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Railway applications – Communication means between safety equipment and man-machine interfaces (MMI)

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SEK Svensk Elstandard.
Postadress: SEK, Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00. *Telefax*: 08 - 444 14 30
E-post: sek@elstandard.se. *Internet*: www.elstandard.se

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

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SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

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.

SEK Svensk Elstandard
Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

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Railway applications - Communication means between safety equipment and man-machine interfaces (MMI)

Applications ferroviaires - Moyens de communication entre l'équipement de sécurité et l'interface homme-machine (IHM)

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CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

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Foreword

This Technical Report was prepared by the Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

It was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.4.3.3 (simple majority).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

This Technical Report has been prepared under a Mandate M/334 given to CENELEC by the European Commission and the European Free Trade Association.

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Contents

Figures

Tables

Introduction

The purpose of this Technical Report is to show how to harmonise the communication means between onboard signalling safety systems and the driver-machine interface in the driver's desk.

The need for this standardisation has grown out of several trends.

One trend is that the rolling stock is being computerised more and more, enabling sophisticated functions within the rolling stock and various subsystems of the train.

Further, the driver's desk of such rolling stock is built around one or several computer screens [1)]. These allow the driver to interact with the computerised rolling stock functions. The user interfaces are typically user friendly, feature e.g. graphics and colours.

In case of degraded situation (screen failure) and with several screens available on the desk, it should be possible to relocate important information to a screen that is still working. This improves operational availability.

Another trend is the harmonisation of onboard signalling safety equipment. The ERTMS/ETCS as defined by the directive 96/48/EC and the related Control-Command TSI defines a control-command signalling system on European level.

For ERTMS/ETCS onboard, the driver-machine interface is also based on computerised screen(s).

The ERTMS/ETCS defines the concept of Specific Transmission Module STM, allowing the existing national control-command systems to be modified into an STM. This allows integration between national control-command systems and ERTMS/ETCS onboard equipment via a standardised interface (FFFIS STM).

Since desk space is a limited resource, the STM concept allows national onboard control-command systems to use the driver machine interface resources of ERTMS/ETCS. This is one aspect of the integration of national equipment with ERTMS/ETCS onboard.

Therefore the ERTMS/ETCS driver machine interface allows the driver to interact with any of the installed STMs or/and ERTMS/ETCS onboard. The selection of the active system is a responsibility of ERTMS/ETCS.

A third trend is that a European market is opened for control-command equipment as well as rolling stock.

Traditionally, control-command systems were generally linked to a country, and rolling stock was equipped with one or more national signalling safety system. This has effectively limited the rolling stock to operate within a limited number of countries.

The ERTMS/ETCS, in combination with STMs makes available onboard signalling safety equipment that enables cross-border traffic, freeing rolling stock from this barrier.

There are indeed other barriers hindering cross-border traffic, being operational, technical or administrative. They are gradually being overcome. One example is the interoperable voice radio, EIRENE, based on GSM-R.

[1)] In this Introduction the term "screen" is used in a popular sense, implying e.g. touch screen or other means of input from driver.

The combination of the above trends leads to the conclusion that during train operation, ERTMS/ETCS must have access to one of the screens in the desk. Further, it is desirable to maintain the advantages of multi-screen installations created by train system providers, allowing the ability to change screen for ERTMS/ETCS in case of screen failure. Thus a certain level of integration and harmonised communication is called for.

Another motivation for this Technical Report is related to Life Cycle Cost. The interface shown here helps replacement of screen and desk equipment through the lifetime of the vehicle, whatever is the supplier.

1 Scope

This Technical Report defines, in accordance with the ERTMS/ETCS requirements:

a) for each DMI function to be exchanged to and from the driver, including ETCS, STM:

— performances needed;

— degraded modes recovering;

b) DMI Safety targets;

c) communication system requirements:

— real-time capability;

— performances (bandwidth, etc.);

— expansion capability;

— RAMS;

— applicable standards;

— degraded modes;

— degraded modes management;

— interface with other systems;

— LCC requirements.

Each item in the list above corresponds to one chapter of the present document.

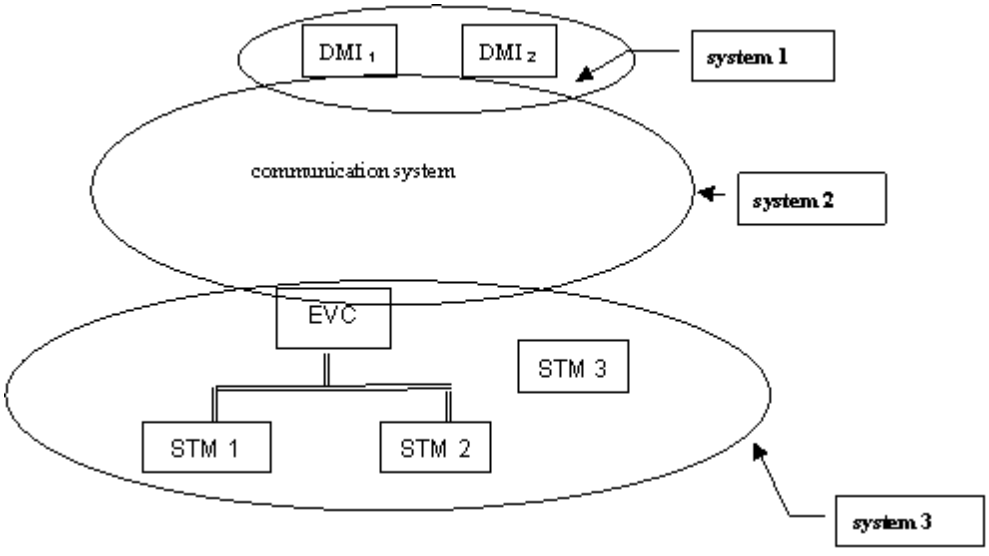

Figure 1 - Systems concerned by this document

This Technical Report does not cover the following items:

— Train functions;

— STM “Separate DMI” as defined in document [1] regarding DMI equipment that is part of the STM itself;

— GSMR EIRENE functions;

— Ergonomics;

— Use of the ETCS DMI as a terminal server for maintenance purpose.

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.

96/48/EC, *Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system*

EN 50128, *Railway applications - Communication, signalling and processing systems - Software for railway control and protection systems*

EN 50129, *Railway applications - Communication, signalling and processing systems - Safety related electronic systems for signalling*

EN 50155, *Railway applications - Electronic equipment used on rolling stock*

EN 50159-1, *Railway applications - Communication, signalling and processing systems - Part 1: Safety-related communication in closed transmission systems*

EN 50159-2:2001; *Railway applications - Communication, signalling and processing systems - Part 2: Safety-related communication in open transmission systems*

CLC/TS 50459-2, *Railway applications - Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 2: Ergonomic arrangements of ERTMS/ETCS information*

CLC/TS 50459-6, *Railway applications - Communication, signalling and processing systems - European Rail Traffic Management System - Driver-Machine Interface - Part 6: Audible information*