SLOVENSKI STANDARD
SIST ENV 13149-1:2003

01-oktober-2003

Javni prevoz – Sistemi za časovno razporejanje in nadzor cestnih vozil – 1. del: Definicija po WORLDFIP in aplikacijska pravila za prenos podatkov z vgrajeno opremo

Public transport - Road vehicle scheduling and control systems - Part 1: WORLDFIP definition and application rules for onboard data transmission

Ta slovenski standard je istoveten z: **ENV 13149-1:1999**

ICS:

35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade
43.040.15	Avtomobilska informatika. Vgrajeni računalniški sistemi	Car informatics. On board computer systems
43.080.20	Avtobusi	Buses

SIST ENV 13149-1:2003 **en**

EUROPEAN PRESTANDARD
PRÉNORME EUROPÉENNE
EUROPÄISCHE VORNORM

ENV 13149-1

November 1999

ICS 35.100.05; 35.240.60; 43.080.20; 45.060.01

English version

Public transport - Road vehicle scheduling and control systems - Part 1: WORLDFIP definition and application rules for onboard data transmission

This European Prestandard (ENV) was approved by CEN on 30 August 1999 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. ENV 13149-1:1999 E

CONTENTS

FOREWORD

This European Prestandard has been prepared by Technical Committee CEN/TC 278 "Road transport and traffic telematics", the secretariat of which is held by NNI.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

INTRODUCTION

The present situation is the following:

- A large number of Vehicle Scheduling and Control Systems (VSCS) do not use a data bus, resulting in
    - point to point data links with an expensive cabling which cannot be preinstalled during the manufacturing of the vehicle, increasing the cost of the system
    - different proprietary transmission protocols which have to be implemented as and when required
    - difficulty to change the provider of a given type of equipment as no compatibility exists between different providers of the same type of equipment
- Some systems implement the VDV IBIS bus specification, but:
    - IBIS bus is very slow and does no more cover the needs for high speed data transmission between equipments
    - IBIS bus is not an open system and does not cover some of the necessary messages
    - practically every VSCS manufacturer has been obliged to implement a second high speed data bus which is proprietary, resulting in no possibility to interchange equipments with other manufacturers

The buses which are proposed by CEN/TC278 aim at avoiding the preceding difficulties with the following characteristics:

- high capacity and high speed data bus
- consistent workplan ensuring interoperability down to the message level
- low cost solution
- already standardised data bus
- large number of already existing and future applications outside the VSCS area, ensuring the existence of equipment on the market, the progressive decrease of the cost of the necessary chips and the timelessness of the solution
- existing chips and basic software up to and including the layer 7 of the ISO 7 layer communication model and existing developments tools, minimising the development costs

The buses proposed by CEN/TC 278 have been chosen among others through a progressive selection process. This work took into account a flexible approach to the range of applications, the potential traffic loading under different operating circumstances and the definition of objective criteria for a transmission bus. The candidate buses were evaluated against the criteria in terms of performance, cost, industrial support and the existence of maintained standards.

1. SCOPE

The present standard specifies the choice and the general application's rules of an onboard data transmission bus between the different equipment for service operations and monitoring of the fleet. This applies to equipment installed onboard buses, trolleybuses and tramways only as part of a bus fleet operation. It excludes tramways when they are operated as part of a train, subway or metro operation. These equipment include operations aid system, automatic passenger information systems, fare collection systems, etc....

The equipment directly related to the functioning of the vehicle (driver dashboard, engine management, brake systems, door opening systems, etc...) are excluded from the scope of the present standard and are dealt with in other standardisation bodies.

Two alternative transmission buses will be accepted. This standard refers to the so called WORLDFIP bus. A second set of standards will be published for the second solution (so called CAN). There is no ranking between the two solutions and the selected bus system, between the two standardised alternatives, shall be subject to an agreement between each transport operating organisation and its equipment providers.

The present standard refers to the so called OSI transmission model and covers OSI layers 1,2,7, the other layers are not used in our applications.

The present standard covers the link between equipment inside a single vehicle. Although it could be applied to multiple vehicles, this application is not explicitly covered by this standard.

The present standard is the first part of a set of standards, related to the onboard transmission bus, which will comprise, for each allowed transmission bus, the following set of standards:

1. choice of the bus and general application's rules
2. cabling specifications
3. messages' content specifications

2. NORMATIVE REFERENCES

This European Prestandard incorporates by dated or undated reference, prvisions 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 European Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication refered to applies:

EN 61158-2	Field bus standard for use in industrial control systems, Part 2: Physical layer specification and service definition (IEC 1158-2:1993)
EN 50170, Volume 3	General purpose field communication system
ISO 7498: 1984	Basic reference model for open systems interconnection

3. DEFINITIONS

Network: the system formed by a particular implementation of the data transmission bus.

Presence variable: a variable transmitted by a device to indicate that it is present on the bus.

