SLOVENSKI STANDARD
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Home and building electronic systems (HBES) - Technical Report 8: Transport layer and network - Class 1

Home and Building Electronic Systems (HBES) -- Technical Report 8: Transport Layer and Network Layer, Class 1

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ICS:

35.100.30	Omrežni sloj	Network layer
35.100.40	Transportni sloj	Transport layer
97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use

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CENELEC

R205-008

REPORT

October 1996

Descriptors: Home and building electronic systems (HBES), home electronic systems, transport layer, network layer

English version

Home and Building Electronic Systems (HBES)
Technical Report 8:
Transport Layer and Network Layer, Class 1

This CENELEC Report has been prepared by Technical Committee CENELEC TC 205, Home and Building Electronic Systems (HBES). It was approved by CENELEC on 1995-11-28.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung
Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. R205-008:1996 E

Foreword

This Technical Report has been prepared by the Technical Committee CENELEC TC 205 (former TC 105), Home and Building Electronic Systems (HBES). It was decided to ask BT for publication during a voting plenary meeting on September 12 and October 18 and 19, 1995.

It was approved for publication as R205-008 by the CENELEC Technical Board on 1995-11-28.

The final intent of TC 205 is to develop a unique standard, with possible use of different media. The following structure of the series of standards *EN 50090 Home and Building Electronic Systems (HBES)* has been decided:

Part 1:	Standardization structure
Part 2:	System overview
Part 3:	Aspects of application
Part 4:	Transport Layer and Network Layer
Part 5:	Media and media dependent layers
Part 6:	Interfaces
Part 7:	Management

Nevertheless, due to historical and market reasons, a first step was taken that allows three different implementations for some parts of the standard, the other parts being common. It is expected that a future version of the HBES standard will only propose one unique implementation, including the existing common parts. For the time being, TC 205 had agreed that the existing different implementations are described in European Prestandards (ENVs).

The three implementations are:

- implementation 1: BatiBUS;
- implementation 2: EIB;
- implementation 3: EHS.

The use of one implementation in a specific ENV requires the use of the same implementation throughout the whole series.

As decided during the meeting of TC 205 held on March 28 and 29th 1995, in accordance with the TC 205 standardization structure as approved by the Technical Board, and in line with TC 205's approach initiated and exposed three years ago as laid down in the CENELEC IT Strategy Plan, the following documents - which were expected to become parts of the EN(V) 50090 series and which describe the protocols of the three proposed HBES implementations BatiBUS, EIB and EHS - had been submitted to vote at plenary meetings of TC 205, in accordance with subclause 7.2 of the CEN/CENELEC Internal Regulations Part 2:

prENV 50090-3-3	Aspects of application - Application Layer
prENV 50090-4	Transport Layer and Network Layer
prENV 50090-5-2	Media and media dependent layers - Network based on Twisted Pair, Class 1
prENV 50090-6-3	Interfaces - Media interfaces
prENV 50090-7	Management

The comments expressed by some National Committees during these meetings reflected the reluctance to the principle of endorsing three existing systems as a step to coming to a unique solution.

Despite the public commitment of the consortia supporting these systems to converge on a unique system, a commitment proven already by the acceptance of:

EN 50090-2-1	System overview - Architecture
EN 50090-2-2	System overview - General Technical requirements
EN 50090-3-1	Aspects of application - Introduction to the application structure
EN 50090-3-2	Aspects of application - User process
R205-001	Applications and requirements - Class 1
R205-002	Guidelines for the professional installation of Twisted Pair cables Class 1
R205-004	Applications and requirements - Class 2 and 3

as well as by the ongoing work in TC 205, none of the arguments put forward could change the opinion of these National Committee delegations.

A formal vote at the meetings showed that there was not sufficient consensus to have the prENVs approved. Therefore the Technical Board decided to publish these documents as CENELEC Reports:

R205-007	Aspects of application - Application Layer
R205-008	Transport Layer and Network Layer, Class 1
R205-009	Media and media dependent layers - Network based on Twisted Pair, Class 1
R205-010	Interfaces - Medium Interface, Twisted Pair, Class 1
R205-011	Management

This Technical Report contains clauses which may be subject to Intellectual Property Rights (IPR)[1].

In accordance with CEN/CENELEC Memorandum 8, the Central Secretariat received a declaration from the three consortia whose protocols are described in this Technical Report, i.e. BCi, EHSA and EIBA, the details of which have been made available to the CENELEC membership.

For full details or IPR conditions the three consortia can be contacted at the following addresses:

BatiBus club international (BCi)
11, rue Hamelin
F-75783 PARIS CEDEX 16

European Home System Association (EHSA)
Excelsiorlaan 11 - Bus 1
B-1930 ZAVENTEM

European Installation Bus Association (EIBA)
Avenue de la Tanche 5
B-1160 BRUSSELS

1) As defined in CEN/CENELEC Memorandum No 8.

