

Federal Railroad Administration
Report to Congress



**Railroads' Progress Toward Implementation of
Positive Train Control Systems**

July 1, 2018

I. Introduction

Pursuant to Title 49 United States Code (U.S.C.) § 20157(d), the United States Department of Transportation (DOT) and the Federal Railroad Administration (FRA) are providing this report to the U.S. House of Representatives Committee on Transportation and Infrastructure and the U.S. Senate Committee on Commerce, Science, and Transportation on each railroad's progress toward implementing a positive train control (PTC) system. The purpose of this report is to advise Congress, the public, railroads, and other industry stakeholders about:

- (1) The statutory deadlines and requirements for full PTC system implementation, including the statutory criteria that railroads subject to the congressional mandate must meet by December 31, 2018;
- (2) A summary of the recent actions FRA has taken to support railroads' implementation of PTC systems and ensure compliance with the statutory requirements;
- (3) Each railroad's progress toward implementing a PTC system, including information regarding the twelve railroads most at risk, as of March 31, 2018, of not meeting either the December 31, 2018, deadline, or the statutory criteria necessary to qualify for an alternative schedule under 49 U.S.C. § 20157(a)(3); and
- (4) A summary of railroads' self-reported challenges and risks to fully implementing PTC systems in accordance with the statutory mandate.

DOT and FRA are encouraged that railroads have made significant progress toward implementing highly complex PTC systems, which will further enhance the safety of rail transportation throughout the country. As of March 31, 2018, FRA-certified PTC systems were being operated in revenue service on over 33,000 route miles of the approximately 60,000 route miles subject to the mandate, which exhibits progress by the railroad industry in implementing this safety-enhancing technology.

The key statistics and infographics in this report are based on self-reported data railroads have provided to FRA in their Quarterly PTC Progress Reports (Form FRA F 6180.165) for Quarter 1 of 2018 and railroads' 2017 Annual PTC Progress Reports (Form FRA F 6180.166).¹ Unless otherwise noted, the data in this report is current as of March 31, 2018. The primary data presented illustrates the overall status of industry-wide PTC system implementation, each railroad's progress with respect to meeting the statutory criteria required to qualify for an alternative schedule, if necessary, by December 31, 2018, common challenges that railroads continue to experience, and each railroad's status toward full PTC system implementation.

Railroads are primarily implementing the following PTC systems in the United States: (1) the Interoperable Electronic Train Management System (I-ETMS), which is the predominant system being implemented by Class I railroads; (2) the Advanced Civil Speed Enforcement System II (ACSES II), which is being implemented by most railroads operating on the Northeast Corridor; (3) Enhanced Automatic Train Control (E-ATC), which is being implemented by six intercity

¹ See Office of Management and Budget (OMB) Control No. 2130-0553.

passenger or commuter railroads; and (4) the Incremental Train Control System (ITCS), which is being implemented by Amtrak in parts of Michigan.

II. Summary of the Statutory Deadlines and Requirements for PTC System Implementation

A. Background

As the Rail Safety Improvement Act of 2008 first mandated, each Class I railroad and each entity providing regularly scheduled intercity or commuter rail passenger transportation must implement an FRA-certified PTC system on: (1) its main line over which 5 million or more gross tons of annual traffic and poison- or toxic-by-inhalation hazardous materials are transported; (2) its main line over which intercity or commuter rail passenger transportation is regularly provided; and (3) any other tracks the Secretary of Transportation prescribes by regulation or order.²

Under 49 U.S.C. § 20157 and FRA's implementing regulations, a PTC system must be designed to prevent train-to-train collisions, over-speed derailments, incursions into established work zones, and movements of trains through switches left in the wrong position, in accordance with the technical specifications under 49 CFR part 236, subpart I.³

B. The December 31, 2018, Deadline and the Requirements for Compliance

On October 29, 2015, the Positive Train Control Enforcement and Implementation Act of 2015 (PTCEI Act) extended the original statutory deadline for full implementation of PTC systems from December 31, 2015, to December 31, 2018.⁴

FRA interprets “complete”⁵ or “full”⁶ implementation of a PTC system to mean that an FRA-certified and interoperable PTC system—including all hardware, software, and other components—has been fully installed, sufficiently tested, and is in operation on all route miles required to have operations governed by a PTC system under 49 U.S.C. § 20157.⁷ Full

² Rail Safety Improvement Act of 2008, Pub. L. No. 110-432, § 104(a), 122 Stat. 4848 (Oct. 16, 2008), as amended by the Positive Train Control Enforcement and Implementation Act of 2015, Pub. L. No. 114-73, 129 Stat. 568, 576–82 (Oct. 29, 2015) and the Fixing America's Surface Transportation Act, Pub. L. No. 114-94, § 11315(d), 129 Stat. 1312, 1675 (Dec. 4, 2015) (codified as amended at 49 U.S.C. § 20157). See Title 49 Code of Federal Regulations (CFR) part 236, subpart I (Positive Train Control Systems).

³ See, e.g., 49 U.S.C. § 20157(g)(1), (i)(5); 49 CFR § 236.1005.

⁴ 49 U.S.C. § 20157(a). Please note that the PTCEI Act also required FRA to extend each deadline under 49 CFR § 236.1006(b)(4)(iii)(B) by three years, related to equipping certain Class II and Class III railroads' locomotives that operate in PTC territory. See 49 U.S.C. § 20157(k); 81 Fed. Reg. 10126 (Feb. 29, 2016).

⁵ See, e.g., 49 U.S.C. § 20157(c)(1); 49 CFR § 236.1005(b)(7).

⁶ See, e.g., 49 U.S.C. § 20157(a)(3)(B)(v); 49 CFR § 236.1005(b)(7); 79 Fed. Reg. 49693, 49706 (Aug. 22, 2014).

⁷ See, e.g., 49 U.S.C. § 20157(a)(1)–(3), (e)–(h), (i)(3); 49 CFR part 236, subpart I. The PTCEI Act, however, recognizes that certain PTC system failures (e.g., initialization failures, cut outs, and malfunctions) will occur during the period specified in the statute, but a railroad must both operate at an equivalent or greater level of safety than the level of safety achieved immediately prior to the use or implementation of the PTC system and comply with certain safety measures during any PTC system failures. See 49 U.S.C. § 20157(j).

implementation requires that all controlling locomotives shall be equipped with a fully operative and functioning onboard PTC apparatus, including the controlling locomotives of each railroad subject to the statutory mandate and each tenant railroad operating on a PTC-equipped track segment, except for a railroad's controlling locomotives that qualify for an exception under 49 CFR § 236.1006. The statutory mandate and FRA's implementing regulations require a PTC system to be interoperable, meaning the locomotives of any host railroad and tenant railroad operating on the same main line will communicate with and respond to the PTC system, including uninterrupted movements over property boundaries.⁸

The PTCEI Act authorizes the Secretary of Transportation, and FRA by delegation, to approve a railroad's "alternative schedule and sequence" with a full implementation deadline beyond December 31, 2018, to complete certain non-hardware, operational aspects of PTC system implementation.⁹ A railroad's alternative schedule, if any, must contain a deadline that is as soon as practicable, but no later than December 31, 2020.¹⁰ To request FRA's approval of a railroad's alternative schedule to complete testing, certification, interoperability, and full implementation beyond December 31, 2018, a railroad must submit a written notification to FRA when it has met the statutory criteria necessary to qualify for an alternative schedule and is prepared for FRA's review and approval.¹¹

To obtain FRA's approval of an alternative schedule, a railroad's written notification must demonstrate, to FRA's satisfaction, that the railroad has met each of the statutorily-required criteria. The statutory criteria include: the installation of all PTC system hardware consistent with the railroad's PTC Implementation Plan; the acquisition of all spectrum consistent with the railroad's PTC Implementation Plan; and sufficient progress on employee training and advanced testing and/or implementation.¹² In its written notification, a railroad must also certify that the railroad will be in full compliance with all requirements of the statutory mandate on or before the deadline provided in its alternative schedule and demonstrate that it has included its proposed alternative schedule in its PTC Implementation Plan.¹³ **Table 1** below describes each of these criteria in more detail.