4. TYPICAL STRUCTURE OF THE NETWORK

4.1 Outline Functions of the Network

The network is provided as a means of communication between equipment, not as a mean of power distribution. It will provide for the Physical, Data Link and Application layers. Power distribution may be provided within the same cable (on different wires) provided it does not contravene other requirements of this standard. The following gives a brief summary of some of the main features of the network:

- Essentially fieldbus linear topology
- Periodic (Cyclic) data
- Aperiodic (Events) data
- Message and file transfer
- Provides for control and information transfer
- Deterministic performance-parametering of priority order and periods
- Bus arbitration to ensure time critical data is undisturbed by less critical events and messages
- Producer consumer model with provision to broadcast data
- Open network
- Self clocking
- Half duplex
- Medium redundancy possibility
- Remote monitoring
- Intelligent and non-intelligent devices
- Distributed database
- Error detection

4.2 Diagram of Preferred Implementation

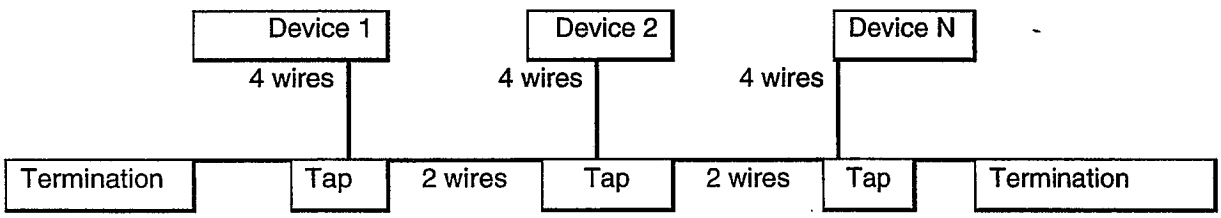

Diagram 1: Preferred implementation

5. SPECIFICATIONS FOR THE ON-BOARD DATA TRANSMISSION SYSTEM

5.1 Data transmission bus

The data transmission bus shall be as defined in EN 50170, which is generally known as WorldFIP.

5.2 General Rules

These general rules are derived from EN 61158-2, and particularly those referring to the Medium Attachment Unit (MAU): 1Mbits/s, voltage mode, wire medium. The following are particularly relevant and shall apply.

5.2.1 Network Medium

This consists of shielded twisted pair wires mainly used in a linear topology

5.2.2 Transmission speed

The devices connected to the bus shall operate at the nominal rate of 1Mbit/second .

5.2.3 Coupling Mode

The coupling of a device to the medium shall be by the voltage mode (parallel coupling) using transformers.

5.2.4 Redundant Media

Four wire configurations providing a medium redundancy network are permitted but not mandatory

5.2.5 Network Configuration Rules

The network configuration rules of EN 61158-2, section 12 shall apply with the exception that the limit to 32 devices on a bus applies only to a bus segment. The bus can consist of more than one segment resulting in more than 32 devices attached to the same bus.

5.2.6 Encoding

The Preamble and Delimiters coding shall be as defined by EN 61158-2 section 9. CRC coding shall be as defined by EN 50170-3.

5.2.7 Turnaround time

The turnaround time TR of the different devices shall be set to 10 µs. plus or minus 0,025µs.

5.2.8 Waiting time at the bus arbiter level for an answer

The waiting time (or silence time) for an answer after requesting a given variable or message (when the corresponding equipment fails to answer) shall be set to 150µs. plus or minus 0,025µs.

5.2.9 Jabber Inhibit

The jabber inhibit requirements of EN 61158-2 section 12 shall apply.

5.2.10 Connectors

The connectors referred to in EN 61158-2 section 12 are not mandatory. They will be defined in the second part (cabling specifications) of the set of standards.

5.2.11 Cables

Cables are refered to in EN 61158-2 section 12 and the corresponding specifications will be complemented in the second part (cabling specifications) of this European Prestandard.

5.3 Conformance Class

The network shall operate to electrical conformance class CH as defined in EN50170 Volume 3, Part 1.

5.4 Bus Arbiter

The following rules apply:

1. There shall be at least one bus arbiter but any device can be nominated as the main bus arbiter.
2. Secondary bus arbiters are permitted to suit the application.
3. It shall be possible to modify the arbitration table easily by updating the memory.
4. It shall be possible for the arbiter to store and manage at least four arbitration tables which can be received and switched via the bus
5. The arbiter shall provide for a minimum of 64 Kbytes of dedicated memory for the arbitration function.

5.5 Presence Variable

Each device connected to the bus shall have one variable which acts as a presence variable.

ANNEX A (INFORMATIVE) CEN/TC 278 INTERNAL REPORT ON REQUIREMENTS FOR ON BOARD TRANSMISSION BETWEEN EQUIPMENT

TABLE OF CONTENTS

1-Introduction:

1-1-Scope:

This informative annex is aimed at explaining the path followed to choose the transmission buses.

The purpose of this document is to specify the main requirements of a transmission bus to be used between the on board equipment of a Vehicle Scheduling and Control System for road public transport vehicles. It corresponds to the Work Item 3.1.1 of the program of work of the CEN TC278/WG3 "Public Transport". It applies to equipment installed onboard buses, trolleybuses and tramways only as part of a bus fleet operation. It excludes tramways when they are operated as part of a train, subway or metro operation. This document has been the basis for the rest of the standardisation work on the on board data transmission bus, it has first been published as part of an Internal Technical report.

