TESTIMONY OF

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BEFORE THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

OF THE

U.S. SENATE

ON
"IMPLEMENTATION OF POSITIVE TRAIN CONTROL"

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SUBMITTED BY
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The American Public Transportation Association is a nonprofit international association of more than 1,500 public- and private-sector organizations, which represents a $68 billion industry that employs 420,000 people and supports millions of private-sector jobs. APTA members are engaged in the areas of bus, paratransit, light rail, commuter rail, subways, waterborne services, and intercity and high-speed passenger rail. This includes: transit systems; planning, design, construction, and finance firms; product and service providers; academic institutions, transit associations and state departments of transportation. APTA is the only association in North America that represents all modes of public transportation. APTA members serve the public interest by providing safe, efficient, and economical transit services and products.

Introduction

Chairman Thune, Ranking Member Nelson, and Members of the Committee on Commerce, Science, and Transportation, on behalf of the American Public Transportation Association (APTA) and its more than 1,500 public- and private-sector member organizations, thank you for the opportunity to submit written testimony on commuter railroads' implementation of positive train control (PTC).

My name is Paul Skoutelas, and I am the President and Chief Executive Officer (CEO) of the American Public Transportation Association. Prior to joining APTA in January, I served in leadership positions on numerous boards and committees for transportation organizations, including on APTA's Board of Directors and Executive Committee, the Transportation Research Board, National Transit Institute, Pennsylvania Transportation Institute, and the Transit Cooperative Research Program. I also served as national director of WSP USA's Transit & Rail Technical Excellence Center where I provided strategic direction on public transit and rail projects. Prior to WSP, I was CEO at two major public transportation agencies: the Port Authority of Allegheny County in Pittsburgh, Pennsylvania, and the Central Florida Regional Transportation Authority (LYNX) in Orlando, Florida.

I want to begin by reiterating APTA's and the commuter rail industry's long-standing and unwavering commitment to implementing positive train control.

Since the Committee's last hearing on PTC implementation in March, the nation's commuter railroads have continued to make strong and continuous progress in installing and implementing positive train control. This progress is reflected in the Federal Railroad Administration's (FRA) recently released second quarter PTC Progress report, including reducing by two the number of commuter railroads on FRA's list of at-risk railroads.

The commuter rail industry has been working continuously with freight partners, third-party contractors, Amtrak, and FRA to implement PTC and address technical and interoperability challenges. APTA has also provided a number of forums for collaboration and the sharing of best practices and lessons learned, including through its Commuter Rail PTC Subcommittee, which has been particularly helpful in providing a cohesive push as the industry works toward a common goal—implementing PTC and making an already safe system even safer.

We greatly appreciate the Committee's focused attention on the critical issues of rail safety and PTC, and the challenges and successes that publicly-funded commuter railroads have experienced in procuring, installing, and implementing this complex signaling and communications technology.

Safety is Our First Priority

For commuter rail operators and the entire public transportation industry, safety is our first priority. Safety is not simply a value we share; it is a core operating principle and a promise to our riders. The men and women responsible for managing and operating public transportation systems are fully committed to the safety of their systems, passengers, employees, and the general public.

Moreover, throughout our 136-year history, APTA and its predecessor associations have been leading advocates for safety improvements. We have led the way in creating an effective safety culture over many decades:

- creating a Rail Safety Audit Program;
- developing Safety Management Program Plans; and
- writing more than 270 standards and recommended practices for public transit, including Passenger Rail Equipment Safety Standards (PRESS) for commuter rail cars.

APTA's PRESS standards help improve the safety of public transportation systems by specifying safety requirements for vehicle crashworthiness, passenger door systems, emergency lighting and evacuation, and new benchmarks to improve the safety of vehicle interiors including seat attachment strength and workstation tables.

With regard to positive train control, APTA publicly supported the concept of PTC prior to enactment of the Rail Safety Improvement Act of 2008 (RSIA), and we advised Members of Congress and other policymakers of the need for proven technology, adequate resources, and the expanded radio spectrum necessary to put PTC into operation. Since enactment of RSIA, APTA has actively worked to assist the commuter rail industry with PTC research, development, installation, and implementation, including by participating in FRA's Rail Safety Advisory Committee (RSAC); establishing "user groups" among different types of commuter rail operators to share information and encourage coordinated actions; and conducting PTC conferences, workshops, and summits with commuter rail chief executive officers, senior engineering staff, FRA senior staff, and Congressional staff.