Criteria	Specific Progress Railroads Must Make to Qualify for an Alternative Schedule Under 49 U.S.C. § 20157(a)(3)
Hardware	Installed, by December 31, 2018, all PTC system hardware that will be installed for PTC system implementation, consistent with the railroad's governing PTC Implementation Plan.
Spectrum	Acquired, by December 31, 2018, all spectrum necessary for implementation of the railroad's PTC system, consistent with the railroad's governing PTC Implementation Plan.
Employee Training	Completed the employee training required under 49 CFR part 236, subpart I for all applicable personnel in any territory, or segment

⁸ See 49 U.S.C. § 20157(a)(2)(A)(i)(I), (a)(2)(D), (i)(3); 49 CFR §§ 236.1003, 236.1011(a)(3).

⁹ 49 U.S.C. § 20157(a)(3)(A)–(D); 49 CFR § 1.89.

¹⁰ 49 U.S.C. § 20157(a)(3)(B)–(D).

¹¹ 49 U.S.C. § 20157(a)(3)(A)–(B).

¹² 49 U.S.C. § 20157(a)(3)(B)(i)–(iii), (vi)–(vii).

¹³ 49 U.S.C. § 20157(a)(3)(B)(iv)–(v).

	thereof, where the PTC system is currently being operated in revenue service demonstration (RSD) or revenue service.
Advanced Testing and/or Implementation	<p>For Class I railroads and Amtrak, the railroad has implemented a PTC system or initiated RSD on the majority of territories (e.g., subdivisions or districts) or route miles the railroad owns or controls that are required to have operations governed by a PTC system.</p> <p>For railroads other than Class I railroads or Amtrak, the railroad has initiated RSD on at least one territory that is required to have operations governed by a PTC system, or met any other criteria established by FRA.</p>
Schedule and Sequence	Included in the PTC Implementation Plan an alternative schedule and sequence for implementing a PTC system as soon as practicable, but no later than December 31, 2020.
Certification	Certified to FRA in writing that the railroad will be in full compliance with the requirements of 49 U.S.C. § 20157 on or before the deadline in the proposed alternative schedule and sequence.

Table 1 - Statutory Criteria for FRA Approval of Alternative Schedule and Sequence.

The PTCEI Act *requires* FRA to approve a railroad's alternative schedule if a railroad submits a written request to FRA that demonstrates the railroad has met the statutory criteria for an alternative schedule under 49 U.S.C. § 20157(a)(3)(B).¹⁴

Based on FRA's review of the Annual PTC Progress Reports and Quarterly PTC Progress Reports railroads have submitted to date, it is likely that most railroads subject to the statutory mandate will need to request and obtain FRA's approval of an alternative schedule with a deadline beyond December 31, 2018, in order to continue testing, obtaining PTC System Certification, achieving interoperability, and fully implementing PTC systems.

Some railroads, most notably BNSF Railway (BNSF), the Southern California Regional Rail Authority (Metrolink), the Southeastern Pennsylvania Transportation Authority (SEPTA), and Union Pacific Railroad (UP), will likely have an FRA-certified PTC system in operation on their own locomotives on all route miles required under 49 U.S.C. § 20157, on or before December 31, 2018. However, it is unlikely that all controlling locomotives of tenant railroads operating on these PTC-equipped railroad properties will be capable of operating with the host railroad's PTC system by that date.

Accordingly, this report provides high-level information—current as of March 31, 2018—about each railroad's progress toward meeting the statutory criteria required to qualify for an alternative schedule, based on the data railroads most recently reported in their Quarterly PTC Progress Reports (Form FRA F 6180.165) for Quarter 1 of 2018.

¹⁴ See 49 U.S.C. § 20157(a)(3)(A)–(D); 49 CFR § 1.89.

III. FRA's Recent Oversight Actions

A. Overall Approach

FRA continues to actively monitor Class I railroads' and intercity passenger and commuter railroads' incremental implementation of PTC systems and to provide guidance and outreach to railroads and other critical stakeholders, including state and local governments, associations representing railroads, and PTC system suppliers and vendors. On December 27, 2017, one year ahead of the deadline for PTC system implementation, Secretary Elaine L. Chao issued a letter to all Class I railroads, intercity passenger railroads, and commuter railroads, stressing the urgency and importance of safely implementing PTC systems in the upcoming year and meeting the statutory deadline. Given railroads' progress as of this spring, and the limited time remaining to implement PTC systems by December 31, 2018, FRA considers railroads' completion of the statutory requirements for an alternative schedule the most critical compliance matter between now and December 31, 2018.

Since December 2017, FRA leadership has continued to meet with the executive leadership and technical teams of each railroad subject to the statutory mandate to help ensure PTC systems are being implemented as efficiently as possible, discuss any challenges the railroads continue to experience, and review the railroads' plans for compliance with the statutory mandate. FRA also continues to meet in person with key industry suppliers as well as associations representing railroads, and has helped create and support multiple industry forums dedicated to improving collaboration among all PTC stakeholders, including technical user groups for each of the three primary PTC systems being implemented. FRA will host three symposia throughout the summer of 2018 to proactively provide information and guidance on critical issues pertinent to the statutory 2018 requirements and successful implementation of PTC systems.¹⁵

B. FRA's Oversight Actions from 2017 to Present

To ensure railroads and key stakeholders understand the statutory requirements to qualify for an alternative schedule beyond December 31, 2018, if necessary, and provide early warning to railroads that might be at risk of not meeting the necessary statutory criteria to qualify, FRA proactively began an outreach initiative last year that includes the following elements:

- Letters in May 2017 to the 17 railroads¹⁶ that, as of December 31, 2016, FRA considered at risk of neither meeting the December 31, 2018, deadline nor meeting the statutory

¹⁵ The first symposium was held on June 15, 2018, to systematically communicate information to all railroads subject to the statutory mandate regarding compliance with the December 31, 2018, deadline and, if necessary, the process to qualify for and obtain FRA's approval of an alternative schedule. FRA will hold a second symposium on July 16, 2018, to discuss best practices for PTC system field testing and interoperability testing. The third symposium, on August 20, 2018, will cover lessons learned and best practices for PTC Safety Plans, which are necessary for host railroads to obtain PTC System Certification from FRA and to achieve full PTC system implementation under the statutory mandate.

¹⁶ The 17 recipients of letters about lack of hardware installation progress as of December 31, 2016, were: Altamont Corridor Express; Belt Railway Company of Chicago; Canadian National Railway; Capital Metropolitan Transportation Authority; Central Florida Rail Corridor; Denton County Transportation Authority; Long Island Rail Road; Maryland Area Regional Commuter; Massachusetts Bay Transportation Authority; Metro-North Commuter

criteria required to qualify for an alternative schedule, specifically because self-reported data indicated that each railroad had installed less than 50% of its PTC system hardware as of December 31, 2016;

- Letters in June 2017 to governors and state departments of transportation (state DOTs)¹⁷ regarding any commuter railroad in the state that had installed less than 50% of its PTC system hardware as of December 31, 2016;
- Initiation of enforcement actions in June and July 2017 against 14 railroads that either failed to complete the end-of-2016 hardware installation milestones that the railroad established in its PTC Implementation Plan or failed to submit a timely Annual PTC Progress Report to FRA by the statutory March 31, 2017, deadline, as described below in Section III(D);
- A December 27, 2017, letter from Secretary Elaine L. Chao to all Class I railroads, intercity passenger railroads, and commuter railroads, in response to the December 18, 2017, Amtrak 501 accident, stressing the urgency and importance of safely implementing PTC systems during the upcoming year and meeting the statutory deadline;
- Meetings during the first six weeks of 2018 with the executive leadership and technical teams from each of the 41 railroads subject to the statutory mandate to discuss the importance of timely PTC system implementation, ongoing challenges that railroads are experiencing, and each railroad's precise plans for compliance with the statutory mandate;
- Letters on March 14, 2018, to each of the major PTC system suppliers and vendors, emphasizing the critical role they play in ensuring that railroads implement PTC systems in a timely manner and inviting each supplier and vendor to meet with FRA leadership in Washington, DC;
- Meetings from March 23 to May 8, 2018, with the ten major PTC system suppliers and vendors to discuss which railroads the supplier or vendor is providing PTC system products or components and/or any related services, and the suppliers' and vendors' plans to expedite delivery of PTC system products, components, and other services;
- Letters on April 24, 2018, to 15 railroads¹⁸ that FRA considered at risk of not meeting the statutory criteria to qualify for an alternative schedule, specifically because self-reported data from 15 railroads indicated that each railroad had installed less than 80% of its PTC system hardware as of December 31, 2017;

Railroad; Nashville Regional Transportation Authority (RTA) / Nashville and Eastern Railroad (NERR); New Jersey Transit; New Mexico Rail Runner Express; Northern Indiana Commuter Transportation District; South Florida Regional Transportation Authority; Trinity Railway Express; and Terminal Railroad Association of St. Louis. Please note, that on March 28, 2018, FRA conditionally approved NERR's request for a regulatory main line track exception under 49 CFR § 236.1019(c)(2)(ii). The exception applies to the approximately 32 miles on which RTA provides Music City Star commuter rail service. The track segment is signaled, using a centralized traffic control system, and NERR noted it maintains temporal separation by operating freight trains only when commuter service is not operating.

