



SLOVENSKI STANDARD

SIST-TP CLC/TR 50542-1:2014

01-december-2014

Nadomešča:

SIST-TP CLC/TR 50542:2010

Železniške naprave - Krmilnik vlakovnega prikazovalnika v strojevodjemem prostoru - 1. del: Splošna arhitektura

Railway applications - Driver's cab train display controller (TDC) - Part 1: General architecture

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST-TP CLC/TR 50542-1:2014](https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-3319/sist-tp-clc-tr-50542-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-3319/sist-tp-clc-tr-50542-1-2014>

Ta slovenski standard je istoveten z: CLC/TR 50542-1:2014

ICS:

35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade
45.020	Železniška tehnika na splošno	Railway engineering in general

SIST-TP CLC/TR 50542-1:2014

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST-TP CLC/TR 50542-1:2014](https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014>

TECHNICAL REPORT
RAPPORT TECHNIQUE
TECHNISCHER BERICHT

CLC/TR 50542-1

October 2014

ICS 35.240.60; 45.020

Supersedes CLC/TR 50542:2010

English Version

**Railway applications - Driver's cab train display controller (TDC)
- Part 1: General architecture**

This Technical Report was approved by CENELEC on 2014-06-30.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST-TP CLC/TR 50542-1:2014](https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014>



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
Foreword.....	- 3 -
Introduction	- 4 -
1 Scope	- 6 -
2 Normative references	- 7 -
3 Terms and definitions	- 7 -
4 Symbols and abbreviations	- 8 -
5 Functions.....	- 9 -
5.1 Definitions	- 9 -
5.1.1 General.....	- 9 -
5.1.2 From TDC to connected systems.....	- 9 -
5.1.3 From connected systems to TDC.....	- 10 -
5.1.4 Delays	- 10 -
5.2 Function analysis.....	- 12 -
5.2.1 Function failure modes and failure effects	- 12 -
5.2.2 Failure modes and effects	- 13 -
6 Safety targets	- 16 -
7 Certification	- 18 -
8 TDC general description	- 18 -
8.1 General.....	- 18 -
8.2 Information destination	- 18 -
8.3 Second source	- 19 -
8.4 TDC maintenance and LCC.....	- 19 -
8.5 Safety and reliability targets.....	- 20 -
8.6 TDC DMI redundancy management	- 20 -
8.7 TDC recommended architecture	- 20 -
8.7.1 Constraints	- 20 -
8.7.2 TDC architecture examples	- 21 -
Annex A (informative) Actions	- 24 -
A.1 Introduction	- 24 -
A.2 From TDC to connected systems.....	- 25 -
Bibliography.....	- 26 -

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST-TP CLC/TR 50542-1:2014

[https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-](https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014)

[4aa1d88313f9/sist-tp-clc-tr-50542-1-2014](https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014)

Foreword

This document (CLC/TR 50542-1:2014) has been prepared by CLC/TC 9X "Electrical and electronic applications for railways".

This document supersedes CLC/TR 50542:2010.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST-TP CLC/TR 50542-1:2014](https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014>

Introduction

The purpose of this Technical Report is to propose harmonisation for communication between the DMIs and the train systems on the driver's desk.

The need for this harmonisation 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.

Furthermore, the driver's desk of such rolling stock is built around one or several computer screens¹. These allow the driver to interact with the computerised rolling stock functions. The user interfaces are typically user friendly, featuring 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.

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 integration of national control-command systems into the ERTMS/ETCS onboard system via a standardised interface.

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. For this purpose the ERTMS/ETCS driver machine interface allows the driver to interact with any of the installed STMs connected by STMs specification or/and ERTMS/ETCS onboard.

A third trend is that a European market is opened for control-command and TCMS equipments 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 control-command systems. This has effectively limited the rolling stock to operate within a limited number of countries.

The ERTMS/ETCS, in combination with STMs enables cross-border traffic, freeing rolling stock from this barrier.

The combination of the above trends leads to the conclusion that during train operation, TCMS need to have access to the screens on the desk. Furthermore, it is desirable to maintain the advantages of multi-screen installations, allowing the ability to switch to another screen in case of screen failure for information to be still displayed. Thus a certain level of integration and harmonised communication is demanded.