As a result of this overriding and sustained commitment to safety, today, public transit is the safest form of surface transportation. Every year, 29 commuter railroads across America safely carry passengers on <u>500 million</u> trips. And traveling by commuter and intercity passenger rail is <u>18 times safer</u> than traveling by car.

Positive Train Control Mandate

Moreover, we are working to make commuter rail even safer by installing and implementing PTC, a complex signaling and communications technology that provides a critical safety overlay on top of already safe commuter rail systems.

In 2015, Congress recognized the implementation challenges that the Government Accountability Office had outlined since RSIA implementing regulations went into effect. In enacting the Positive Train Control Enforcement and Implementation Act of 2015, Congress identified specific installation and implementation milestones. Under current law (49 U.S.C. 20157), commuter railroads are required to implement PTC by December 31, 2018, or, alternatively, to meet the following milestones (as defined in 49 U.S.C. 20157(a)(3)(B)) by that date:

- Installed all PTC hardware (wayside and onboard equipment);
- Acquired all necessary spectrum for PTC implementation;
- Completed all employee training required under the applicable PTC system regulations;
- Initiated revenue service demonstration (RSD) on at least one territory subject to the PTC requirement (or other criteria); and
- Submitted a plan, schedule, and certification to the Secretary of Transportation for implementing a PTC system.

Upon reaching these milestones by the end of 2018, the commuter railroads must implement PTC as soon as practicable, and no later than December 31, 2020.

APTA supports these statutory deadlines and is committed to assisting all our commuter railroads in implementing PTC.

PTC: Unparalleled Technological Challenge

As defined in statute, a positive train control system is a "system designed to prevent train-to-train collisions, over speed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position."

Implementing PTC requires changes to four main system components—vehicles, communications, signals, and the back office/control center—and each has to be fully functioning and integrated with the other systems.

When RSIA was enacted in 2008, there was no universal off-the-shelf technology capable of achieving these safety objectives. Although many commuter railroads have long used collision avoidance systems to help protect against certain accidents, these systems did not have all of the required attributes of PTC. Since the enactment of RSIA, APTA and its member commuter railroads have aggressively pursued both the funding and technology necessary to implement the PTC mandate by the statutory deadlines.

PTC is a predictive enforcement system of subsystems overlaid on existing systems. Although commuter railroads are currently in the process of installing these systems, a one-size-fits-all approach to implementation does not exist. Each commuter railroad has its own unique and complex operating environment and PTC systems must be tailored to meet those specific operating requirements.

For instance, commuter railroads interoperating with freight railroads typically use a variant of PTC called I-ETMS. Railroads that operate on the Northeast Corridor are installing an Amtrak-developed system known as ACSES. Railroads without extensive freight interoperability requirements may use a different PTC variant called E-ATC.[1] As such, what works for one commuter railroad may not work for another. Thus, each passenger rail system needs to build its own unique PTC solution, and it is that absence of a proven, off-the-shelf technology that creates uncertainty about whether a new solution will work as intended.

In general, the following components are required for implementation of PTC:

Locomotive Hardware

All locomotives and other operating equipment must be fitted with onboard computers, radios, display units, and event recorders. Numerous configurations of commuter rail equipment are in service including self-propelled cars and push-pull equipment adding to the complexity and cost of deploying these onboard systems.

Wayside Hardware

The wayside equipment that needs to be installed is also extensive and includes Wayside Interface Units (WIU), switch monitors, wayside radios, base stations, and transponders. The

[1] PTC is deployed by commuter railroads in three basic forms:

1. I-ETMS™ (Interoperable – Electronic Train Management System): In general, railroads that share track with freight railroads are installing and implementing a system known as I-ETMS, a GPS-based technology heavily dependent on the nationwide 220 MHz radio network. All wayside elements are monitored and reported to the locomotive. Track conditions and restrictions are delivered to the locomotive and reported to the operator for action. The system monitors the action of the operator and reacts if safety is compromised. I-ETMS supports interoperability with freight railroads. FRA granted type approval to I-ETMS on February 4, 2015.