¹⁷ For example, FRA sent letters to the state DOTs and state governors of California, Florida, Indiana, Maryland, Massachusetts, New Jersey, New Mexico, New York, Tennessee, and Texas.

¹⁸ The 15 recipients of at-risk letters based on hardware installation progress as of December 31, 2017, were: Altamont Corridor Express; Belt Railway Company of Chicago; Capital Metropolitan Transportation Authority; Central Florida Rail Corridor; Consolidated Rail Corporation; Florida East Coast Railway; Maryland Area Regional Commuter; Massachusetts Bay Transportation Authority; Metro-North Commuter Railroad; New Jersey Transit; New Mexico Rail Runner Express; Northern Indiana Commuter Transportation District; Peninsula Corridor Joint Powers Board (Caltrain); South Florida Regional Transportation Authority; and Trinity Railway Express.

- At least monthly PTC system implementation meetings with Amtrak executive staff since February 2018;
- Continued industry engagement—for example, on May 1, 2018, FRA presented at the Surface Transportation Board’s Railroad-Shipper Transportation Advisory Council about the status of the industry’s implementation of PTC systems. On May 2 and May 10, 2018, respectively, FRA career staff met with the American Public Transportation Association (APTA) and its member railroads and the Association of American Railroads (AAR) and its member railroads to discuss and answer industry questions. On May 21, 2018, FRA supported a PTC seminar with over 250 attendees sponsored by the Railway Systems Suppliers, Inc.;
- Continued participation in industry stakeholder meetings, including AAR’s ACSES II Working Group, APTA’s I-ETMS Working Group for commuter railroads, the railroad-led E-ATC Working Group, and other meetings designed to bring together railroads, vendors, and suppliers with common PTC systems to discuss ongoing technical issues and lessons learned;
- Letters on June 1, 2018, to twelve railroads¹⁹ that FRA remains concerned are at risk of not meeting the statutory criteria to qualify for an alternative schedule, specifically because self-reported data from twelve railroads indicated that each railroad had installed less than 85% of its PTC system hardware as of March 31, 2018;
- From May 30 to June 1, 2018, FRA met with each of the twelve at-risk railroads to review the steps each railroad is taking to ensure it complies with the statutory mandate, to discuss its implementation progress during recent months, and to offer these railroads as much technical assistance as possible during this important time;
- Letters on June 1, 2018, to the governors and state DOTs of California, Florida, Indiana, Maryland, Massachusetts, New Jersey, New Mexico, and Texas, regarding any commuter railroad in the state that had installed less than 85% of its PTC system hardware as of March 31, 2018. FRA emphasized the importance of the state government ensuring these railroads have proper technical support and sufficient oversight of PTC system implementation;
- Ongoing quarterly meetings with at-risk railroads and regular engagement throughout the year; and
- FRA’s first-ever PTC symposium on June 15, 2018, to systematically communicate information to all railroads subject to the statutory mandate regarding compliance with the December 31, 2018, deadline and, if necessary, the process to qualify for and obtain FRA’s approval of an alternative schedule.

In addition, FRA continues to provide frequent technical assistance directly to railroads throughout all phases of PTC system development, installation, field testing, revenue service demonstration, and implementation by providing lessons learned guidance and other technical advice to help railroads resolve issues during each phase. Moreover, in support of PTC Research

¹⁹ The twelve recipients of at-risk letters based on hardware installation progress as of March 31, 2018, were: Altamont Corridor Express; Belt Railway Company of Chicago; Capital Metropolitan Transportation Authority; Central Florida Rail Corridor; Maryland Area Regional Commuter; Massachusetts Bay Transportation Authority; New Jersey Transit; New Mexico Rail Runner Express; Northern Indiana Commuter Transportation District; Peninsula Corridor Joint Powers Board (Caltrain); South Florida Regional Transportation Authority; and Trinity Railway Express.

and Development, FRA has provided technical support for railroads' development of their PTC systems, including I-ETMS, ACSES II, E-ATC, and the Interoperable Incremental Train Control System (I-ITCS). For example, FRA has supported the continued operation of the PTC test bed at the Transportation Technology Center, Inc. in Pueblo, Colorado. In cooperation with individual railroads, as well as APTA, AAR, and the American Short Line and Regional Railroad Association (ASLRRA) committees, FRA is also supporting approximately ten PTC-related research projects.

C. Grant Funding and Financial Assistance

The safety enhancements of PTC systems come with significant costs, both in terms of initial implementation costs and increased operations and maintenance costs. Industry estimates initial implementation costs will exceed \$14 billion, and multiple railroads have estimated that ongoing operations and maintenance costs will be approximately 15 to 20 percent of annual capital costs.²⁰ Since 2009, FRA has awarded approximately \$735 million in grant funding to support railroads' implementation of PTC systems. FRA also supported the Federal Transit Administration (FTA) with its evaluation and selection of approximately \$197 million in grant fund awards to 17 commuter and intercity passenger railroads and state and local governments for installation of PTC systems, which were announced on May 31, 2017. The sources of the approximately \$932 million in FRA and FTA grant funding are:

- \$475 million from FRA's High-Speed Intercity Passenger Rail Grant Program;
- \$197 million in Fixing America's Surface Transportation Act (FAST Act) funding;
- \$120 million in annual capital grant funding to Amtrak (as of March 2018);
- \$86 million from FRA's Railroad Safety Technology Grant Program;
- \$52 million in American Recovery and Reinvestment Act grant funding to Amtrak; and
- \$2 million in Research and Development grants.

Additionally, in May 2015, FRA issued a \$967.1-million Railroad Rehabilitation and Improvement Financing (RRIF) loan to the Metropolitan Transportation Authority for Long Island Rail Road's and Metro-North Railroad's implementation of PTC systems. On December 8, 2017, DOT's Build America Bureau closed a \$162 million Transportation and Infrastructure Finance and Innovation Act (TIFIA) loan and a \$220 million RRIF loan to be issued to the Massachusetts Bay Transportation Authority for PTC system implementation.²¹

Furthermore, the FAST Act authorized three new competitive rail development grant programs—i.e., two capital grant programs and one operating grant program: Consolidated Rail Infrastructure and Safety Improvements (CRISI), Federal-State Partnership for the State of Good

²⁰ In a March 2017 report, AAR estimated that it will cost freight railroads "... hundreds of millions of additional dollars ... each year after [PTC system implementation] to maintain" PTC systems. See AAR, *Positive Train Control*, at 2 (March 2017). APTA also stated in a February 21, 2017, press release that PTC system implementation is "expected to cost the commuter rail industry ... \$100 million annually in additional maintenance costs." See APTA, *Commuter Rail Industry Continues to Make Progress on Positive Train Control*, (Feb. 21, 2017) <http://www.apta.com/mediacenter/pressreleases/2017/Pages/PTC-Quarterly-Report.aspx>.

²¹ Approximately \$31 billion is currently available for lending under the RRIF program. Lending authority under the TIFIA program is approximately \$22 billion; however, this figure is subject to available subsidy budget authority and the levels of risk associated with future loans.

