

Rail to Digital automated up to autonomous train operation

D13.1

Moving Block Specifications applying a train-centric approach

Introduction

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REPORT CONTRIBUTORS

For the report contributors please refer to the corresponding sections of the Deliverable.

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EXECUTIVE SUMMARY

This Deliverable contains an Architecture description, Requirements, and Hazard Analysis for an ETCS Moving Block System, in accordance with the GA Project 101102001 — FP2 - R2DATO and represents the collaborative WP approach of refining the System Pillar work e.g. CCS architecture and harmonized operational rules to derive a System Specification for a Moving Block System.

This document is a Deliverable from WP13 Moving Block ETCS Level 3 – Specification. The Deliverable consists of four parts. The first part is the introduction, the second part the result of the Task 13.1 - System Definition, the third the result of the Task 13.2 - System Specification and the fourth part the result of the Task 13.3, namely the Safety Analysis.

Work on this deliverable is actively progressing within WP14. As part of this effort, the Safety Analysis is being updated to address the outstanding comment raised by the external reviewer.

ABBREVIATIONS AND ACRONYMS

ATO	Automatic Train Operation
CCS	Control-Command and Signalling
ETCS	European Train Control System
R2DATO	Rail to Digital automated up to autonomous train operation
S2R	Shift2Rail
STPA	System Theoretic Process Analysis
TTD	Trackside Train Detection
WP	Work package

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2 INTRODUCTION

This document introduces the Deliverable 13.1 which consists of three parts corresponding to tasks within the work package. Those parts are shortly described below.

2.1 TASK 13.1: SYSTEM DEFINITION

The objective of this Task (13.1) is to define the signalling system, called Moving Block System, in particular the system objectives, capabilities, boundaries, functions, operational requirements and assumptions in order to cooperate with the Moving Block concept and constitutes the first part of the Deliverable 13.1.

2.2 TASK 13.2: MOVING BLOCK SPECIFICATION – REQUIREMENTS, ENGINEERING, AND OPERATIONAL RULES

Based on the System Definition the purpose of this task is to analyse the impact of the System Pillar on System Requirements and to develop a Moving Block Specification. The work on the Moving Block Specification is organized in an iterative and incremental fashion in five releases. The first three releases are planned for WP13 and releases 4 and 5 are planned for WP14. The contents of each release are defined in collaboration with the stakeholders (e.g. prototype developers and the demonstrators WP). Each release leads to an intermediate and reviewed version of the Moving Block Specification.

2.3 TASK 13.3: MOVING BLOCK SAFETY ANALYSIS

The subject of this task was the safety analysis for the “Moving Block System” (MBS) that has been specified in Tasks 13.1 and 13.2. To move a step beyond what was previously done in S2R (e.g., in-depth analysis of relevant operational scenarios) a novel method – called System Theoretic Process Analysis (STPA) - was applied to the matter. This STPA focuses on “unsafe control actions” in control and feedback loops within complex systems. An advantage over previous methods is the potential to identify emergent risks stemming from the interaction between those (sub)systems, which are often overlooked.

3 CONCLUSIONS

The aim of this Deliverable is to define the System Architecture, Requirements and a Safety Analysis for a Moving Block System based on a train-centric approach using Full Moving block principles with Trackside Train Detection (TTD).

The Deliverable serves as a basis for prototype development of a Moving Block System and the alignment process with the System Pillar to define the CCS target architecture.

The work on the System Definition, Specification and Safety Analysis will be continued in WP14 Task 14.4.