2. ACSES (Advanced Civil Speed Enforcement System): In general, railroads that operate on the Northeast Corridor are installing and implementing an Amtrak-developed system known as ACSES, which uses track-mounted transponders to deliver information to the locomotive. ACSES monitors actions of the train operator and intervenes if safety is compromised. It facilitates interoperability among operators on the Northeast Corridor. FRA granted type approvals to ACSES variants between 2010 and 2013.

3. E-ATC (Enhanced Automatic Train Control)**:** In general, small commuter railroads that do not require complex interoperability with other operators are installing and implementing E-ATC, a track circuit-based system that is less complex and therefore less expensive than either I-ETMS or ACSES. FRA granted type approval to E-ATC on March 11, 2016.

status of the components is transmitted via WIUs to the locomotive to enable the PTC system to take action as necessary.

Communications (Spectrum and Towers)
PTC implementation typically requires a robust wireless infrastructure that is used for transmission of data between the various subsystems including the onboard, wayside, and back office equipment. The communications architecture includes data radios, antennas, wayside towers, and spectrum.[2] After enactment of RSIA, many commuter railroads chose to adopt the PTC protocol developed for freight railroads or intercity passenger (Amtrak) operations instead of investing the time and money to develop their own PTC protocol.

Back Office
The back office stores millions of rail network data points as encrypted information (e.g., speed limits, track layouts, speed of other trains on the system, and train compositions) and transmits the authorization for individual trains to move into new track segments. Operating PTC on commuter railroads presents a variety of back office requirements. Railroads that dispatch trains need to invest in a complete set of upgraded dispatch systems and Back Office Servers.

Employee Training
All employees who perform dispatch, operations, and signaling, as well as roadway workers and supervisors, must be trained and are essential for successful PTC implementation and operation. The commuter rail industry must train approximately 15,000 employees for full PTC operations.

PTC Implementation Progress

Commuter railroads are making strong and continuous progress in implementing positive train control. These railroads have faced, and continue to face, a variety of complex challenges in implementing PTC including financial, technological, and logistical challenges. Some commuter railroads have overcome these significant hurdles, but other railroads continue to grapple with PTC implementation issues. Moreover, these railroads are faced with installing, testing, and implementing PTC on an enormous and complicated network of interconnected railroads while still providing daily service to millions of Americans, in and around many of our nation's most important metropolitan regions.

The commuter rail industry continues to make substantial progress in implementing PTC according to updated analyses conducted by APTA, and as of June 30, 2018:

- 91% of spectrum has been acquired;
- 85% of 13,698 pieces of onboard equipment have been installed on locomotives, cab cars, etc.;
- 79% of 14,083 wayside (on-track equipment) installations have been completed;
- 78% of back office control systems are ready for operation;

[2] Some commuter railroads' PTC systems do not require spectrum and use track-based circuits to communicate data between the onboard and wayside equipment.

- 74% of 14,847 employees have been trained in PTC; and
- 34% of commuter railroads are in testing or revenue service demonstration; or service is fully operational.

These percentages represent significant increases from the status of PTC implementation on commuter railroads compared to six months ago (the end of calendar year 2017).

Overcoming Challenges to PTC Implementation

Total Cost—More than $4 Billion

PTC will cost commuter rail operators approximately $4.1 billion to implement, and an estimated additional $80 million to $130 million each year to operate and maintain. For publicly-funded agencies that rely on federal, state, and local funding, as well as passenger fares to operate their service, these costs are staggering.

Moreover, these costs are in addition to the existing $90 billion backlog needed to bring the current public transportation system into a state of good repair, as estimated by the U.S. Department of Transportation. A recent survey of commuter railroad agencies found that many commuter railroads have state-of-good-repair needs that far outweigh their capital budgets, even before including the additional costs associated with implementing PTC. As a result, to fund PTC, commuter railroads have had to divert funds from other critical infrastructure and safety projects, such as replacing bridges (some of which that are more than 100 years old), rehabilitating outdated locomotives, and upgrading tracks and safety systems.