Repair, and Restoration and Enhancement. For Fiscal Years 2017 and 2018, Congress appropriated an additional \$961 million in funding with an emphasis on assisting with PTC system implementation.

- \$661 million for CRISI for capital projects, regional and corridor planning, environmental analyses, research, workforce development, and training to improve the safety, efficiency, and reliability of passenger and freight rail systems, of which \$250 million is set aside for PTC system implementation;
- \$275 million for Federal-State Partnership for State of Good Repair for capital projects on public- or Amtrak-owned infrastructure, equipment, and facilities to replace existing assets in-kind or with assets that increase capacity or service, maintain service while existing assets are brought into a state of good repair, or bring existing assets into a state of good repair; and
- \$25 million for Restoration and Enhancement Grants for operating assistance for up to three years per route to initiate, restore, or enhance intercity passenger rail transportation.

In the Consolidated Appropriations Act of 2018, Congress made commuter railroads eligible applicants for the \$250 million set-aside in the CRISI program for PTC system implementation.²² On May 18, 2018, FRA published a Notice of Funding Opportunity for the \$250 million in Fiscal Year 2018 CRISI grant funding in the *Federal Register*, providing an expedited 45-day deadline for grant applications.²³ To assist applicants with preparing grant applications, FRA participated in an APTA webinar on May 21 and an ASLRRR webinar on May 30, 2018, and hosted two webinars on June 4, 2018. FRA is working expeditiously to make available the remaining CRISI grant funding that Congress appropriated for Fiscal Year 2018 on March 23, 2018.

D. Compliance Reviews

The PTCEI Act requires FRA to conduct compliance reviews at least annually to ensure each railroad is implementing a PTC system in accordance with its Revised PTC Implementation Plan (PTCIP), including any FRA-approved amendments.²⁴ FRA is authorized to assess civil penalties against any railroad that fails to complete the end-of-year implementation milestones the railroad established in its PTCIP, including the railroad's end-of-2016 and end-of-2017 milestones for PTC system hardware installation, spectrum acquisition (if necessary for the railroad's PTC system), and employee training.²⁵ FRA has effectively complied with this oversight mandate and has taken multiple steps to ensure railroads implement PTC systems in accordance with the interim deadlines in their Revised PTCIPs.

For example, during calendar year 2017, FRA determined that 17 railroads each failed to complete one or more PTC system hardware installation milestones the railroad established for calendar year 2016 in its Revised PTCIP. In March 2017, FRA sent a letter to each of these 17 non-complaint railroads,²⁶ reminding each railroad that the PTCEI Act requires the railroad to

²² See Pub. L. No. 115-141 (Mar. 23, 2018).

²³ 83 Fed. Reg. 23328 (May 18, 2018).

²⁴ 49 U.S.C. § 20157(c)(2).

²⁵ 49 U.S.C. § 20157(a)(2)(D), (e)(2).

²⁶ The following 17 railroads each failed to complete one or more end-of-2016 PTC system hardware installation milestones from its Revised PTCIP: Amtrak; Belt Railway Company of Chicago; BNSF Railway; Canadian

implement a PTC system in accordance with its Revised PTCIP and failure to do so is a punishable violation.²⁷

In June and July 2017, FRA initiated enforcement action against seven railroads that both (1) failed to complete one or more end-of-2016 PTC system hardware installation milestones from its Revised PTCIP, and (2) were at or below 33% done with full PTC system implementation as of December 31, 2016. FRA determined it was necessary to take enforcement action to propel these railroads to implement a PTC system in accordance with their own schedules.²⁸ In addition, FRA believes that the assessment of a civil penalty against those railroads was necessary to urge them to expedite installation of PTC system hardware, which is integral to full implementation of a PTC system. FRA considers railroads' failure to complete end-of-year hardware installation milestones particularly problematic because a railroad must install *all* PTC system hardware by December 31, 2018, to qualify for an alternative schedule under the PTCEI Act, among the other statutory criteria.²⁹ Significant hardware installation is also necessary for a railroad to be able to initiate the required field testing of its PTC system, including revenue service demonstration.³⁰

In terms of other PTC enforcement action to date, in June and July 2017, FRA issued Notices of Probable Violation against seven other railroads that failed to submit a timely Annual PTC Progress Report (Form FRA F 6180.166, OMB Control No. 2130-0553) to FRA by the statutory March 31, 2017, deadline.³¹ All 14 railroads paid the civil penalties that FRA assessed for these violations of the statutory mandate and FRA's implementing regulations.

By mid-July 2018, FRA will issue Notices of Probable Violation, including a proposed civil penalty assessment, to 13 railroads that each failed to complete its end-of-2017 PTC system hardware installation milestones and/or spectrum acquisition milestones from its Revised PTCIP, including any FRA-approved amendments in effect on December 31, 2017.³² Consistent with FRA's commitment to ensuring railroads comply with the statutory mandate, including interim requirements, FRA will propose the maximum civil penalty for this type of violation—i.e., a

National Railway; Canadian Pacific Railway; Capital Metropolitan Transportation Authority; CSX Transportation, Inc.; Kansas City Southern Railway; Maryland Area Regional Commuter; Nashville Regional Transportation Authority / Nashville and Eastern Railroad; New Jersey Transit; Norfolk Southern Railway; Northeast Illinois Regional Commuter Railroad (Metra); Northern Indiana Commuter Transportation District; Southern California Regional Rail Authority (Metrolink); Terminal Railroad Association of St. Louis; and Union Pacific Railroad.

²⁷ 49 U.S.C. § 20157(a)(2)(D), (e)(2).

²⁸ FRA issued a Notice of Probable Violation and a civil penalty to the following seven railroads for the failure to complete one or more of its end-of-2016 PTC hardware installation milestones from its Revised PTCIP: Belt Railway Company of Chicago; Capital Metropolitan Transportation Authority; Maryland Area Regional Commuter; Nashville and Eastern Railroad; New Jersey Transit; Northern Indiana Commuter Transportation District; and Terminal Railroad Association of St. Louis.

²⁹ 49 U.S.C. § 20157(a)(3)(B)(i).

³⁰ See 49 U.S.C. § 20157(a)(3)(B)(vi)–(vii); 49 CFR § 236.1035.

³¹ See 49 U.S.C. § 20157(c)(1), (e)(1); 49 CFR § 236.1009(a)(5). FRA issued a Notice of Probable Violation and a civil penalty to the following seven railroads for the failure to submit its Annual PTC Progress Report to FRA by the deadline: Amtrak; New Mexico Rail Runner Express; Northstar Commuter Rail; Regional Transportation District Commuter Rail (Denver RTDC); Sonoma-Marín Area Rail Transit; Sounder Commuter Rail; and Southeastern Pennsylvania Transportation Authority.

³² 49 U.S.C. § 20157(a)(2)(D), (e)(2).

one-time civil penalty of \$27,904—against any railroad that failed to complete its end-of-2017 hardware installation milestones and/or spectrum acquisition milestones.³³

Finally, FRA is diligently reminding railroads that a railroad's FRA-approved PTCIP on file on December 31, 2018, or at the time a railroad requests FRA's approval of an alternative schedule, defines what milestones must be achieved for compliance, particularly with respect to the total quantities of PTC system hardware that must be installed for implementation of a PTC system.³⁴

IV. Status of Railroads' Implementation of PTC Systems

The infographics in this report and the appendix provide only an overview of railroads' self-reported progress, based on their Quarterly PTC Progress Reports (Form FRA F 6180.165) for Quarter 1 of 2018 and 2017 Annual PTC Progress Reports (Form FRA F 6180.166). To view railroads' full PTC progress reports, including further detail and narrative explanations of the reported progress, please download railroads' reports from FRA's website at: <https://www.fra.dot.gov/Page/P0628>.

