Chapter 1
U.S. Regulatory Requirements for Positive Train Control Systems

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ABSTRACT
Positive Train Control (PTC) Systems are a type of Communications Based Train Control System (CBTC) designed to enhance railroad safety. As a consequence of a series of high profile train accidents in the United States, a statutory mandate for the installation of these systems in high risk areas by the end of 2015 has been established. This chapter identifies the impetus behind the statute, the statutory requirements associated with PTC, the implementing regulations for the statutory requirements, and the current status of regulatory compliance.

INTRODUCTION
Railroads can be found on every continent on the globe except Antarctica carrying passengers and freight. Depending on the country they operate in, railroads are overseen by a variety of governmental, quasi-governmental, and non-governmental agencies. In the United States (U.S.), railroads are regulated by two different agencies of the U.S. Federal government. The first is the Surface Transportation Board (STB), which regulates railroad rates, resolves service disputes, railroad mergers, sales, construction and abandonments. The second is the Federal Railroad Administration (FRA) whose primary function is to promulgate and enforce rail safety regulations. Among the various types of railroad safety systems that are governed by FRA regulation is Positive Train Control (PTC), a form of Communication Based Train Control (CBTC). This chapter will discuss...
PTC in the U.S., its history, and U.S. federal government regulations regarding it use.

The other most significant PTC regulatory efforts undertaken to date worldwide, specifically the European Commission and the European Railway Agency (ERA) efforts with the European Train Control System (ETCS), have been driven to a large extent by the objective of facilitating transnational interoperability by replacing a large number of different existing national train control systems installed across the overwhelming majority of the European rail network with a single harmonized system. The result of the ERA efforts has been the development of a series of increasingly detailed Technical Interoperability Standards (TIS) that define not only the train control system and infrastructure, but the communications infrastructure as well. (EC, 2010)

This differs significantly from the US situation. On roughly 60% of the U.S. rail network, there are no train control systems of any type deployed, and verbal authorities passed to the train crew from the dispatcher control train movements. Additionally, unlike Europe, the US railroads are by and large privately owned and are vertically integrated, owning and operating not only the rolling stock but the underlying infrastructure. As a consequence the US regulatory efforts have not focused on detailed specifications of technical interoperability requirements, but rather on the general performance objectives that any system, regardless of the underlying technology, must meet. Individual U.S. railroads and their suppliers determine the detailed technical requirements for the systems they elect to procure and install as opposed to the federal government.

**BACKGROUND**

Rail operations in the U.S. are predominately freight, with comparatively limited passenger/commuter services. The U.S. rail system is the largest integrated freight and passenger system in the world, operating over 169,000 miles of track (AAR, 2010; IUC 2010). The 563 freight railroads employ almost 170,000 people and operate over 1.2 million freight cars. The 563 freight railroads are dominated by seven “Class 1” railroads; the Burlington Northern and Santa Fe (BNSF), CSX, Kansas City Southern (KCS), Norfolk Southern (NS) Canadian Pacific (CP - Soo Line), Canadian National (CN- Grand Trunk) and Union Pacific (UP). The CP (Soo Line) and CN (Grand Trunk) represent the U.S. operations of the CP and CN Railroads respectively.

The Class 1 freight railroads play a significant role in the U.S. economy. They moved over 1,820 billion ton miles of freight, or 42% of all US freight traffic by revenue mile (DOT, 2007). In contrast, the 27 members of the European Union only moved 447 billion tonne-kilometers, 18.1% of all freight traffic by tone-kilometer (EU, 2010). In terms of operating revenue, the 2009 aggregate revenues of the BNSF, UP, CSX, and NS alone were over $44 billion dollars. If these numbers are viewed as a country, then their combined revenues would rank them as the 72st largest country in the world by Gross Domestic Product (GDP). (IMF, 2010)

Passenger/commuter service in the U.S. is modest, especially when compared to passenger/commuter services elsewhere in the world. The National Railroad Passenger Corporation (Amtrak) provides long distance intercity service. While providing service to 46 states and the District of Columbia, it only has a 22,000 mile network the majority of which is over freight railroad tracks. If included among U.S. airlines in 2008, Amtrak would only rank 8th in the number of passengers served, with only 6.6 Billion revenue passenger miles (FRA, 2010; DOT, 2010). Local commuter service is provided by 23 local agencies. Operating over 8,000 miles of track, they had only slightly over 11 billion revenue passenger miles (APTA, 2010). By comparison, the 27 members of the EU had almost 399 billion revenue passenger kilometers (EU, 2010), or more than 12 times the combined U.S. intercity and commuter passenger miles.
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