Contents

1 Scope

This Technical Report describes the Transport Layer and Network Layer, Class 1, Specifications of the three implementations, BatiBUS (implementation 1), EIBus (implementation 2) and EHS (implementation 3).

2 Normative references

This Technical Report incorporates by dated or 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 Technical Report only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50090-1*)	Home and Building Electronic Systems (HBES) - Part 1: Standardization structure
EN 50090-2-1	Home and Building Electronic Systems (HBES) - Part 2-1: System overview - Architecture
R205-009	Home and Building Electronic Systems (HBES) - Technical Report 9: Media and media dependent layers - Network based on twisted pair, Class 1
ISO/IEC 7498-1	Information Technology - Open Systems Interconnection - Basic Reference Model: The basic model

3 Definitions

3.1 Definitions common to all implementations

L-Layer	Link Layer
N-Layer	Network Layer
PH-Layer	Physical Layer

3.2 Additional definitions for implementation 1

None.

3.3 Additional definitions for implementation 2

ACK	Acknowledge
LPDU	Link layer Protocol Data Unit
LSDU	Link layer Service Data Unit
NAK	Negative Acknowledge
NPDU	Network layer Protocol Data Unit
NSDU	Network layer Service Data Unit
TPDU	Transport layer Protocol Data Unit
TSDU	Transport layer Service Data Unit
area	see EN 50090-2-1
line	see EN 50090-2-1
line coupler	see EN 50090-2-1
Backbone-bus-coupler	see EN 50090-2-1
area address	see EN 50090-2-1
line address	see EN 50090-2-1

3.4 Additional definitions for implementation 3

3.4.1 closed medium: A medium that carries only locally generated messages, locally in the sense that all the messages are only generated by the connected terminals. Examples are twisted pair and coax cables.

3.4.2 open medium: A medium that due to physical or mechanical characteristics can carry "externally" originated messages as well. Examples are Power Line, Infra Red or Radio Frequency.

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*) At present draft

4 Transport Layer

4.1 Implementation 1

EN 50090-2-1 introduces the possible roles and functionalities for the Transport Layer. The services of this layer are optional ; this lets open the possibility of a 'nil implementation' for this layer. This is the case for implementation 1.

The different functionalities of connection and data segmentation are handled respectively by the lower and upper layers.

This present document therefore has only two purposes :

- consistency of the part numbering for the HBES standard,
- possible evolution of implementation 1, which would only involve one document change.

4.2 Implementation 2

4.2.1 Introduction

The object of this Technical Report is to define the requirements of the transport layer, used in Home and Building Electronic Systems for class-1-control-busses.

4.2.2 Functional description

The requirements described in this and the following subclauses should be met by the transport layer of the class-1-control-bus, unless it is regulated explicitly different.

4.2.2.1 Overview

The transport layer is responsible for end-to-end data transmissions. There are two types of communication services : (logical) connectionless and (logical) connection-oriented communication.

In addition, the transport layer converts the (external) addresses to internal connection numbers and vice versa.

The following diagram shows which services are provided by the transport layer to the application layer and which services are needed by the transport layer, in order to carry out its tasks from the network layer.