A. FRA's Conditional Certification of Railroads' PTC Systems

Under the statutory mandate, a railroad must obtain PTC System Certification from FRA before it operates a PTC system, or a component thereof, in revenue service on the general rail system.³⁵ To date, based on FRA's highly detailed, technical review of each railroad's PTC Safety Plan (PTCSP), FRA has conditionally certified the following seven railroads' I-ETMS systems as non-vital overlay PTC systems: BNSF, Canadian Pacific Railway, CSX Transportation, Inc. (CSX), Kansas City Southern Railway, Norfolk Southern Railway (NS), Metrolink, and UP.³⁶ In addition, FRA has conditionally certified Amtrak's Advanced Civil Speed Enforcement System II (ACSES II) and SEPTA's ACSES II as vital overlay PTC systems.³⁷ Three other railroads, Portland and Western Railroad, North County Transit District, and Canadian National Railway, have submitted PTCSPs to FRA, which are currently under FRA review.

On August 20, 2018, FRA will host a symposium to convene railroads to discuss lessons learned and best practices for railroads' PTCSPs. Although submission of a PTCSP by December 31, 2018, is *not* required by law to qualify for an alternative schedule, FRA's approval of a host

³³ See 82 Fed. Reg. 16127 (Apr. 3, 2017).

³⁴ See 49 U.S.C. § 20157(a)(3)(B)(i)–(vii), (a)(3)(C)–(D).

³⁵ See 49 U.S.C. § 20157(h)(1). However, FRA may authorize a railroad to commence operation of a PTC system in revenue service, before the railroad obtains PTC System Certification, to the extent necessary to enable the safe implementation and operation of a PTC system in phases. See 49 U.S.C. § 20157(h)(2).

³⁶ See 49 U.S.C. § 20157(h)(1). See also 49 CFR §§ 1.89, 236.1015.

³⁷ Both non-vital and vital overlay systems must be designed to reliably prevent train-to-train collisions, over-speed derailments, incursions into established work zone limits, and movements through a main line switch in the improper position. A non-vital overlay system must obtain at least an 80-percent reduction of the risk associated with PTC-preventable accidents and maintain a level of safety for each subsequent system modification that is equal to or greater than the level of safety for the previous PTC system. See 49 CFR § 236.1015(e)(1). A vital overlay system must meet a higher threshold, as its PTCSP must include sufficient documentation to demonstrate that the PTC system, as built, fulfills the safety assurance principles set forth in Appendix C to 49 CFR part 236. See 49 CFR § 236.1015(e)(2). Pursuant to Appendix C, a vital overlay PTC system must, for example, adhere to an intrinsic fail-safe design concept and must automatically assume a safe operating mode in the event of failure.

railroad's PTCSP is necessary for a host railroad to obtain PTC System Certification from FRA and to achieve full PTC system implementation under the statutory mandate.

B. Railroads' Progress Toward Full PTC System Implementation

At the onset of this Administration, PTC systems were in operation on approximately 18% of the freight railroads' route miles required to be governed by a PTC system, which over the last year increased significantly to 60% as of March 31, 2018. Intercity passenger and commuter railroads also made progress in this respect, albeit at a much slower rate—specifically, PTC systems were in operation on approximately 24% of the required route miles as of March 31, 2017, which increased only to 25% as of March 31, 2018.

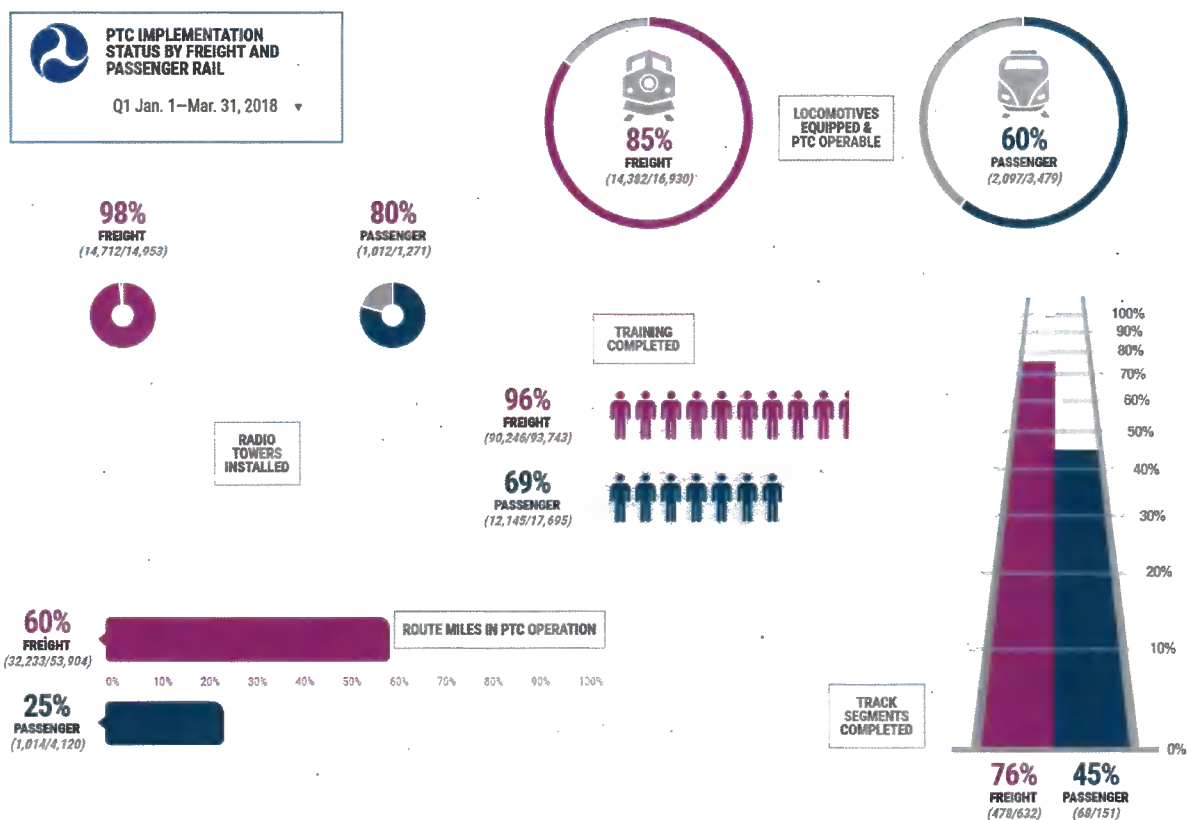


Figure 1 – Status of Overall Industry PTC System Implementation as of March 31, 2018.

As indicated in the statistics provided in **Figure 1**, the railroad industry continues to make significant progress toward full implementation of PTC systems, but considerable work remains to be done by intercity passenger and commuter railroads. Please see **Appendix A** to this report for specific railroad-by-railroad progress toward meeting several requirements for full implementation of PTC systems, including data regarding PTC-operable locomotives and track segments, employee training, spectrum acquisition and availability, PTC System Certification, route miles where PTC systems are in operation, and interoperability between host railroads and tenant railroads.

In addition to granting nine host railroads conditional PTC System Certification and thereby authorizing each railroad to operate its PTC system in revenue service, FRA has conditionally approved requests from an additional 23 railroads to field test uncertified PTC systems on the general rail system, under 49 CFR § 236.1035 as of June 30, 2018. Specifically, in addition to the nine railroads that have obtained conditional PTC System Certification, FRA has approved requests from seven additional railroads to initiate revenue service demonstration (i.e., advanced field testing)³⁸ and 16 more railroads to initiate initial field testing³⁹ as of June 30, 2018.