Another motivation for this Technical Report is related to Life Cycle Cost. The recommendations written here simplify the replacement of screens and desk equipment through the lifetime of the vehicle, independent of the supplier.

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.

This document is the first one of a series of three documents:

CLC/TR 50542-1 *Railway applications — Driver's cab Train Display Controller (TDC) — General architecture*

pr TR50542-2 *Railway applications — Driver's cab Train Display Controller (TDC) — Display systems FIS*

pr TR50542-3 *Railway applications — Driver's cab Train Display Controller (TDC) — Other systems FIS*

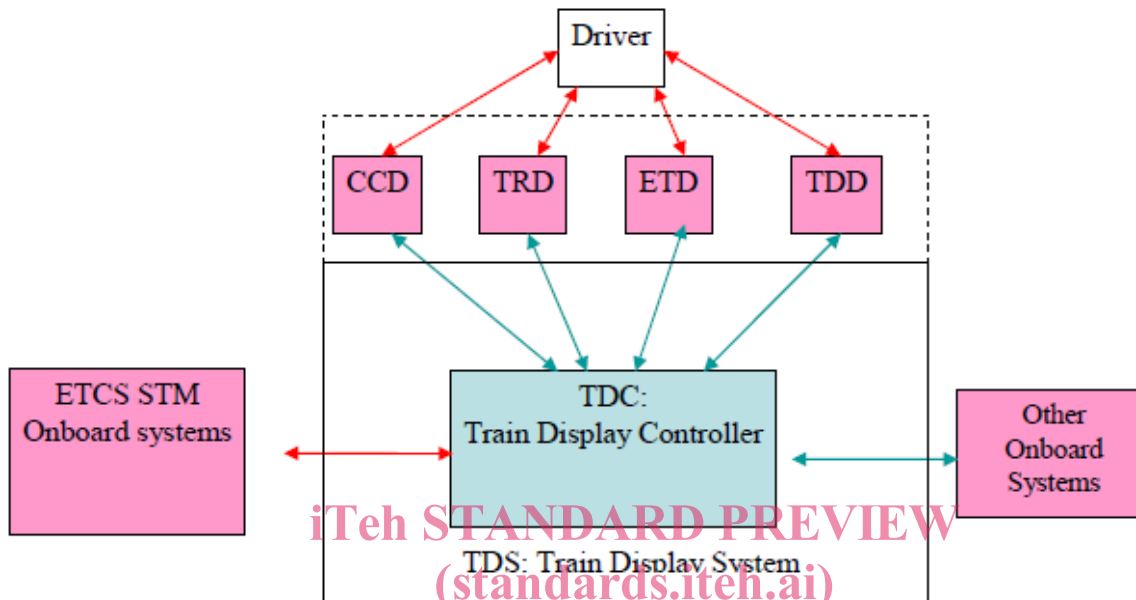
iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST-TP CLC/TR 50542-1:2014](https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/188cade7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014>

1 Scope

In accordance with the ERTMS/ETCS specifications, Subset 121, UIC 612 leaflet, ERA ERTMS-015560 3.3.0 document, EN 50126 and EN 61375 series requirements, this Technical Report describes the Train Display System (TDS) in the driver's cab, and the link between the TDS/TDC and some of its interfaces (Blue box and blue links only):



SIST-TP CLC/TR 50542-1:2014
 Figure 1 — Terms and definitions
<https://standards.iteh.ai/catalog/standards/sist/186c4dc7-46b5-4838-ad99-4aa1d88313f9/sist-tp-clc-tr-50542-1-2014>

The scope of the Train Display System (TDS) thus includes:

- Functions, except functions defined in the ETCS Subset 121. These functions describe exchanges between TDC and the connected display systems;
- Performance allocation (RAMS included as per EN 50126): for each function defined in item a), defining the performances needed and the degraded modes recovering;
- Needs for certification: description of special requirements to avoid ETCS recertification after other display system modification;
- Train Display Controller (TDC):
 - Redundancy management;
 - Architecture;
- For each system connected (except those defined in ETCS Subset 121): the Functional Interface Specification (FIS).

