Freight Railroads & Positive Train Control (PTC)

PTC is a safety system that tracks the speed and movement of trains and can automatically stop a train to prevent specific human-error accidents. In 2008, Congress passed legislation requiring that PTC be installed on track that carry passengers and certain hazardous materials. The law requires that the technology prevent four specific types of accidents:

- Train-to-train collisions.

- Derailments caused by excessive speed.

- Accidents that can occur if trains are routed down the incorrect track.

- Unauthorized train movements on tracks undergoing maintenance.

How does PTC technology work?

PTC systems must be able to determine the precise location, direction and speed of trains, compare this information with similar details of other trains or other types of restrictions on track use, warn operators of potential changes in operating conditions or conflicts and bring a train to a stop should the engineer fail to act appropriately. A PTC system consists of three main elements integrated by a wireless data communications system that must move massive amounts of information back and forth between the back-office servers, the trackside equipment, and computers on board locomotives. These three elements include:

1. **An onboard or locomotive system** monitors a train's position and speed and activates brakes as necessary to enforce speed restrictions and prevent unauthorized train movements.

2. **A trackside (or "wayside") system** monitors railroad track signals, switches, and track to communicate data needed to permit the onboard system to authorize train movement.

3. **A back-office server** stores all information related to the rail network and trains operating across it (e.g., speed restrictions, train movement authorizations, train compositions, etc.) and transmits this information to individual locomotive onboard enforcement systems.
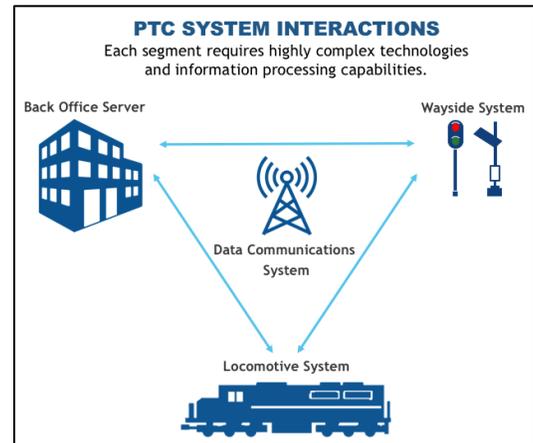
Can a PTC-enabled train still have an accident?

PTC will prevent four specific types of accidents related to human error that were outlined by Congress, but it does not address every potential cause of a rail accident. Railroads approach safety strategically and deploy a variety of methods to address the leading causes of incidents — track, equipment and human error — to help reach the goal of zero accidents.

These plans rely heavily on the continuing development of technology to address the increasingly complex issues that result in track or equipment component failures. There is no substitute for aggressively maintaining and modernizing physical infrastructure and equipment. The rail industry has invested an average of approximately $25 billion a year over the past five years on maintaining and modernizing the rail network, helping make recent years among the safest in rail history.

Key Takeaway

PTC — technology that will reduce the number of human error-caused accidents by automatically stopping or slowing a train — is in operation across 100% of all required passenger and freight route miles nationwide.

PTC SYSTEM INTERACTIONS
Each segment requires highly complex technologies and information processing capabilities.

Back Office Server — Wayside System — Data Communications System — Locomotive System

What is interoperability?

America's rail network is a combination of privately owned freight and publicly owned commuter and passenger systems. It is very common for the trains pulled by the locomotives of one railroad to operate on track that is owned and controlled by another railroad.

Interoperability ensures that individual railroads' PTC systems work together seamlessly no matter which railroad owns the locomotives and track. Put another way, a passenger locomotive operating on a freight railroad's track must behave the same way as that freight railroad's locomotive would on that same track.

How will PTC affect the future of freight rail?

The U.S. freight rail industry has embarked on an exciting new era of innovation. Technology like PTC and automated inspections are helping put the industry's goal of zero accidents within sight. Greater application of technology to address critical safety issues has the potential to compound these benefits.

Beyond safety, PTC systems and their foundational components have the potential to drive further efficiencies and innovation across the nation's rail network. With detailed geomapping, advanced communications systems and upgraded locomotive hardware, railroads have new tools in their ongoing efforts to increase capacity, optimize customer service and reduce fuel use and emissions.

Realizing the full benefit of these future technologies, however, will require modernization of regulations that recognize the value a technologically-advanced rail industry brings to the nation.