C. Railroads' Progress Toward Meeting 2018 Statutory Requirements

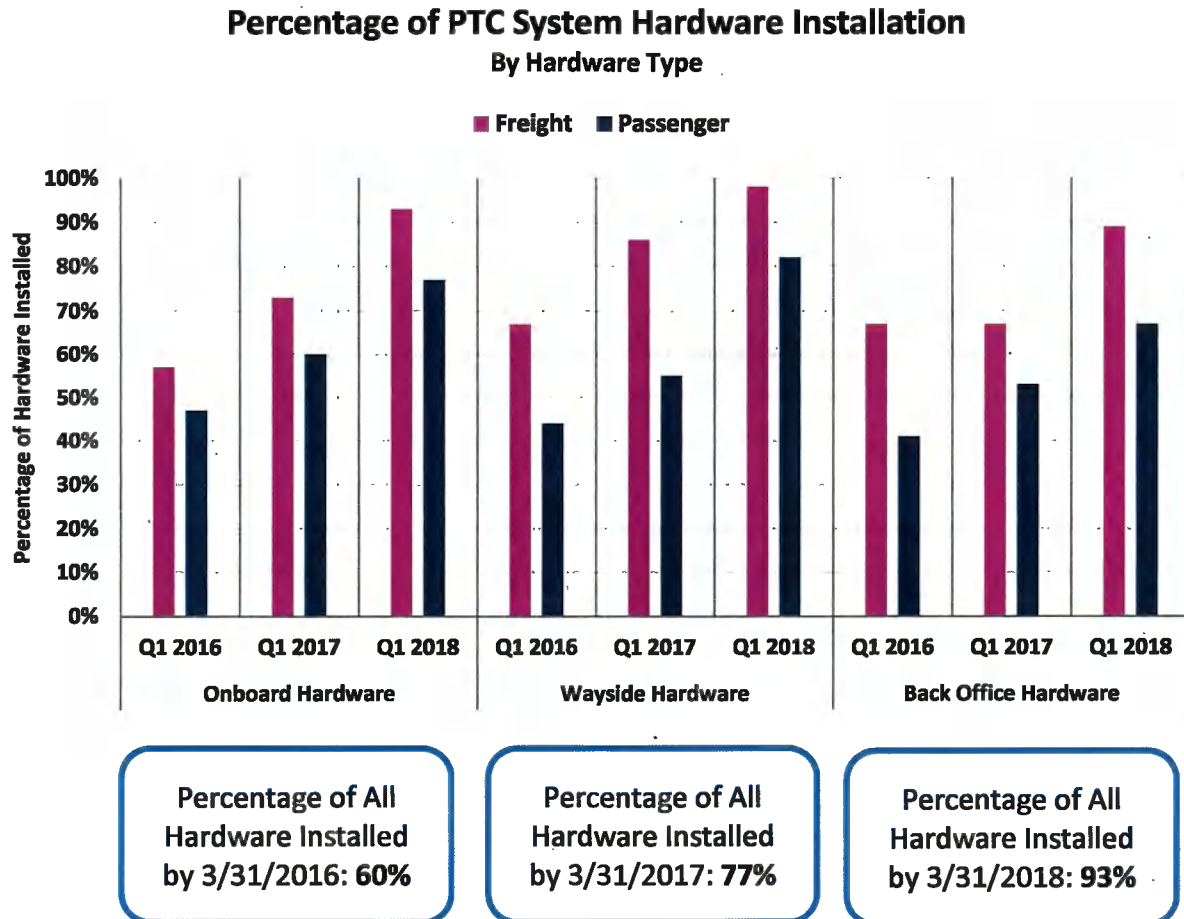


Figure 2 – Industry Progress Toward Installing PTC System Hardware from Quarter 1 of 2016 to Quarter 1 of 2018.

As indicated in **Figure 2**, railroads subject to the statutory mandate have made significant progress in installing onboard, wayside, and back office hardware necessary for PTC systems.

³⁸ Canadian National Railway; North County Transit District; Port Authority Trans-Hudson; Portland and Western Railroad; Regional Transportation District Commuter Rail (Denver RTDC); Sonoma-Marín Area Rail Transit; and Sounder Commuter Rail.

³⁹ Alaska Railroad; Belt Railway Company of Chicago; Central Florida Rail Corridor; Consolidated Rail Corporation; Denton County Transportation Authority; Florida East Coast Railway; Long Island Rail Road; Massachusetts Bay Transportation Authority; Metro-North Commuter Railroad; New Jersey Transit; Northeast Illinois Regional Corporation (Metra); Northern Indiana Commuter Transportation District; South Florida Regional Transportation Authority; Terminal Railroad Association of St. Louis; Trinity Railway Express; and Utah Transit Authority FrontRunner Commuter Rail.

As of March 31, 2018, railroads self-report that approximately 93% of PTC system hardware has been installed. From Quarter 1 of 2017 to Quarter 1 of 2018, railroads increased the total amount of installed PTC system hardware from 77% to 93%.

Notably, intercity passenger and commuter railroads increased PTC system hardware installation by 20% from Quarter 1 of 2017 to Quarter 1 of 2018, with freight railroads increasing hardware installation by 16% during that same period. Hardware installation is an initial, yet critical, phase of implementing a PTC system. As of March 31, 2018, 14 railroads report they have completed installation of all hardware necessary for PTC system implementation and another 13 railroads report they have installed over 80% of the required hardware.

In addition, as of March 31, 2018, all but two railroads report having acquired sufficient spectrum for their PTC system needs, which represents substantial progress. From Quarter 1 of 2017 to Quarter 1 of 2018, railroads acquired 23% of the spectrum necessary for PTC system implementation, with 93% of the necessary spectrum acquired as of March 31, 2018.

Figure 3 provides a detailed analysis of each railroad's self-reported progress as of March 31, 2018, with respect to the various statutory criteria a railroad must meet to qualify for an alternative schedule, as explained in Section II(B) above.⁴⁰

⁴⁰ 49 U.S.C. § 20157(a)(3)(B)(i)–(vii).

Railroad Name	Total Hardware Installed	Onboard Hardware Installed ²	Wayside Hardware Installed	All Spectrum Acquired?	Sufficient RSD Initiated?	Employees Trained
Class I Railroads						
BNSF Railway (BNSF)	100%	20,000/20,000	13,735/13,735	Yes	Yes	21,877/21,877
CSX Transportation (CSX)	96%	3,600/3,600	5,616/5,964	Yes	Yes	15,634/15,634
Canadian National Railway (CN)	96%	2,837/2,930	4,718/4,950	Yes	No	5,198/5,614
Kansas City Southern Railway (KCS)	95%	1,648/1,876	3,021/3,021	Yes	No	1,939/2,158
Union Pacific Railroad (UP)	95%	19,392/22,060	29,661/29,661	Yes	Yes	24,776/25,767
Norfolk Southern Railway (NS)	94%	5,188/5,800	10,733/11,193	Yes	No	18,438/18,832
Canadian Pacific Railway (CP)	91%	1,799/2,020	2,591/2,824	Yes	No	1,965/2,775
Intercity Passenger Railroads						
Amtrak (ATK)	94%	1,879/1,968	655/727	Yes	Yes	2,929/2,929
Commuter Railroads						
Southern California Regional Rail Authority (SCAX) "Metrolink"	100%	448/448	631/631	Yes	Yes	330/330
North County Transit District (SDNX)	100%	68/68	86/86	Yes	Yes	97/98
Southeastern Pennsylvania Transportation Authority (SEPA)	100%	1,525/1,525	152/152	Yes	Yes	1,192/1,192
Regional Transportation District Commuter (RTDC) "Denver"	100%	264/264	228/228	Yes	Yes	120/120
Sonoma-Marín Area Rail Transit (SMART)	100%	45/45	75/75	N/A	Yes	76/76
Northstar Commuter Rail (NSCR)	100%	48/48	N/A	N/A	Yes	18/18
Alaska Railroad (ARR)	100%	216/216	301/301	Yes	No	263/472
Denton County Transportation Authority (DCTA)	100%	44/44	121/121	N/A	No	0/50
Virginia Railway Express (VREX)	100%	164/164	N/A	N/A	To Be Determined	46/108
Utah Transit Authority FrontRunner Commuter Rail (UFRC)	100%	120/120	137/137	N/A	No	0/200
Long Island Rail Road (LIRR)	98%	584/584	332/361	Yes	No	1,859/3,194
Southern Commuter Rail (SCR)	96%	155/164	49/49	Yes	To Be Determined	4/4
Northeast Illinois Regional Corporation (NIRC) "Metra"	90%	1,850/2,112	770/789	Yes	No	1,181/1,801
Port Authority Trans-Hudson (PATH)	86%	1,100/1,150	2,005/2,448	N/A	No	910/910
Metro-North Commuter Railroad Co. (MNCW)	86%	1,706/1,880	164/292	Yes	No	2,474/2,915
Peninsula Corridor Joint Powers Board (PCMZ) "Caltrain"	74%	134/268	246/246	Yes	No	0/199
Massachusetts Bay Transportation Authority (MBTA)	71%	834/1,140	516/760	Yes	No	215/932
Central Florida Rail Corridor (CFRC) "SunRail"	53%	2/48	93/105	Yes	No	0/114
Northern Indiana Commuter Transportation District (NICD)	53%	132/292	51/51	N/A	No	259/259
Maryland Area Regional Commuter (MACZ) "MARC"	52%	54/156	N/A	N/A	To Be Determined	0/100
Altamont Corridor Express (ACEX)	25%	13/52	N/A	N/A	To Be Determined	0/28
South Florida Regional Transportation Authority (SFRV) "Tri-Rail"	25%	48/156	9/76	Yes	No	0/230
New Jersey Transit (NJTR)	13%	175/2,200	147/334	Yes	No	172/1,100
New Mexico Rail Runner Express (NMRX) "Rio Metro"	9%	0/72	21/162	No	No	0/88
Capital Metropolitan Transportation Authority (CMTA)	0%	0/68	0/35	N/A	No	0/148
Trinity Railway Express (TRE)	0%	0/68	0/89	Yes	No	0/80
Other Railroads						
Portland & Western Railroad (PNWR) and TriMet (TMEV)	100%	68/68	20/20	N/A	No	32/32
Terminal Railroad Association of St. Louis (TRRA)	100%	68/68	43/43	Yes	No	153/230
Kansas City Terminal Railway (KCT)	100%	16/16	50/50	No	No	0/14
Florida East Coast Railway (FECR)	92%	438/483	288/304	N/A	No	24/347
Consolidated Rail Corp. (CRSH)	86%	138/164	20/20	Yes	No	153/303
Belt Railway Company of Chicago (BRC)	80%	8/8	16/22	N/A	No	57/160

