SEK SVENSK ELSTANDARD

SEK Teknisk rapport 50501-1

Utgåva 1, november 2007

Railway applications – Rolling stock – Intercommunication between vehicles and train/wayside – Part 1: Data dictionary and rules for functional standardisation

(CENELEC Technical Report 50501-1:2007)

ISSN 1651-1417

ICS 35.240.60; 45.020

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Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

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Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CLC/TR 50501-1

May 2007

ICS 35.240.60; 45.020

English version

Railway applications – Rolling stock – Intercommunication between vehicles and train/wayside – Part 1: Data dictionary and rules for functional standardisation

Applications ferroviaires – Matériel roulant – Communications entre véhicules et communications sol/train – Partie 1: Dictionnaire de données et règles pour la standardisation fonctionnelle

Bahnanwendungen – Bahnfahrzeuge – Datenaustausch zwischen Fahrzeugen bzw. Zug/Strecke – Teil 1: Datenkatalog und Regeln für die funktionale Standardisierung

This Technical Report was approved by CENELEC on 2007-01-01.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. CLC/TR 50501-1:2007 E

Foreword

This Technical Report was prepared by SC 9XB, Electromechanical material on board rolling stock, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to vote and was approved by CENELEC as CLC/TR 50501-1 on 2007-01-01.

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Introduction

Survey Group SC9XB/SGB1 conclusions

From the conclusion of the works of Survey Group SC 9XB/SGB1, in document CLC/SC9XB(Sec)174 (Bibliography [9]), a series of standards is to be prepared, with the following guiding principles:

- the overall objective is to develop standards for data exchange involving railway vehicle consists, between themselves or with fixed installations;
- standardisation is focussed to what is necessary for implementing interoperability as defined in Directive 2001/16/EC (on the interoperability of the Trans-European conventional railway system), and as will be specified by the bodies in charge of drafting Technical Specifications for Interoperability (TSI);
- the scope of the work is then limited to international Passenger trains and freight trains in The Trans-European conventional rail system, excluding the signalling and control-command subsystem. This does not explicitly exclude High Speed Trains (HST), but excludes formally trams, metros and urban or suburban trains.

Separate functional standards will be established for freight and Passenger trains. Requirements for interoperability, including those specified in a set of Technical Specifications for Interoperability (TSI), are different for these two categories of rolling stock.

The series of standards has been structured as follows, with four categories:

- STD1: data dictionary and rules for functional standardisation;
- STD 2: functions in freight traffic (for a selected set of functions);
- STD 3: functions in passenger traffic (for a selected set of functions);
- STD 4: standardisation of communications procedures.

This document is the first part, in category STD1, of the series of functional standards, aiming to define a common modelling framework, to be used for the development of the subsequent standards: common methods and rules, a unique Reference Architecture, and common Data Dictionary.

The Trans-European conventional rail system

Trans-European conventional rail system shall be considered as defined in Article 2 of the Council Directive 2001/16/EC on the interoperability of the Trans-European conventional railway system:

For the purposes of this Directive: "Trans-European conventional rail system" means the structure, as described in Annex I, composed of lines and fixed installations, of the Trans-European transport network, built or upgraded for conventional rail transport and combined rail transport, plus the rolling stock designed to travel on that infrastructure.

The Trans-European rail system is broken down into subsystems, as described in Annex II of the Directive:

a) structural area
   - *infrastructure*, in particular access / egress points that define the boarders of an infrastructure managed by a given organisation, and also shunting, freight terminals and stations,
   - *energy*, electrification system…,
   - *control and command and signalling*, to command and control train movement,
   - *traffic operation and management*, including train driving, traffic planning and management,

- *rolling stock*, including all train equipment and man-machine interfaces for driver, on-board staff and passengers.

b) operational area

- *maintenance*, including logistics centres for maintenance work and reserves for corrective and preventive maintenance,
- *telematics applications*: freight services and passenger services (including passenger information, reservation and payment, luggage management, connections between trains and other modes of transport).

Examples of functions to be standardised

NOTE In the following informal function descriptions, interface ”type B” (“train level to consist level”, named also “train to consist” for short), and interface ”type C” (train to ground) are used (see Figure 1 in 4.4.2).

