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Railway applications - Train Modes functional interface specification

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Railway applications - Train Modes functional interface specification

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Foreword

This document (CLC/TR 50610:2014) has been prepared by WG15 of the Technical Committee CENELEC TC 9X, "Electrical and electronic applications for railways".

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

The text was obtained as transposition of the functional interface specification FIS TrainmodesRpt_V32007 09 3 produced as output of the European research project MODTRAIN.

1 Scope

The scope of this Technical Report is to provide an overview of the Train Modes, their management and their functional interfaces.

2 Normative references

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

UIC 438, *Uniform numerical marking of railway rolling stock*

UIC 556, *Information transmission in the train (train bus) - General dispositions*

UIC 612-1, *Rolling Stock configurations and main activated functions for EMU/DMU, Locomotives and Driving Coaches – Operational configurations and driver procedures*

3 Terms, definitions and abbreviations

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

3.1 Terms

3.1.1
configuration
action which affects the system function

3.1.2
parameterisation
action which affects the system behaviour

3.2 Abbreviations

All the abbreviations used in this document are listed in Table 1, in alphabetic order referenced to their term.

Table 1 - Abbreviation table

Abbreviation	Term
ASC	Automatic Speed Control
DDU	Driver Display Unit
ETCS	European Train Control System
FBS	Functional Breakdown Structure
FI	Functional Interface
HV	High Voltage
HVAC	Heating Ventilation Air Conditioning
ID	Identity
LV	Low Voltage
PBS	Product Breakdown Structure
SL	Sleeping mode
STM	Specific Transmission Module (as part of ETCS)
SW	Software
TCMS	Train Control & Monitoring System
TCS	Traction Control System
TDD	Technical and Diagnostic Display
UML	Unified Modelling Language
WSP	Wheel Sliding Protection

4 TrainModes

4.1 General

The train modes describe the operational state of the train.

This report describes the train modes components and their management.

4.2 TrainModes_Components

4.2.1 General

With reference to Figure 1, the diagram shows the relation between the management of cabs and the relevant train modes.

The management of train-wide operational modes uses information from several other train-wide functions and issues commands to them.