¹Data is current as of March 31, 2018. All data is based on self-reported data via railroads' Quarterly PTC Progress Reports from Q1 of 2018 (Form FRA F 6180.165, OMB Control No. 2130-0553).

²Onboard hardware may include multiple components per locomotive.

Figure 3 – Railroads' Progress Toward Meeting Statutory Criteria for an Alternative Schedule as of March 31, 2018.

D. Railroads at Risk of Failing to Meet One or More Statutory Criteria Required for an Alternative Schedule by December 31, 2018

FRA considers any railroad that had installed less than 85% of its PTC system hardware as of March 31, 2018, to be at risk, as hardware installation is only an initial phase of implementing a PTC system and only one of the statutory criteria required to qualify for an alternative schedule. FRA provides below a synopsis of the twelve railroads, in alphabetical order, that FRA currently considers at risk based on the objective metric regarding hardware installation progress as of March 31, 2018. Please note that, in certain cases, FRA identifies below tenant railroads that operate on the same main lines as the twelve at-risk railroads for additional context; however, please reference the “Interoperability” column in **Appendix A** for the number of required tenant railroads that are equipping locomotives with PTC technology and for more comprehensive information, please reference each railroad’s PTCIP in its PTC docket at <https://www.fra.dot.gov/Page/P0628>.

Altamont Corridor Express (ACE)

ACE operates eight weekday commuter trains over approximately 85 miles of track owned by UP and the Peninsula Corridor Joint Powers Board (Caltrain) from Stockton to San Jose, California. ACE does not own any track and is a tenant-only railroad. FRA considers ACE at risk as it had installed only 25% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. ACE’s current plan is to complete installation of all onboard PTC system equipment on ACE’s six locomotives and seven cab cars during October 2018 and to begin field testing on UP in the summer of 2018 and on Caltrain in approximately October 2018. Given its small fleet and number of revenue service operations, ACE is confident it can complete PTC system hardware installation during the fourth quarter of 2018; however, initiating the required level of testing on its host railroads, along with Caltrain’s ability to meet the statutory criteria required for an alternative schedule, will remain ACE’s primary risks.

Belt Railway of Company of Chicago (BRC)

BRC is a Class III switching and terminal railroad with 28 route miles of main line that enable the transfer of freight among all Class I railroads, regional railroads, and short line railroads in the Chicago Switching District. FRA considers BRC at risk as it had installed 80% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. While BRC will implement a PTC system on all 28 miles, it recently requested to amend its PTC Implementation Plan to limit its required PTC system implementation to the two miles of track where BRC hosts regularly scheduled intercity and commuter rail passenger transportation—specifically, two daily Amtrak trains and 30 daily Northeast Illinois Regional Corporation (Metra) commuter trains on weekdays and six daily trains on Saturdays. BRC has informed FRA that, to date, BRC has finished installing all PTC system hardware on the two miles of track where Amtrak and Metra operate. BRC cites its supplier’s ability to develop BRC’s back office and a PTC-capable dispatch system as the most significant ongoing challenges for BRC’s implementation of a PTC system. BRC has confirmed it will request FRA’s approval to establish substitute criteria instead of the applicable statutory criterion that requires initiating revenue service demonstration “on at least 1 territory that is required to have operations

governed by a [PTC] system,” for purposes of qualifying for an alternative schedule.⁴¹ Based on BRC’s revised PTC Implementation Plan, BRC has an achievable path to meeting the statutory criteria required to qualify for an alternative schedule, but it must closely manage its supplier to ensure it timely completes and delivers the back office and PTC-capable dispatch subsystems.

Caltrain

Caltrain operates approximately 92 daily commuter trains over its 52-route-mile corridor from downtown San Francisco to San Jose, California, and an additional six daily trains over approximately 25 route miles of track owned by UP from San Jose to Gilroy, California. FRA considers Caltrain at risk in part because it had installed 74% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. Notably, given termination of its primary contractor in February 2017, Caltrain is no longer implementing I-ITCS as its PTC system. In March 2018, Caltrain awarded a contract to Wabtec to implement I-ETMS. Although it is possible that many of the PTC system hardware components can be effectively reused, surveys are ongoing to determine the extent of compatibility between the existing physical equipment and I-ETMS. At a minimum, this transition will require significant onboard and back office hardware modifications, in addition to perhaps other modifications. The testing that must be performed to validate system functionality and Caltrain’s ongoing electrification construction efforts also present significant schedule risks for implementation of I-ETMS. Caltrain continues to work closely with FRA and has put forward an achievable path to meeting the statutory criteria required to qualify for an alternative schedule, but only if it closely manages the ongoing equipment surveys, its schedule, and any potential complications that arise due to its contemporaneous capital projects.

Capital Metropolitan Transportation Authority (CMTY)

CMTY operates approximately 38 weekday commuter trains over its 32-mile Central Subdivision in the Austin, Texas, metropolitan area. FRA continues to consider CMTY at risk as it had installed none of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. CMTY informed FRA that, by June 30, 2018, CMTY plans to complete hardware installation on two of its locomotives and on the 10-mile track segment on which it will conduct field testing and revenue service demonstration. CMTY anticipates it will complete the remainder of onboard PTC system hardware installation by November 2018 and wayside hardware installation by December 2018. On December 4, 2017, in response to CMTY’s written request, FRA established substitute criteria that would permit CMTY to initiate revenue service demonstration on the 10-mile segment described in its October 31, 2017, request letter instead of one entire territory, for purposes of meeting substitute criteria under 49 U.S.C. § 20157(a)(3)(B)(vii)(II). Given CMTY’s plan to complete hardware installation on its 10-mile pilot track segment by June 30, 2018, and CMTY’s estimate that it will commence initial field testing in October 2018, FRA has conveyed to CMTY that initiating revenue service demonstration this year might be infeasible, so it might be necessary for CMTY to request other substitute criteria for purposes of qualifying for an alternative schedule. CMTY has put forward an achievable path to meeting the statutory criteria required to qualify for an alternative schedule, but it must remain vigilant, adhere to an aggressive installation schedule, and

⁴¹ See 49 U.S.C. § 20157(a)(3)(B)(vii).

expeditiously manage and mitigate risks, including the final design and delivery of E-ATC software.