1) Dynamic passenger information system. Refer to [14], a contribution of TrainCom European Research Project (ref: IST-1999-20096), proposing a detailed XML specification of messages that are exchanged between vehicles and with the ground. This specification covers all characteristic features of the rail environment, including its dynamic aspects.

2) Maintenance: Euromain European Research Project (ref: IST-2001-34019) proposes detailed XML specifications for data, and including the definition of functions for real time monitoring, data collection and statistics.

3) Passenger emergency brake: The Technical Specification for Interoperability (TSI) relating to the rolling stock subsystem (High Speed)) gives requirements for this function. This is a train level function. If the train is formed by several coupled consists, an interface “train to consist” (type B) is involved. A communication with the ground is also possible: interface “train to ground” (type C).

4) “Stabled ready for use”: This is a train level function, ensuring that a train composition is ready for service when required. If the train is formed by several coupled consists, an interface “train to consist”, (type B) is involved. A communication with the ground is also possible for triggering train preparation: “ground to train” interface (type C).

5) Control of passenger lighting: Control of lighting from the driver cab, for two consists coupled together. There are in addition some local controls in each coach.

Level of services for the lighting system may be different for the two consists

- version 1, with two levels of lighting: full, reduced,
- version 2, with three levels of lighting: full, reduced, and night.

The issue raised by this example is one problem of interoperability among a set of heterogeneous consists.

EXAMPLE
When the driver is in the consist which is fitted with version 1, how to specify the interface between consists, in order to have an acceptable behaviour in the other consist fitted with version 2.

Two alternative solutions are

- each consist should be able to interpret in its own way every possible command issued by another leading consist. For instance, a consist fitted with version 1 will set “reduced level” when receiving a “night level” command,
- the driver could control each consist after having “imported” on the cab MMI the specific control interface of the given consist.

6) Train integrity (completeness of train)

Some possible solutions to check the completeness of the train may use

- connector at the end of the train,
- with GPS + EGNOS, precision < 2,5 m possible,
- GPS with integrated inertial system.

The positions at the train extremities are measured, and compared to the train length obtained by summing all vehicles lengths, obtained for configuration data stored in the UIC gateways. Safety integrity requirement SIL 4 is needed for ERTMS level 3 for train integrity function.

7) Establishing and distributing time and date

A train level function. If there are several consists, clocks have to be synchronised train wide. A problem to solve is how to take into account variable network propagation delay for synchronisation messages. An another issue is standardisation of reference time source, and synchronisation protocols.

8) Establishing and distributing speed

A train level function. Speed data has to be time-stamped. If there are several consists, clocks have to be synchronised train wide (by function distributing time and date). A problem to solve is how to take into account variable network propagation delay.

The precise requirements on this function depends of the various consumers of the speed information, requesting various quality of service.

1 Scope

This Technical Report will define

- requirements for the methods to be used for functional standardisation, in the standards to be prepared for data exchange involving railway vehicles, in two contexts

  1) inter-consists communication, within a train formation,
  2) communication with ground based installations.

- the Reference Architecture defining the essential functional interfaces,

- the concept of a central Data Dictionary/repository to be applied to freight and passenger traffic functions. In this context, data are to be limited to basic information elements, which are necessary to define standard messages required for interoperability, and displayed on the interfaces of the communicating entities. Entering Data Dictionary will provide full definition of a data element, along with its essential attributes at conceptual level.

The purpose, in the perspective of the standards to be prepared, is to document the data element pertinent to the functional area and essential for interoperability, to allow the reuse of data element among functional area systems, and facilitate data interchange among the systems.

NOTE Data Dictionary shall be designed to provide a structural framework that enables continued growth and enhancement of the scope of defined data. Rationale for this requirement is that it is difficult, when defining the scope of a proposed system to fully define the application domain and all included interoperability related data. In addition over time, functional requirements will expand.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Object Management Group Inc. (http://www.omg.org) , July 2004, Unified Modelling Language Specification - version 1.4.2 (OMG reference formal/04-07-02), identical to ISO/IEC 19501:2005(E).

Extensible Markup Language (XML) 1.0 (Third Edition) W3C Recommendation, 4th February 2004, François Yergeau, Tim Bray, Jean Paoli, C. M. Sperberg-McQueen, Eve Maler.