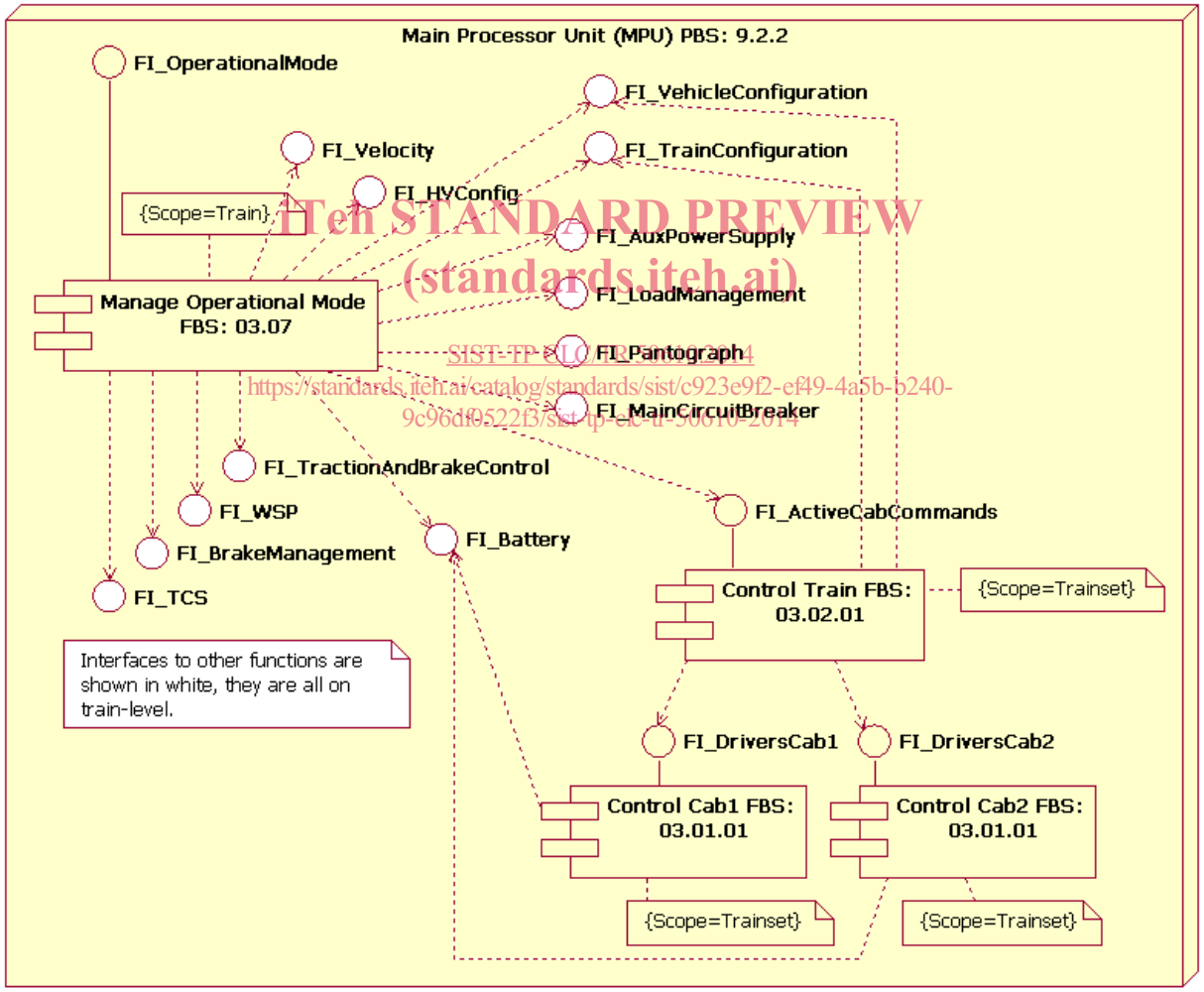

Figure 1 - Management of cabs and relevant Train Modes

4.2.2 Manage Operational Mode FBS: 03.07

This block represents the function to manage the train-wide operational modes.

4.2.3 Control Cab1 FBS: 03.01.01

This block represents the local function managing the modes of a single driver's cab. This function is local within a trainset.

4.2.4 Control Cab2 FBS: 03.01.01

This block represents the local function managing the modes of a single driver's cab. This function is local within a trainset.

4.2.5 Control Train FBS: 03.02.01

This block represents the function which is managing the modes of the driver's cabs in a trainset and the command issued from the cabs and information sent to the cabs.

4.3 TrainModes_Logical

4.3.1 General

This sub-clause describes the Interfaces, classes and behaviour of train modes.

Figure 2 shows the other functions and subsystems involved in the train modes management. Furthermore the figure shows the signals which cause the entering and leaving of train modes.