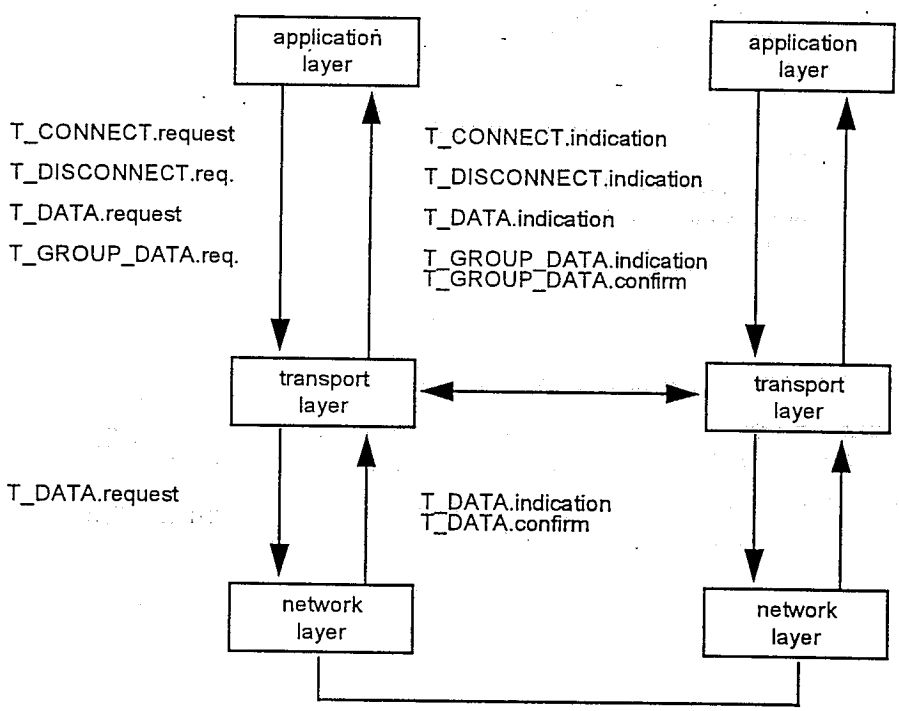


Figure 1: Services provided by the Transport Layer to the Application Layer

4.2.2.2 Connection-oriented communication

A point-to-point-communication between two devices is made possible by use of (logical) connection-oriented communication.

The connection-oriented communication consists of three phases: Connection establishment, data transfer and connection release.

Every data packet will be confirmed by the receiving transport layer, in order to detect transmission errors over several lines. Additionally, every data packet (cyclic) will be numbered.

In case of a transmission error, the transport layer tries to recover these through repetitions. If that is not possible, the (logical) connection will be released.

The (logical) connection is monitored by a time-out mechanism. If no communication take places within 6 seconds, the connection will automatically be released.

4.2.2.3 Connectionless communication

The (logical) connectionless communication permits the sending of data packets to one or several devices at the same time. This kind of communication is very efficient, since it is not necessary to establish or release a logical connection.

However, it cannot be assured that the transmitter will detect all transmission errors.

4.2.3 Description of the Transport Layer Services

4.2.3.1 Service-Description

There are three services for the connection-oriented communication available. The T_CONNECT-service is used to establish a (logical) connection. The data transmission takes place by using the T_DATA-service. For the release of the connection serves the T_DISCONNECT-service.

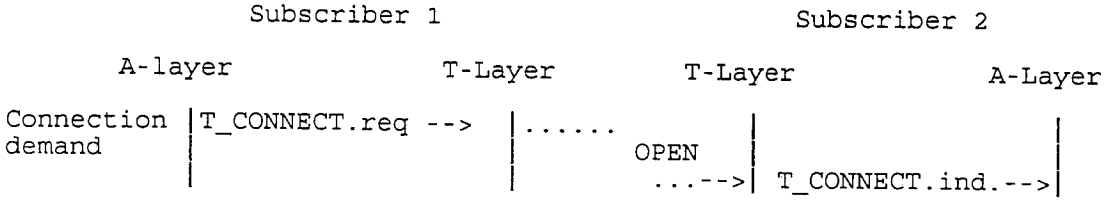
The (logical) connectionless communication only takes place with the T_GROUP_DATA-service.

4.2.3.2 Service-Primitive-Description

4.2.3.2.1 Overview

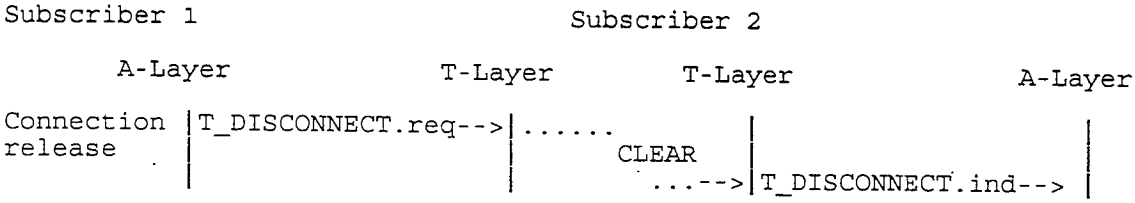
4.2.3.2.1.1 Connection-oriented communication

The application layer opens a (logical) communication connection with the T_CONNECT.request-primitive. The transport layer, which sets up the connection, informs the user by means of a T_CONNECT.indication primitive about the connection establishment.

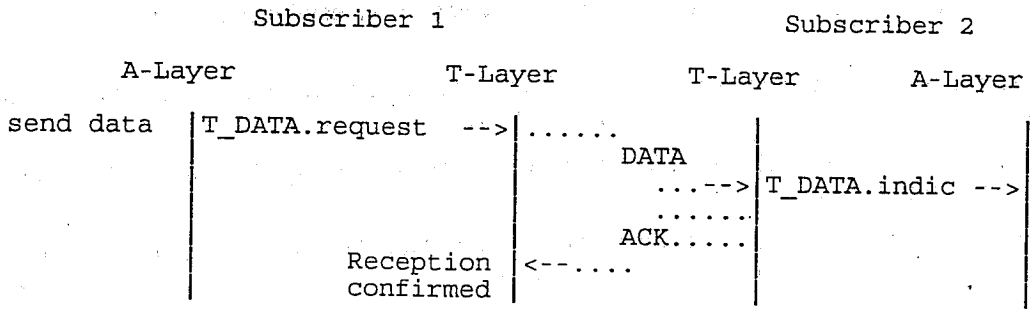


A connection can be released from both parties.