Limited Federal Funding

The enactment of RSIA coincided with the 2008 global financial crisis and a multi-year period of short-term SAFETEA-LU extension acts and transportation appropriations continuing resolutions making it difficult for public transit agencies to plan and fund major projects like PTC. Since Congress mandated PTC, the federal government has directly provided barely one-tenth ($435 million) of the necessary funding for commuter railroads to implement PTC. Moreover, more than 80 percent of this funding ($360 million) has only been awarded in the last 16 months (since May 2017). In addition, two commuter rail operators have also secured federal loans to help pay for PTC implementation. While this financing has been helpful, the burden of repaying these loans still falls on public agencies that are already under financial pressure.

We urge Congress and the administration to consider these costs and provide additional funding to enable publicly-funded commuter railroads to quickly implement, operate, and maintain PTC, as well as address the massive backlog of other deferred critical infrastructure and safety projects. Additional funding would not only help commuter railroads continue to achieve the necessary milestones to implement PTC, but it would also allow them to address critical and costly interoperability challenges and system-wide reliability improvements after PTC deployment. As previously noted, the annual ongoing cost of PTC for publicly-funded commuter railroads is estimated to be between $80 million and $130 million.

Limited Vendors and Expertise

PTC is specialized rail signaling and communications equipment and there are a very limited number of manufacturers of this technology. A limited number of PTC-qualified vendors are simultaneously in demand by freight, intercity passenger, and commuter rail operators to develop, design, and test this complex safety technology, and it has been a significant challenge for the industry. In addition, the procurement process employed by public transit agencies is more rigorous and time intensive, which hindered some agencies' ability to advance contracts. Moreover, the scale of large freight railroad PTC procurements made it difficult for commuter railroads, which typically contract for much smaller procurements, to compete in the limited market.

Installing and commissioning PTC requires highly-qualified signaling, communications, and software engineers. Workforce development is a critical issue in public transportation generally. With so many railroads implementing PTC at the same time, worker retirements and limited available expertise in the specialized communications and signaling fields, where institutional knowledge is crucial, has taxed the nationwide implementation effort.

Communications (Spectrum and Towers)

Many commuter railroads have also faced significant issues in accessing and acquiring the necessary radio spectrum. Railroads often attempted to secure spectrum on the secondary market, only to encounter issues such as questions about ownership and legal authority to sell, unavailability in required geographic areas, and cost-prohibitive contractual requirements. Some railroads contracted their spectrum usage to the host railroads on which they operate, which created other issues that needed to be addressed.

Commuter railroads also may be subject to contractual constraints imposed by state and local governments. For instance, receiving government approval to use a sole-source procurement to acquire spectrum can take a very long period of time.

Finally, after spectrum is acquired, commuter rail PTC systems are subject to radio interference from freight railroads operating on or near commuter rail territory that can overwhelm commuter rail PTC signals and render the system vulnerable to failure. Complex, and sometimes costly, solutions must be developed to mitigate this operational problem.

Equipment Installation and Training

Commuter railroads do not have surplus equipment or personnel, and the impact of PTC implementation on daily service has been significant. It is extremely difficult to operate the level of service that our customers rely upon when railroads must remove railcars and personnel from service for onboard equipment installation and training and work on multiple territories simultaneously.

Most locomotives and other operating equipment must be reconfigured to accommodate the installation of PTC components, which has led to higher costs and longer schedules to implement PTC than initially predicted. To provide an example of the level of effort required to install this hardware, it generally takes one person working for one complete month to equip one

locomotive or similar controlling equipment. Moreover, this example does not take into account the design and proof-of-concept work that is needed prior to equipage. Similarly, many railroads must upgrade track components such as switches and signals to be reported by the Wayside Interface Units. Commuter railroads face the same challenges in equipping the wayside components as private-sector freight railroads, but with far more limited development and testing resources.

In addition, railroads installing I-ETMS must maintain extensive back office capability to interact with the overall PTC network. Recognizing this requirement as a key resource constraint for commuter railroads, APTA, in conjunction with FRA, worked with suppliers to develop a cloud-based back office system. In 2015, FRA provided approximately $5 million for this initiative. The shared back office provides for efficient operations, software maintenance, communications software updates, train initialization, and other key features. Several suppliers now offer this service.