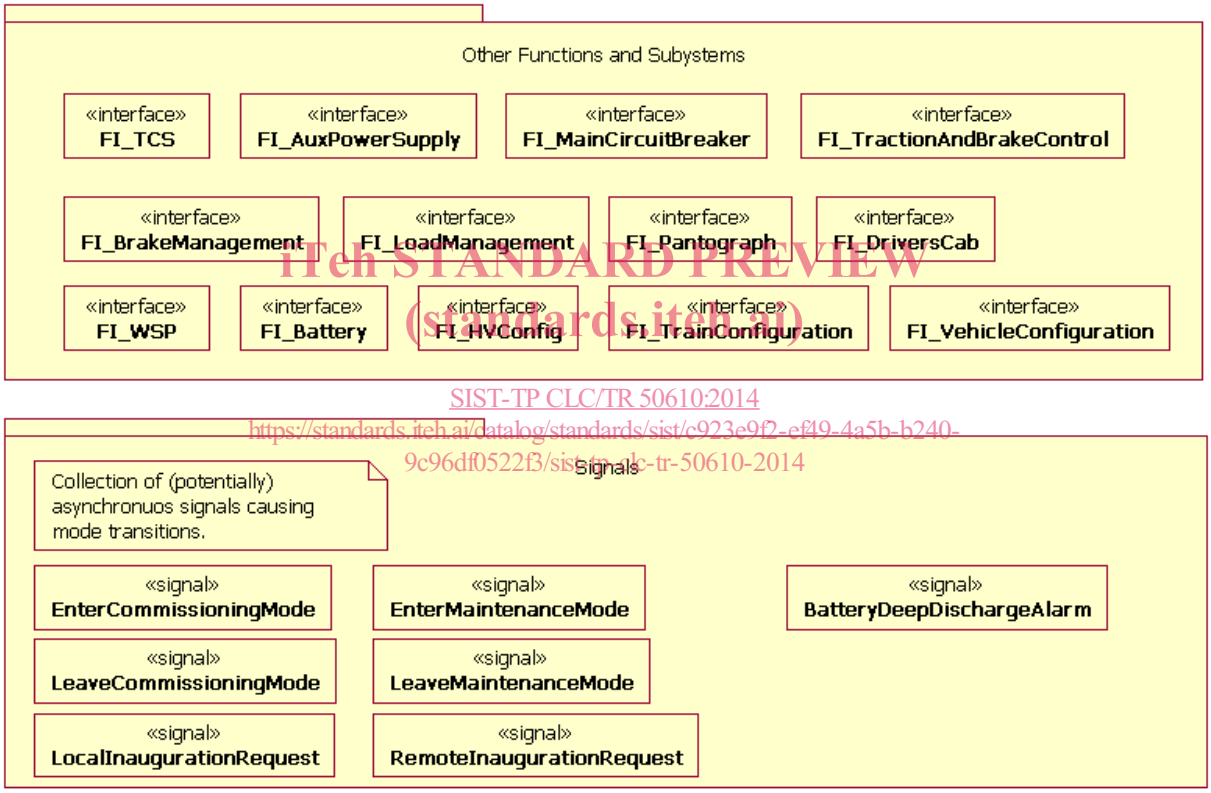

Figure 2 - Interfaces to other functions and subsystems and signals to enter/leave modes

Figure 3 shows the UML diagram of the common interface between the drivers cab and the relevant train modes.

