



U.S. Department of Transportation
Federal Transit Administration



Rail Transit Shared Use and Control Systems Study

Background

The Federal Railroad Administration (FRA) of the U.S. Department of Transportation (USDOT) has jurisdiction over the general railway system to provide for the safe operation of the nation's railroads. In recent years, as the need for public transit has grown, many urban areas have been seeking to use railroad rights-of-way or trackage for transit. USDOT has been receptive and supportive of such increased use; however, it has recognized that such shared use poses safety concerns, of which the two most significant are the enforced separation of trains and the standards for vehicle crashworthiness.

Public transit operators have indicated a desire to use the newer types of non-compliant rail vehicles, primarily light rail vehicles, and while regulations have been established for enforced separation of trains and for standards for crashworthiness on the general railway system, commingling of crashworthy compliant and non-compliant vehicles in each shared corridor has thus far been handled on an individual basis. This usually temporally separates the classes, generally a light rail passenger vehicle and a heavier freight vehicle. Typically, passenger services run during the day and freight at night, providing for safe operation, but limiting the services of each.

Responding to the head-on collision in Chatsworth in September 2008 between a Metrolink passenger train and a Union Pacific Rail Road freight train, the U.S. Congress incorporated in the Rail Safety Improvement Act of 2008 requirements for positive train control (PTC) systems. The FRA has implemented new regulations for railroads to deploy PTC systems to prevent train-to-train collisions, derailments due to overspeed, routing of trains through misaligned switches, and protection of work zones. These capabilities of PTC have prompted interest in determining if PTC systems could have the additional benefit of facilitating concurrent shared use operation.

Objectives

With the goal of evaluating the use of PTC to enforce FRA requirements to facilitate improved shared use of the general railway system by compliant and non-compliant vehicles operating on the same and nearby rail tracks and rights-of-way (generally referred to as shared use in this study), the objectives were to 1) review the operating rules that govern shared track operation and temporal separation for currently active temporal separation waivers issued to U.S. commuter and light rail transit systems operating on the general railway system; 2) analyze the functionality of PTC systems and software to automatically enforce the spatial separation and closing speed limitations of compliant and non-compliant trains in shared use operations; 3) document the lessons learned in the development of PTC;

4) evaluate the feasibility, risk, and reliability of current PTC technologies for enforcing the necessary restrictions applicable to shared-use operations; 5) identify the changes needed to signal and PTC systems to enable their use for mitigating the risk of operating compliant and non-compliant trains in shared corridors; and 6) create a template for a demonstration project that would utilize a PTC system for shared use operations.

Findings and Conclusions

There is potential for expanded shared use of the general railway system by non-compliant vehicles based on experience gained from existing shared corridor operations and with the deployment and certain modifications of PTC and the underlying signal system.

The research reviewed the functionality of the three existing PTC systems, namely ATC/ACES (Automatic Train Control enhanced by Advanced Civil Speed Enforcement System) in operation on Amtrak's Northeast Corridor, ITCS (Incremental Train Control System) in operation on Amtrak's Michigan Line and in Illinois, and I-ETMS (Interoperable Electronic Train Management System) now in design, initial installation, and testing in a number of areas outside the northeast U.S. The research identified lessons learned, which included the importance of a complete design, followed by a good pilot program for fine-tuning the finished product before beginning major roll-out.

The research also found that for shared corridor operation, changes will be needed to the PTC systems and the underlying signal systems they enforce. Based on the encouraging findings of this research, the study defined the essentials of a demonstration project that would use cost-effective applications of existing technologies to create practical solutions designed to reduce the risk of commingling non-compatible equipment types to the maximum possible extent.

Benefits

The development of improvements to PTC systems and the underlying signal systems to facilitate increased shared use of the general railway system by non-compliant passenger vehicles offers the potential for the expansion of the nation's public transportation system, providing increased mobility and encouraging economic development and prosperity.

Project Information

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This project was conducted by SYSTRA Consulting, Inc., under the direction of Project Manager Lawrence E. Light. For more information, contact FTA Project Manager Patrick Centolanzi at (202) 366-0234, patrick.centolanzi@dot.gov. All FTA research reports can be found at www.fta.dot.gov/research.