Interoperability

Commuter railroads face different operating environments. Railroads operate as hosts on tracks they own, as tenants on other railroads tracks (e.g., freight railroads, Amtrak), or a combination of the two environments. PTC must have the ability to interface and function with different operators that share use of a section of track. In metropolitan areas, several different rail carriers often operate on one section of track. For instance, Metra, a Chicago-area commuter rail operator, has 13 required rail partners for its service area. Moreover, interoperability requirements are very complex for both testing and implementation. It continues to be a challenge to ensure compatibility and requires close coordination and communication between host and tenant railroads. Commuter railroads continue to diagnose and resolve software issues and address complex interoperability issues as they begin testing the system in RSD.

Overall, there are 28 commuter railroads vying for a limited number of resources related to PTC. As you can imagine, the systems are at various stages of the process. It is important to note that commuter railroads must continue to serve their customers during this process. Each day, systems must delicately balance PTC installation and serving their customers as they work to continue to safely carry passengers on 500 million trips per year.

Conclusion

On behalf of APTA, I want to reiterate the public transportation industry's long standing and continued commitment to install PTC. The nation's commuter railroads are aggressively working to implement PTC by the statutory deadlines, and right now, thousands of workers across the country are working trackside or in back offices to make that happen.

As a former CEO of the Pittsburgh and Orlando public transit systems, I know first-hand how passionate public transportation leaders are about the safety of our riders, employees, and communities. We joined this industry to make a difference in the lives of millions of people by providing access to opportunities. We don't just move people; we connect people to what they need, love, and aspire to achieve—and we do it safely and reliably.

APTA is grateful for the work that this Committee has done to make our nation's railroads safer. We look forward to continuing to work with you and your staff on this and many other issues that face public transportation agencies.

Enclosed is an APTA Fact Sheet on Commuter Rail and Positive Train Control.

Commuter Rail and Positive Train Control
FACT SHEET

APTA AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

AN OUTSTANDING SAFETY RECORD

Public transit is the safest form of surface transportation available to Americans. In fact, traveling by commuter and intercity rail is **18 times safer** than traveling by automobile. Each day, commuter rail safely carries riders on 1.7 million trips.

SIGNIFICANT PROGRESS IN IMPLEMENTING PTC

According to the most recent data as of June 30, 2018, commuter railroads have made solid progress to meet the congressional mandate:

- **91%** of all needed radio spectrum has been acquired
- **85%** of 13,698 pieces of on-board equipment on locomotives and cab cars are PTC-installed
- **79%** of 14,083 wayside installations have been completed
- **78%** of back office control systems are ready for operation
- **74%** of 14,847 employees have been trained in PTC
- **34%** of commuter railroads are in testing, revenue service demonstration, or are operating their trains with PTC

Safety is the first priority for commuter rail operators and the entire public transportation industry.

It's not simply a value we share; safety is a core operating principle and a promise to our riders.

That's why we are 100% committed to making commuter rail even safer by implementing Positive Train Control (PTC).