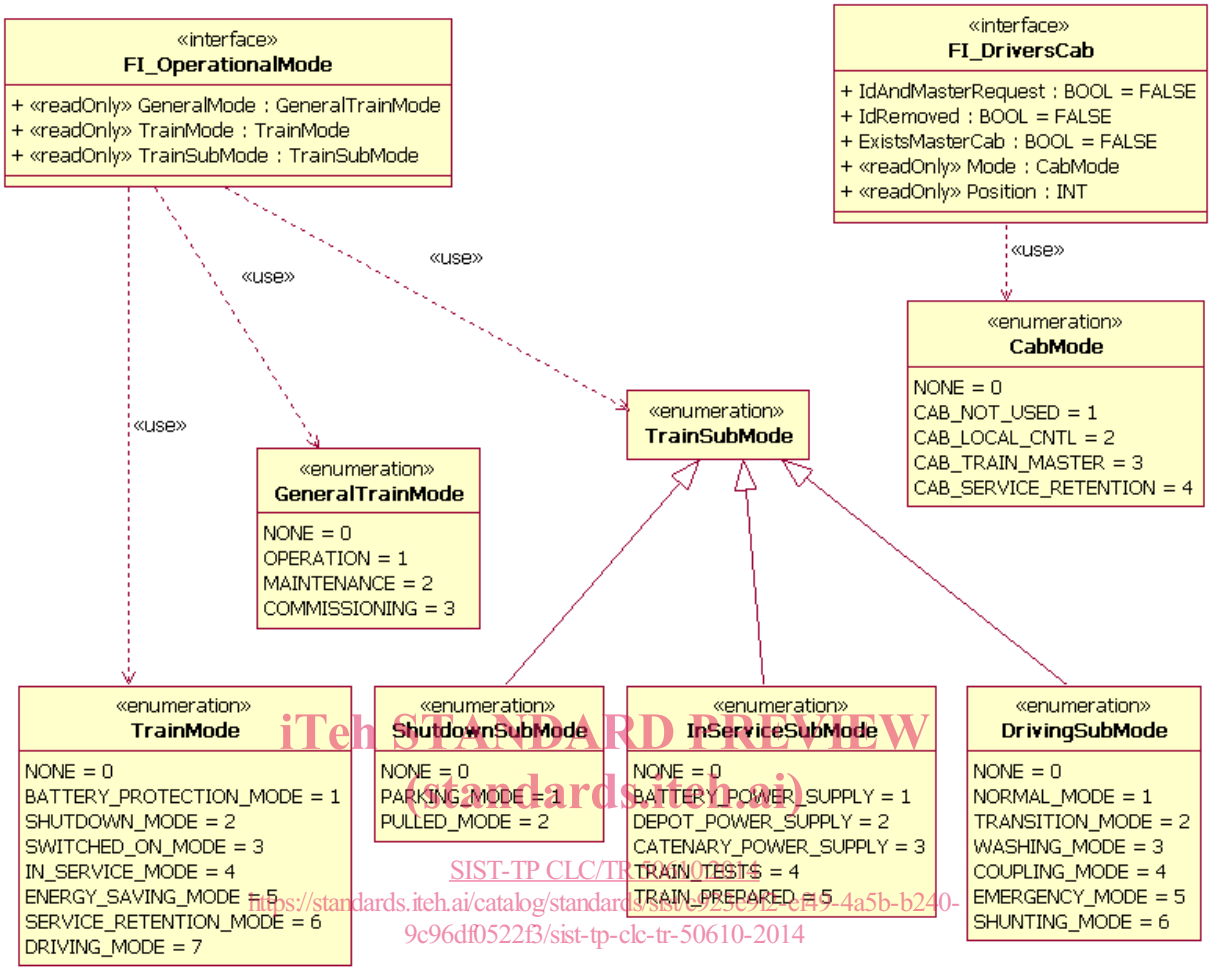

Figure 3 - Common interface between the drivers cab and the relevant train modes

4.3.2 <Interface> FI_DriversCab

The interface FI_DriversCab is specified by a collection of variables showing the current mode of a single driver's cab and commands issued from that cab. Table 2 lists such variables.

Table 2 - FI_DriversCab interface variable

Attribute	Visibility	Type	Description
IdAndMasterRequest	0 - PUBLIC	BOOL	Indicates the insertion of the id card, thus requesting train-wide master role for the cab; this is input from the HW.
IdRemoved	0 - PUBLIC	BOOL	Indicates the removal of the Id card; this is input from the HW.
ExistsMasterCab	0 - PUBLIC	BOOL	The status of ExistsMasterCab is usually set/reset by the insertion/removal of the driver's id card in exactly one cab on the train; this is input from the train- and trainsetwide HW-trainlines.
Mode	0 - PUBLIC	CabMode	Current mode of the cab.
Position	0 - PUBLIC	INT	Fixed position of the cab (end 1 or

Attribute	Visibility	Type	Description
			end 2 of the vehicle).

4.3.3 <Interface> FI_ActiveCabCommands

This interface routes the commands from the active driver's desk.

4.3.4 <Interface> FI_CabCommands

This interface routes the commands from a single driver's cab.
Table 3 lists the driver's cab commands.

Table 3 - Driver's cab commands

Attribute	Visibility	Type	Description
RequestCoupling	0 - PUBLIC	BOOL	Indicates the request for a transition into coupling mode.
RequestShunting	0 - PUBLIC	BOOL	Indicates the request for a transition into shunting mode.
RequestWashing	0 - PUBLIC	BOOL	Indicates the request for a transition into washing mode.
RequestTransition	0 - PUBLIC	BOOL	Indicates the request for a transition into transition mode.
RequestEmergency	0 - PUBLIC	BOOL	Indicates the request for a transition into emergency mode.
EnergySavingRequest	0 - PUBLIC	BOOL	Indicates the request for a transition into energy saving mode.

4.3.5 Other Functions and Subystems

4.3.5.1 <Interface> FI_VehicleConfiguration

This interface provides the access to the configuration data of the vehicle in term of UIC-556 vehicle attributes.

Table 4 provides a definition of the configuration data.

Table 4 - Configuration data over the interface FI_VehicleConfiguration

Attribute	Visibility	Type	Description
VehicleConfiguration	0 - PUBLIC	VehicleProperties	Attributes specifying the current configuration and properties of the vehicle (such as UIC 556 static and dynamic attributes).

4.3.5.2 <Enumeration> VoltageType

The definition of the voltage types is provided by Table 5.

Table 5 - List of VoltageType

Literal	Value	Description
Default	0	Voltage system type not specified / not needed.
DC	1	Voltage system type is DC.
AC	2	Voltage system type is AC.

4.3.5.3 <Enumeration> EnergySource

The definition of the energy sources is provided by Table 6.

Table 6 - List of EnergySource

Literal	Value	Description
None	0	Source not specified / not needed.
Battery	1	Energy source is battery or battery network.
DepotPowerSupply	2	Energy source is (external) power supply from the depot.
Catenary	3	Energy source is catenary.
DepotPowerSupply2	4	Energy source is another (external) power supply from the depot. To be used if there are additional depot power supply systems (e.g. wire and trolley).
Catenary2	5	Energy source is another catenary. To be used, if there are two catenary systems.

4.3.5.4 <Enumeration> CountryOpCode

The definition of the country codes is provided in Table 7.

The list is according to the UIC 438 leaflet and is provided for giving examples.