

Positive Train Control

An Overview



Recent Rail Accidents

- A series of high-profile rail accidents have focused public attention on the implementation of positive train control (PTC) on the U.S. rail system
 - 2013 Spuyten Duyvil derailment (4 fatalities) (Metro-North)
 - 2015 Frankfort Junction, PA derailment (8 fatalities) (Amtrak)
 - 2017 DuPont Washington derailment (3 fatalities)(Amtrak)
 - 2018 Cayce, South Carolina derailment (2 fatalities) (Amtrak)





DuPont, WA Amtrak derailment – December 18, 2017

What is PTC?

- PTC refers to communication-based/processor-based train control technology that prevents the following occurrences:
 - train-to-train collisions,
 - overspeed derailments,
 - incursions into established work zone limits, and
 - the movement of a train through a main line switch in the improper position
 - as applicable, other additional specified functions:
 - Examples: Stopping a train prior to a known malfunctioning grade crossing, when a derail or switch protecting access to the main line is not in the correct position.



U.S. Statutory Mandate

- The Rail Safety Improvement Act of 2008 mandated that PTC be implemented across a significant portion of the Nation's rail industry by December 31, 2015.
 - Class I railroad main lines (i.e., over which 5 million or more gross tons are transported annually) that handle any poisonous-inhalation-hazardous (PIH) materials
 - any railroad main lines over which regularly scheduled intercity passenger or commuter rail services are provided.
- PTC is expected to be implemented over a total of approximately 70,000 miles of track.



Deadline for implementation

- Congress extended the deadline to December 31, 2018, with the possibility of an extension to a date no later than December 31, 2020, if a railroad completes certain requirements:
 - Installs all PTC hardware and acquires all spectrum necessary to implement its PTC system by December 31, 2018;
 - Submits an alternative schedule and sequence providing for implementation of positive train control system as soon as practicable, but not later than December 31, 2020;
 - Completes employee PTC training; and
 - Initiates revenue service demonstration (RSD) on at least one segment that is required to have its operations governed by PTC.



Other types of rail accidents

- PTC does not prevent all kinds of rail accidents:
 - Derailments caused by a defective track condition and/or debris on the tracks
 - Accidents caused by a train striking a motor vehicle on the tracks at a grade crossing
 - Trespasser Strikes
 - Following train collision – PTC prevents head-on-collisions through the Positive Stop provision but does not address certain low speed rear end collisions.
 - Sideswipe of a derailed train
 - Operations at end of track devices
- Like all systems, PTC systems may fail, but will limit the train speed (for MNR, limited to 79 miles per hour).