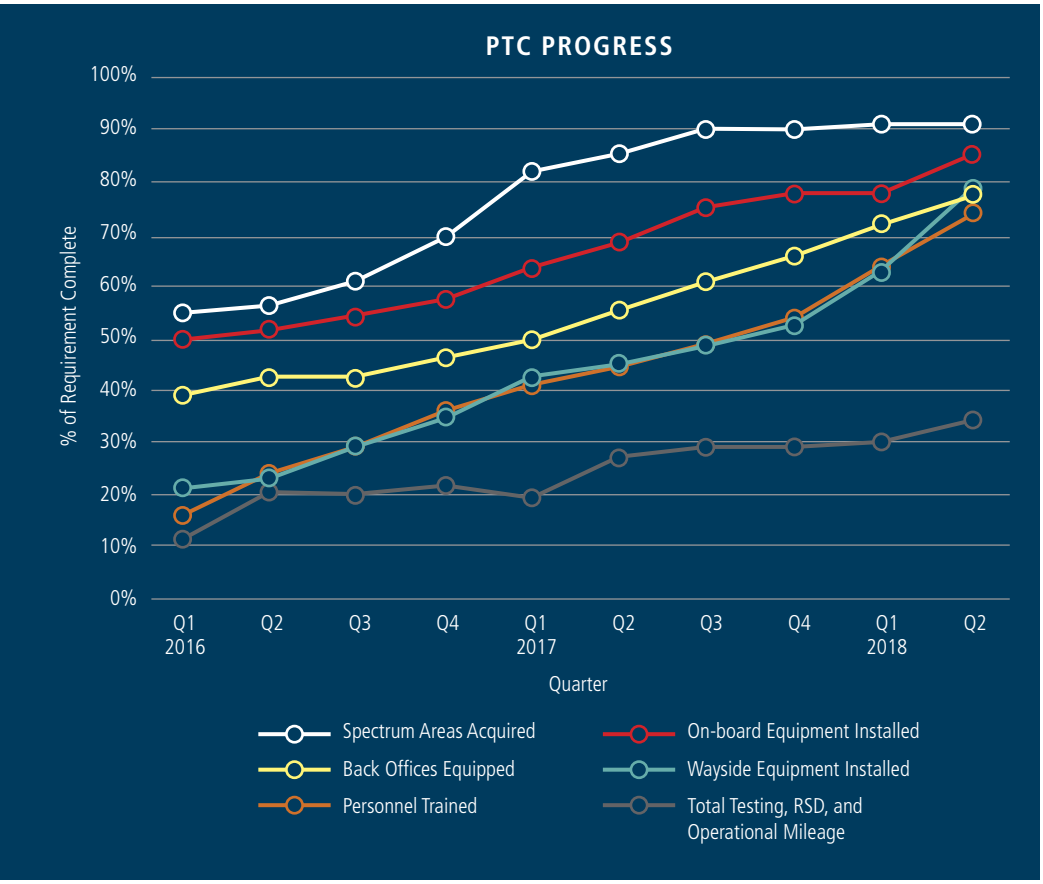
WHAT IS POSITIVE TRAIN CONTROL (PTC)?

PTC is an unparalleled technological and financial challenge in scale, complexity, and time required. PTC is a complex, innovative technology that is designed to make commuter rail even safer.

PTC activates a series of sensors installed on railcar equipment and track that use a combination of wireless Internet, GPS, and encrypted radio transmissions to report to monitoring systems in real-time speed and location data. PTC will prevent train-to-train collisions and derailments caused by speed. However, PTC will not prevent grade-crossing collisions and trespasser fatalities.

UNPARALLELED TECHNOLOGICAL CHALLENGE

PTC isn't off-the-shelf technology that was readily available to buy – it has required significant innovation. Many of the interconnected array of systems needed to be developed, customized, and installed according to its use in each and every system. Commuter rail operators are working tirelessly to achieve critical milestones.



OVERCOMING CHALLENGES

Total cost: PTC will cost commuter rail operators an estimated **$4.1 billion** to implement and $80 to $130 million a year in maintenance and operation costs.

Funding available: Since Congress mandated PTC in 2008, the federal government has awarded $435 million in PTC grants, $360 million of which has been awarded only since May 2017. At a time when the national state-of-good-repair backlog stands at an estimated $90 billion, commuter railroads had to divert funds from other critical infrastructure and safety priorities. In addition, two commuter rail operators have also secured federal loans to help pay for PTC implementation. While this financing has been helpful, the burden of repaying these loans still falls on public agencies that are already under financial pressure.

Limited expertise: There are a limited number of contractors with the expertise to install PTC on both commuter rail and freight railroads. Both modes required the suppliers at the same time, causing delays in installation.

Acquiring spectrum: PTC requires radio spectrum to transmit data between trains and communications towers (just like the spectrum needed for everything wireless, from your garage door opener to your cellphone). Early on, a major hurdle was gaining access to the necessary spectrum.

Time to install: PTC must be installed and tested while operators simultaneously continue to provide safe, reliable service for commuters who took 501 million trips in 2017 alone.

Interoperability: Many railroads run on tracks that they own or are hosted by freight railroads, or a combination of both. Critical to the successful implementation of PTC is making sure that all trains, tracks and the back office of each railroad communicate with one another.