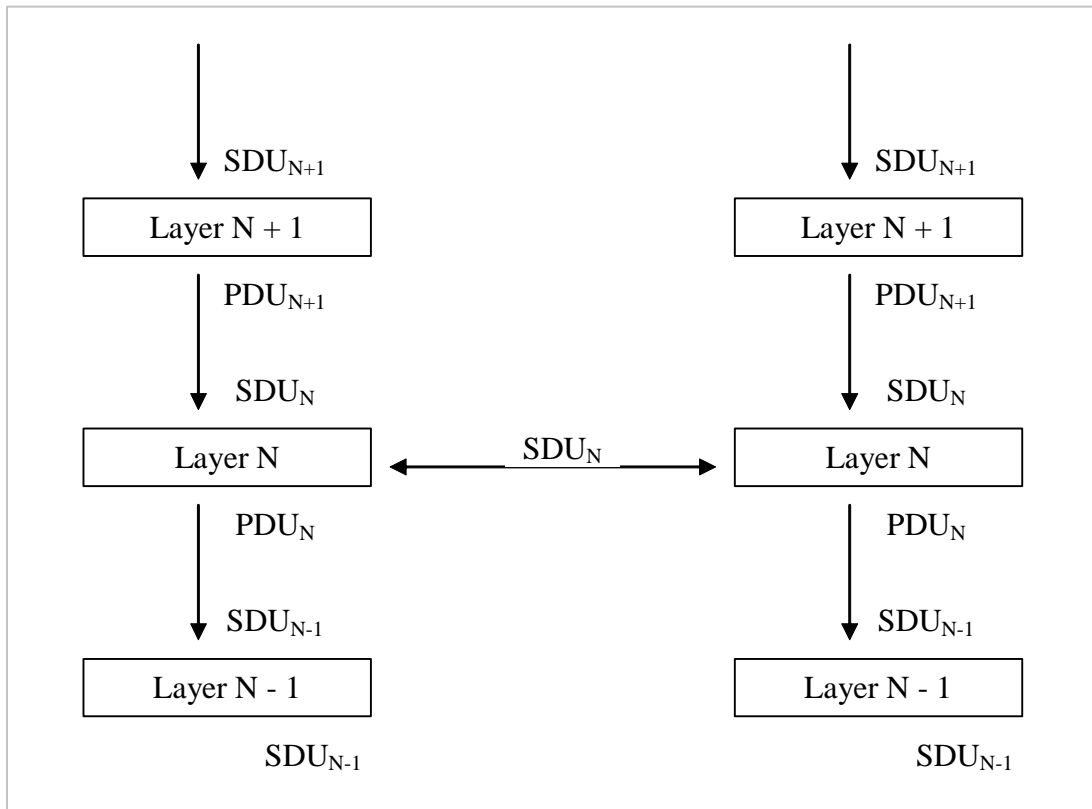


Figure B.1: Layers relation

Within the scope of the present document, the definitions of PDUs and SDUs assume that CAT_TP is considered as the reference layer.

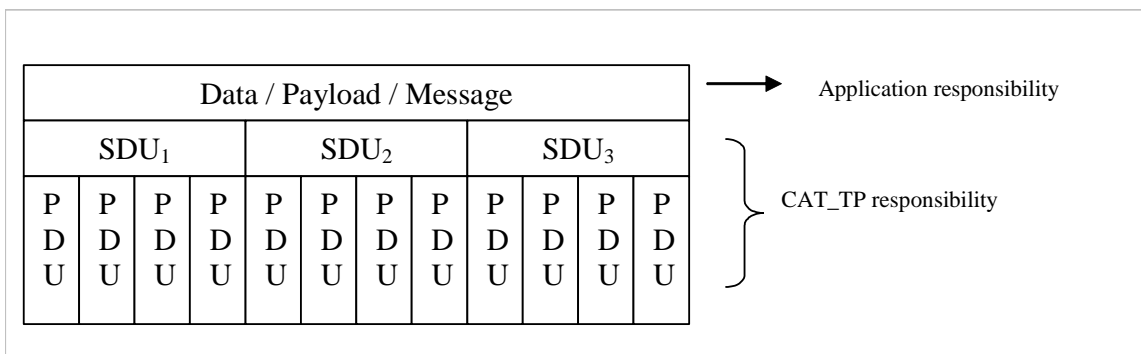


Figure B.2: Responsibility between application and CAT_TP

Application is responsible for data and its associated SDUs, if any. The CAT_TP is responsible to transfer those SDUs in a reliable manner to its peer entity and to split them into several PDUs, if necessary.

Annex C (informative): Change history

Change history								
Date	Meeting	EP SCP Doc.	CR	Rv	Cat	Subject/Comment	Old	New
2003-01	SCP-12	SCP-030068				Final Draft version approved at plenary meeting SCP-12	2.1.0	6.0.0

History

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