The release of a connection takes place with the T_DISCONNECT.request-primitive. The transport layer, which receives the T_DISCONNECT.request-primitive, informs the other transport layer. The other transport layer informs its user with the T_DISCONNECT.indication-primitive.



Data transmission takes place, in which the application layer sends these data by using a T_DAT.raqequest-primitive to the transport layer. The receiving transport layer passes these data to its user with the T_DATA.indication-primitive.



4.2.3.2.1.2 Connectionless communication

Data transmission via (logical) connectionless communication takes place, in which the application layer passes to the data, by using a T_GROUP_DATA.request-primitive, to the transport layer for sending.

The transport layer informs the application layer with the T_GROUP_DATA.indication-primitive about the received data.

4.2.3.2.2 Description of the Service-Primitives

4.2.3.2.2.1 T_CONNECT.request

This primitive is used to establish a (logical) communication to a device. The setup of a connection is not confirmed.

```
T_CONNECT.request    (
                     Address
                     )
```

Address — indicates the single address of the subscriber to whom a communication connection is to be opened.

4.2.3.2.2.2 T _CONNECT.indication

This primitive is used by the transport layer to indicate to a subscriber that another device has opened a connection.

```
T_CONNECT.indication    (
                        Connection
                        )
```

Connection — indicates the internal number of the connection which has been opened.

4.2.3.2.2.3 T DATA.request

This primitive is used by the application layer to pass data to the transport layer for sending via a (logical) connection.

```
T_DATA.request   (
                 Connection,
                 Priority,
                 Routing,
                 Data
                 )
```

Connection	indicates the internal number of the connection, which will be used for data transmission
Priority	indicates the transmission priority with which the data are to be transmitted.
Routing	states whether the routing-counter will be set to the default-value or to 7.
Data	contains the data (including its length) which are to be transmitted.

4.2.3.2.2.4 T_DATA.indication

This primitive is used by the transporter layer to pass data to the application layer after receiving them over a (logical) connection.

```
T_DATA.indication  (
                   Connection,
                   Priority,
                   Routing,
                   Data
                   )
```


Connection	indicates the internal number of the connection which will be used for data transmission.
Priority	indicates the transmission priority with which the data has been transmitted.
Routing	states the value of the routing-counter of the received telegram.
Data	contains the data (including their length) which have been received .

4.2.3.2.2.5 T_DISCONNECT.request

This primitive is used to release a (logical) communication. The release of the connection is not confirmed.

```
T_DISCONNECT.request  (
                      Connection
                      )
```

Connection	indicates the internal number of the connection, which will be closed.

4.2.3.2.2.6 T_DISCONNECT.indication

This primitive is used by the transport layer to indicate to a user that a (logical) communication connection has been closed.

```
T_DISCONNECT.indication   (
                          Connection
                          )
```

Connection	indicates the internal number of the connection, which has been closed.

4.2.3.2.2.7 T_GROUP DATA.request

This primitive is used by the application layer to pass data to the transport layer for sending via a (logical) connectionless connection. The transmission will be confirmed with the T_GROUP_DATA.confirm-primitive.

T_GROUP_DATA.request (
Connection,
Priority,
Routing,
Data
)

Connection	indicates the internal number of the connection, which will be used for data transmission..
Priority	indicates the transmission priority with which the telegram is to be transmitted.
Routing	states whether the routing-counter will be set to the default-value or to 7.
Data	contains the data (including their length) which are to be transmitted.

4.2.3.2.2.8 T_GROUP DATA.confirm

This primitive is used by the transporter layer to confirm the connectionless data transmission to the applicatin layer.

T_GROUP_DATA.confirm (
Result
)

Result indicates the result of the corresponding T_GROUP_DATA.

The possible values are:
SUCCES The telegram has been sent successfully.
ERROR The telegram has not been sent successfully.

4.2.3.2.2.9 T_GROUP DATA.indication

This primitive is used by the transport layer to pass data to the application layer after receiving them over a (logical) connectionless connection.

T_GROUP_DATA.indication (
Connection,
Priority,
Routing,
Data
)

Connection	indicates the internal number of the connection, which has been used for data transmission.
Priority	indicates the transmission priority with which the data have been transmitted.
Routing	states the value of the routing-counter of the received telegram.
Data	contains the data (including their length) which have been received .

4.2.4 Structure of the Transport Layer-PDUs

4.2.4.1 TPDU-Formats

The transport layer distinguishes between four different TPDU-Types.

The TPDU-Type 'T-data packet' will be used for (logical) connectionless communication.

The TPDU-Types 'Numbered T-data packet', 'T-control data' and 'Numbered T-control data' will be used for (logical) connection-oriented communication.