Challenges in implementing PTC

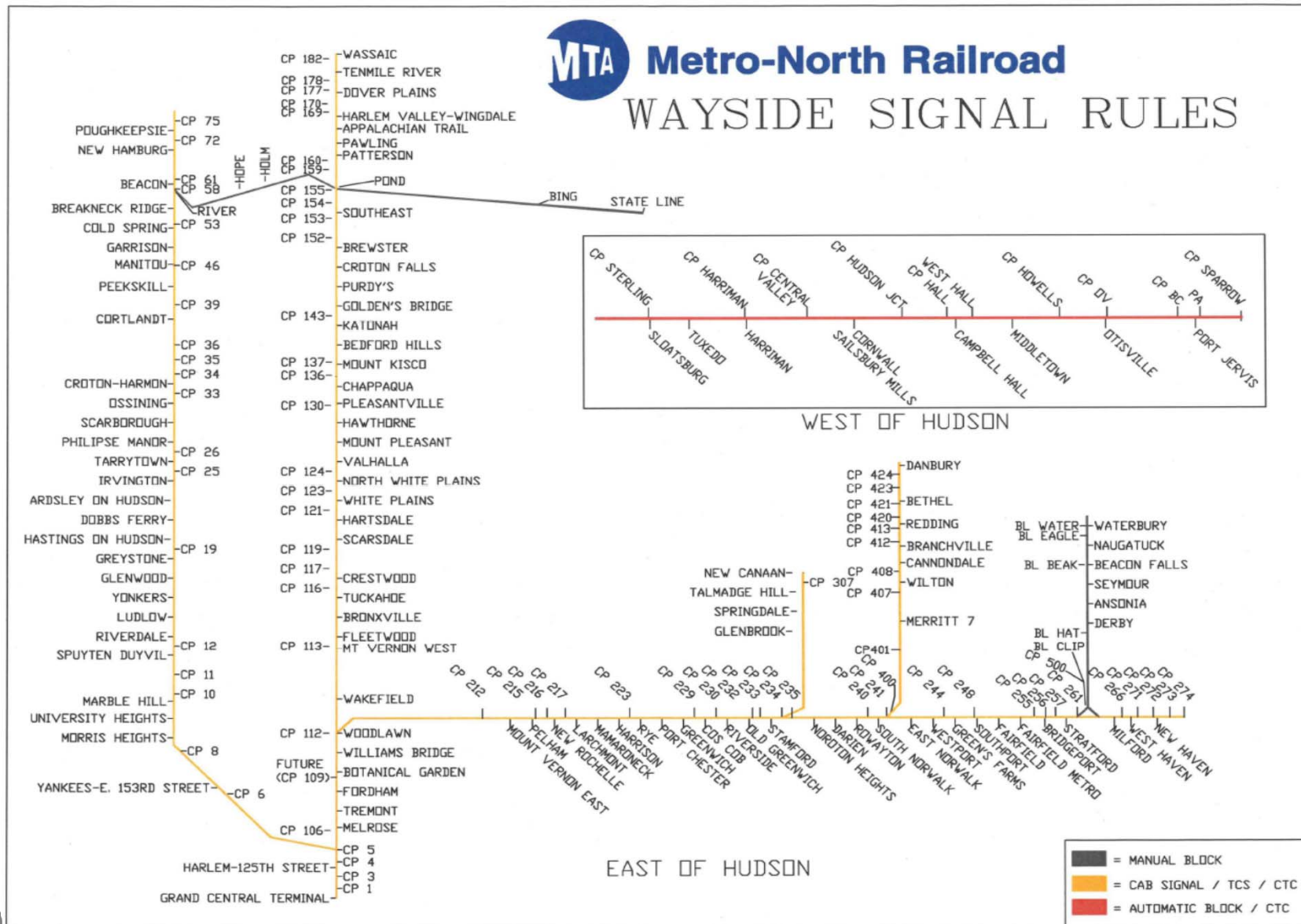
- Strained vendor resources
- R & D project – Off the shelf technology not available; extensive customization and testing required
- Radio spectrum
 - No spectrum set aside for project
 - Railroads had to acquire spectrum on the private market
 - Possibility of interference with other users
- Inoperability requirement
- Stress on FRA resources to review RSD applications, RSD performance data and PTC safety plans.



Facts about Metro-North

- Metro-North's three main rail lines – the Harlem, the Hudson and the New Haven – operate between Grand Central Terminal and stations in the following counties in New York and Connecticut: New York, Bronx, Westchester, Putnam and Dutchess (New York) and Fairfield and New Haven (Connecticut)
- West of the Hudson River, NJ Transit operates service under a contract with Metro-North, covering the Pascack Valley and Port Jervis Lines in Orange and Rockland Counties (New York).
- Second busiest commuter railroad in the United States
- Average weekday ridership – 289,596
- Rail cars – 1,268
- Track miles – 787
- Rail Stations -- 123





Progress toward implementation – Metro-North example

■ Train-to-train collisions

- Cab signal system (CSS)/Automatic Train Control (ATC)
 - At speeds greater than 15 mph, the current CSS and ATC systems already provide for safe train separation, enforce maximum allowed speeds based on traffic and routing conditions, and prevent train routing conflicts.
 - ***Final PTC***: Currently, an engineer can pass a stop signal when operating at 15 mph or less. Final PTC will provide for positive stop protection at control point signals.

■ Incursions into Work Zones

- Enhanced Employee Protection System (EEPS) developed after a 2013 employee fatality
- FRA has determined that it meets PTC requirements.



Progress toward implementation (continued)

■ Overspeed derailments

- Civil speed enforcement (CSE) at six critical curves and five moveable bridges.
 - CSE extended to all East of Hudson tracks and on the Danbury, Waterbury and New Canaan branches in CT. This provides full protection against overspeed derailments like the Spuyten Duyvil and DuPont derailments.
- ***Final PTC***: The PTC system will include the added functionality of enforcing temporary speed restrictions and will provide the ability to stop a train prior to a known malfunctioning grade crossing .

Progress toward implementation (continued)

- Movement through a misaligned switch
 - *Current:* Protected by CTC/CSS/ATC Systems
 - *Final PTC:* Will add positive stop protection for misaligned switches at interlockings.



Issues affecting employees

- Extensive training being provided to train and engine crews, rail traffic controllers, signal maintainers and Maintenance of Equipment personnel.
- Contracting out of installation work to third parties to meet aggressive deadlines
- Potential for civil penalties to be imposed against individual railroad employees for non-compliance with the PTC mandate
 - Conduct must be “willful”
 - Defined as “an intentional, voluntary act committed either with knowledge of the relevant law or reckless disregard for whether the act violated the requirements of the law.”
 - An individual does not act willfully if he or she acts pursuant to the direct order of a railroad official or supervisor under protest.