The use of this transmission bus is limited to the systems and equipment on board the vehicles of urban and interurban public transportation (buses and tramways when they are operated as buses, excluding transportation in complete individual sites such as trains or tramways operated as trains) that are designed for the operation of public transportation (operation aid systems, automatic passenger information systems, fare collection systems, maintenance aid systems).

The functions corresponding to the management of the vehicle itself (such as for example engine control, brake control, etc...) are totally excluded from the scope of work of the present document.

Normally the scope of the document is limited to the transmissions taking place onboard a single vehicle, the transmission between more than one vehicle may require a separate intervehicle bus. However, it would be preferred (but it is not taken as mandatory for the definition of the required bus), to be able to extend the bus through multiple vehicles (3 at the maximum) to avoid the complication of an intervehicle bus. To evaluate this possibility, the additional transmission load corresponding to the addition of a supplementary vehicle will be defined.

The tables given in chapter 4 to evaluate the bus load are only rough estimates and shall not been taken as mandatory.

1-2-Environment of production:

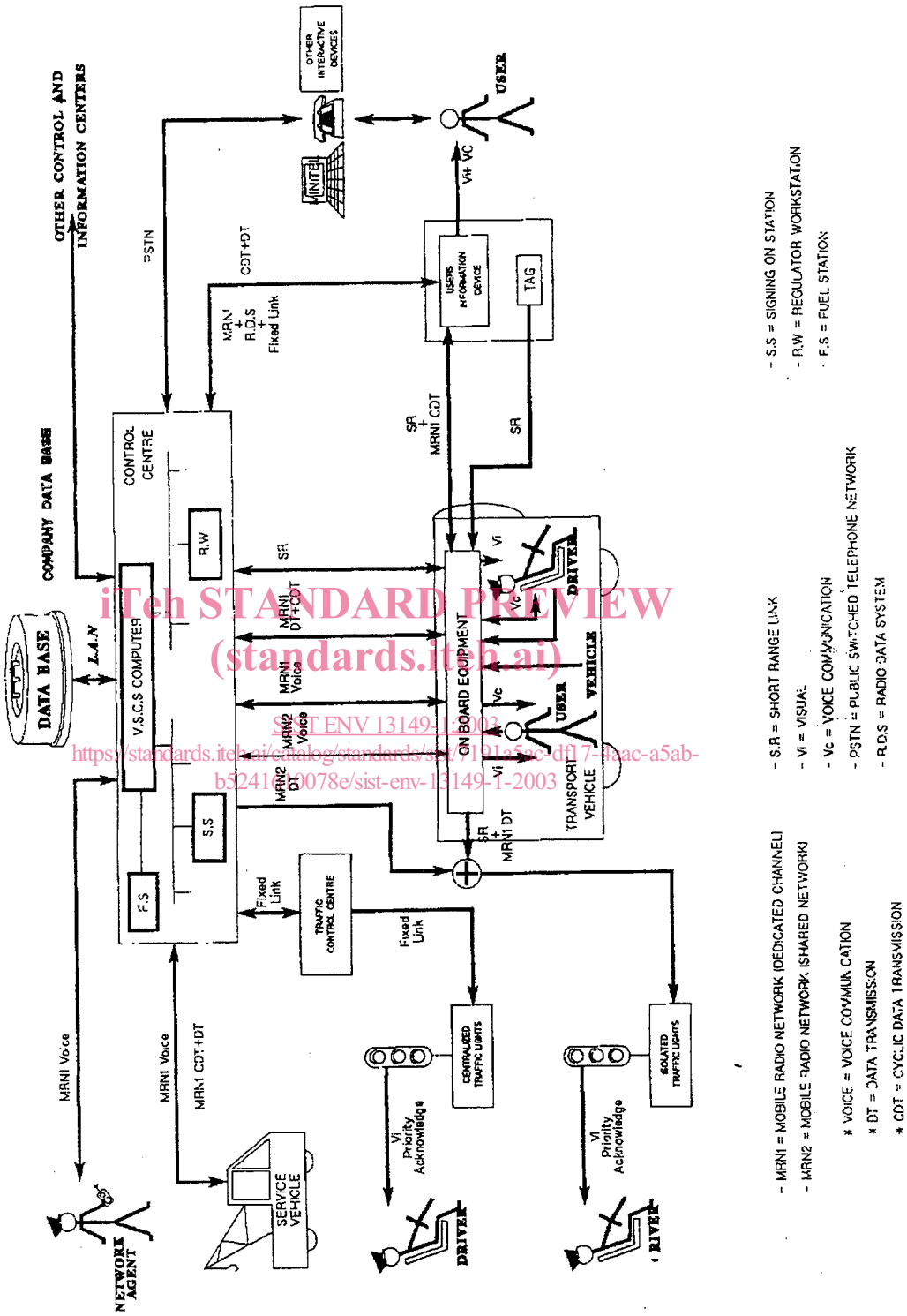

FIG 1 : V.S.C.S GENERAL DESCRIPTION