This Technical Report excludes the following items:

- Communication protocols (e.g. EN 61375 series);
- Ergonomic aspects;
- Interface with ETCS (Subset 121);
- Train functions;
- GSMR EIRENE functions;

- Use of the displays as terminals for maintenance purpose.

2 Normative references

Not applicable.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

Driver Machine Interface

display used to give information to the driver. It contains the hardware and software means to support inform the driver

Note 1 to entry: Information is carried through this interface in the form of visual (light), acoustic and tactile (driver's pressing of buttons).

3.2

button event

pressing or releasing a button

3.3

button

operating element for interaction with the cab display (hard key, soft key, sensitive area)

3.4

cab display

hardware device or system that shows text and/or graphic information to the user

3.5

hard key

physical key with permanent marking and not part of the screen area

Note 1 to entry: This permanent marking may be alpha and/or numeric and/or a symbol.

3.6

indicator

element designed to draw attention to a cab system status which requires a response

3.7

sensitive area

enabled area on a touchscreen on which a physical action is possible in order to give input to the cab display

3.8

soft key

context-dependent key consisting of a combination of a hard key and an associated screen label (text or symbol)

Note 1 to entry: This key is for multifunctional use.

3.9**label**

symbol or text indication on or close to an indicator or a button

3.10**Train Display Controller (TDC)**

equipment used to manage information between displays on the driver's desk and the train

Note 1 to entry: TDC is called DCU (Display Control Unit) in UIC 612 leaflet series. See bibliography.

3.11**Train Display System (TDS)**

TDS consists of the TDC and the related interfaces. Dotted line in Figure 1 — Terms and definitions, represents the limit between driver and the TDS

4 Symbols and abbreviations

CCD	Control Command Display
DMI	Driver Machine Interface
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
ETD	Electronic Timetable Display
EVC	European Vital Computer
FMEA	Failure Mode and Effects Analysis
FIS	Functional Interface Specification
FSV	Function/Task Supervision
HW	Hardware
LCC	Life Cycle Cost
MTBF	Mean Time Between Failures
RAM(S)	Reliability, Availability, Maintainability, (Safety)
SIL	Safety Integrity Level
STM	Specific Transmission Module
SW	Software
TCMS	Train Control and Monitoring System
TDC	Train Display Controller
TDD	Technical and Diagnostic Display

TDS	Train Display System
THR	Tolerable Hazard Rate
TRD	Train Radio Display

5 Functions

5.1 Definitions

5.1.1 General

The functions described in this document are managed by the TDC and its connected systems. The following subclauses give the list of those functions.

The functions below should be implemented in the interface between the TDC and the connected systems. The interface may contain other functions not described in this document.

5.1.2 From TDC to connected systems

Button request: TDC request to connected system to give driver access to the related button.

Button deletion request: TDC request to connected system to remove driver access to the related button.

Indicator request: TDC request to connected system to display the related indicator.

Indicator deletion request: TDC request to connected system to remove the related indicator.

Text message request: TDC request to connected system to display a text message. The request can consist of a reference to a text, or it can include the text itself.

Text message deletion: TDC request to connected system to remove a text message.

Sound on request: TDC request to connected system to start playing acoustic information to the driver.

Sound off request: TDC request to connected system to stop playing acoustic information to the driver.

Data entry request: TDC request to connected system to ask the driver to enter one or several data. The request can contain one or more data values (e.g. default or current values) that can be modified by the driver, and a text identifying the data for the driver.

Data confirmation request: TDC request to connected system to ask the driver to confirm one or several data. The request can contain one or more unconfirmed data values (e.g. recently given by the driver).

Dataview request: TDC request to connected system to display data to the driver.

Dataview deletion request: TDC request to connected system to remove data from the display.

Continuous dataview request: TDC request to connected system to display continuously changing data (e.g. speed, target distance).

Continuous dataview deletion request: TDC request to connected system to remove continuously changing data (e.g. speed, target distance) from the display.