# IEEE Recommended Practice for Communications-Based Train Control (CBTC) System Design and Functional Allocations

## IEEE Vehicular Technology Society

Sponsored by the
Rail Transit Vehicle Interface Standards Committee

1474.3™

IEEE
3 Park Avenue
New York, NY 10016-5997, USA

3 September 2008

**IEEE Std 1474.3™-2008**

# IEEE Recommended Practice for Communications-Based Train Control (CBTC) System Design and Functional Allocations

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**IEEE Rail Transit Vehicle Interface Standards Committee**

of the

**IEEE Vehicular Technology Society**

Approved 12 June 2008

**IEEE-SA Standards Board**

**Abstract:** This recommended practice for communications-based train control (CBTC) system design and functional allocations builds on IEEE Std 1474.1 by decomposing each identified automatic train protection, automatic train operation and automatic train supervision function to a level where each subfunction can be allocated to one of the CBTC subsystems.

**Keywords:** automation, communication, signaling, train control, function

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA



PDF: ISBN 978-0-7381-5772-6 STD95808
Print: ISBN 978-0-7381-5773-3 STDPD95808

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## Introduction

This introduction is not part of IEEE Std 1474.3-2008, IEEE Recommended Practice for Communications-Based Train Control (CBTC) System Design and Functional Allocations.

IEEE Std 1474.1-2004 establishes performance and functional requirements for communications-based train control (CBTC) systems. Although there could be many possible system designs to achieve these performance and functional requirements, the current state-of-the-art and industry trends reflect that in many areas there is a preferred approach to allocating the functional requirements to the individual CBTC subsystems. This recommended practice for CBTC system design and functional allocations documents these preferred approaches as current best industry practice. In those areas where there are no clear-cut recommendations, alternative approaches may be described. In such cases, however, it is not the intent to provide any recommendation or guide as to which alternative approach should be selected for a specific application. This decision would typically be made by the CBTC system supplier, in association with the authority having jurisdiction.

The approach adopted in this recommended practice is to build on IEEE Std 1474.1-2004 by decomposing each identified automatic train protection, automatic train operation, and automatic train supervision function to a level where each subfunction can be allocated to one of the CBTC subsystems.

In addition to capturing best industry practice, this recommended practice is intended to be of value in providing a means for interested parties to gain a better understanding of CBTC system architectures and principles of operation.

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## Contents

# IEEE Recommended Practice for Communications-Based Train Control (CBTC) System Design and Functional Allocations



## 1. Overview

### 1.1 General

This recommended practice establishes the system design and functional allocations for a communications-based train control (CBTC) system. It is divided into nine clauses, as follows:

- Clause 1 describes the scope and purpose of this recommended practice.
- Clause 2 lists normative references that are useful in applying this recommended practice.
- Clause 3 provides definitions that are either not found in other IEEE standards or have been modified for use with this recommended practice.
- Clause 4 provides a top-level description of operations and train operating modes to be supported by CBTC systems.
- Clause 5 defines the general system architecture and principles of operation for CBTC systems.
- Clause 6 defines the detailed automatic train protection (ATP) functional requirements for CBTC systems, including allocation of subfunctions to CBTC subsystems.
- Clause 7 defines the allocation of automatic train operation (ATO) subfunctions.
- Clause 8 defines the allocation of automatic train supervision (ATS) subfunctions.
- Clause 9 summarizes the primary data flows between CBTC subsystems.