Central Florida Rail Corridor (CFRC or SunRail)

SunRail commenced commuter rail service in May 2014, and it currently operates 36 weekday trains on approximately 31.5 route miles of track owned by the Florida Department of Transportation (FDOT). A PTC system is being implemented on FDOT's entire 61.35-mile CFRC corridor, which also hosts six daily Amtrak trains, including the Auto Train, and freight trains operated by CSX and one short line railroad. FRA considers CFRC at risk because it had installed 53% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. CFRC informed FRA that it plans to complete hardware installation on its locomotives and cab cars in July 2018 and wayside hardware installation by October 2018, and will replace its computer-aided dispatch system in approximately September 2018. On January 23, 2017, in response to CFRC's written request, FRA established substitute criteria that would permit CFRC to initiate revenue service demonstration on the 15-mile track segment described in its October 31, 2016, request letter instead of one entire territory, for purposes of meeting substitute criteria under 49 U.S.C. § 20157(a)(3)(B)(vii)(II). Although CFRC has put forward an achievable path to meeting the statutory criteria required to qualify for an alternative schedule, CFRC must remain vigilant, adhere to an aggressive installation schedule, and expeditiously manage and mitigate risks. Given CFRC's estimate that it will commence field testing in October 2018, FRA has conveyed to CFRC that initiating revenue service demonstration this year might be infeasible, so it might be necessary for CFRC to request other substitute criteria for purposes of qualifying for an alternative schedule.

Maryland Area Regional Commuter (MARC)

In addition to limited weekend service, MARC operates, on average, 93 weekday commuter trains serving Maryland, Washington DC, and West Virginia over 202 miles of track owned primarily by CSX and Amtrak. As MARC requested and obtained FRA's approval of a main line track exception for the track it owns (MARC's 3.2-mile Frederick Branch), MARC is implementing a PTC system on only its locomotives and cab cars and is obtaining a hosted back office server. FRA considers MARC at risk because it had installed 52% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. While onboard installations have been progressing since 2016, MARC did not reach an agreement to obtain onboard PTC radios until early 2018, negotiation of which MARC cites as the most difficult challenge to date. It is possible that MARC will be able to begin operating I-ETMS in revenue service on CSX's track by December 31, 2018, as CSX, as the host railroad, has already obtained conditional PTC System Certification for I-ETMS from FRA, and MARC will coordinate field testing and interoperability testing with CSX during the summer and fall of 2018. At a minimum, however, MARC will need an alternative schedule for its implementation of I-ETMS and ACSES II on Amtrak's Northeast Corridor. MARC has made significant progress over the last six months and has an achievable path to meeting the statutory criteria required to qualify for an alternative schedule.

Massachusetts Bay Transportation Authority (MBTA)

MBTA provides commuter rail service via 491 weekday trains on approximately 394 route miles of track, which also hosts the operations of Amtrak, CSX, NS, and three other railroads. FRA considers MBTA at risk because it had installed 71% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. MBTA informed FRA that it currently plans to complete onboard hardware installation by August 31, 2018, and wayside hardware installation by late September 2018. MBTA has commenced field testing of its PTC system on 71 route miles, and it anticipates it will request FRA's approval to initiate revenue service demonstration on its Stoughton Branch in September 2018. In addition, underscoring MBTA's commitment to compliance with the mandate, MBTA has confirmed it will reduce commuter rail service during weekends to ensure it meets the statutory criteria required to qualify for an alternative schedule.⁴² MBTA has made significant progress over the last year and has an achievable path to meeting the statutory criteria required to qualify for an alternative schedule.

New Jersey Transit (NJT)

In total, NJT operates over 700 weekday trains and 382 weekend trains on approximately 1,001 route miles of track, including operations over the Consolidated Rail Corporation and Amtrak's Northeast Corridor. As set forth in its PTC Implementation Plan, NJT is implementing a PTC system on the 326 route miles of track it owns and controls. FRA considers NJT at risk because it had installed only 13% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data.

While NJT will equip 440 locomotives and cab cars with PTC system hardware, it recently requested to amend its PTC Implementation Plan to limit its required hardware installation to 282 locomotives and cab cars, which is what NJT uses for regular service, including a 10% spare ratio. NJT is increasing the pace of onboard PTC system hardware installation by adding shifts to its two facilities, and it projected to equip 25 to 30 vehicles per month during the second quarter of 2018 and 30 to 40 vehicles per month afterwards, which NJT notes will position the railroad to equip more locomotives and cab cars than the 282 required by December 31, 2018. In addition, NJT informed FRA that it is moving forward aggressively with wayside hardware installation, even though it is awaiting final designs, so that NJT can meet the statutory requirements. To date, NJT has commenced field testing of its PTC system on approximately six miles of its Morristown Line. On June 26, 2018, in response to NJT's May 8, 2018, request, FRA established substitute criteria under 49 U.S.C. § 20157(a)(3)(B)(vii)(II) that would permit NJT to conduct field functionality testing on a 16.5-mile segment of track that is representative of NJT's main lines that are subject to the statutory mandate, instead of the criterion that requires initiating revenue service demonstration on one territory. Although NJT has put forward an achievable path to meeting the statutory criteria required to qualify for an alternative schedule, NJT and its contractors need to continue to monitor installation rates and other aspects of PTC system implementation vigilantly, and expeditiously manage and mitigate risks. NJT confirmed

⁴² MBTA, *Commuter Rail Positive Train Control*, (May 31, 2018) <https://www.mbta.com/projects/commuter-rail-positive-train-control-ptc>.

it will reduce commuter rail service, beginning June 4, 2018, until early 2019, to help facilitate compliance with the statutory mandate.⁴³

New Mexico Rail Runner Express (Rio Metro Regional Transit District or NMRX)

On its 120-mile network, NMRX operates 16 daily commuter trains from Santa Fe to Albuquerque, New Mexico, and Amtrak operates two daily Southwest Chief trains from Control Point (CP) Madrid to CP Lamy. FRA considers NMRX at risk because it had installed only 9% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. By July 2018, NMRX expects to have a fully executed contract in place with a PTC system supplier. NMRX is currently in the process of preparing a “limited operations main line track exception” under 49 CFR § 236.1019(c)(1)(iii), which requires the development of a risk mitigation plan and FRA review and approval. NMRX has indicated that it will request a main line track exception on a temporary basis only and intends to fully implement a PTC system by December 31, 2020. Before December 31, 2018, NMRX must complete the required risk assessment; implement any identified risk mitigations; obtain necessary concurrence from its tenant railroads, BNSF and Amtrak; submit its formal request to FRA; and obtain FRA approval. As of June 1, 2018, NMRX anticipates it will submit the formal exception request to FRA in the summer of 2018. Primarily, NMRX cites the high cost of implementing a PTC system and insufficient funding as its primary challenges.

Northern Indiana Commuter Transportation District (NICD or South Shore Line)

NICD operates 43 weekday trains from South Bend, Indiana, to Chicago, Illinois, over NICD’s 75 route miles and an additional 15 route miles owned by Metra. FRA considers NICD at risk because it had installed 53% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. Approximately 72 of NICD’s 82 rail cars are locomotives, and NICD is equipping each locomotive even if it will not serve as the controlling locomotive of a commuter train. Notably, NICD informed FRA that, to date, it has equipped sufficient locomotives with PTC system hardware to cover its regular daily service, including an additional 50% surplus, and it plans to complete onboard hardware installation on the remaining locomotives by November 2018. To date, NICD has commenced PTC system field testing on approximately 72 route miles and plans to conduct field qualification testing in September or October 2018, prior to initiating FRA-approved revenue service demonstration. NICD has made significant progress over the last year and has an achievable path to meeting the statutory criteria required to qualify for an alternative schedule. NICD cited funding as a primary challenge to PTC system implementation, particularly pointing to high operations and maintenance costs each year going forward.

South Florida Regional Transportation Authority (Tri-Rail or SFRTA)

SFRTA operates 50 weekday Tri-Rail commuter trains serving the Broward, Miami-Dade, and Palm Beach counties over 72.6 route miles of track, and hosts four daily Amtrak trains in addition to CSX freight trains. FRA considers SFRTA at risk because it had installed only 25% of the hardware required for its PTC system as of March 31, 2018, based on self-reported data.

⁴³ NJT, *Positive Train Control*, http://www.njtransit.com/var/var_servlet.srv?hdmPageAction=PTCTo.

Notably, SFRTA became the host railroad on March 29, 2015, when it took effective operating control over the 72.6-mile territory, which is owned by FDOT and had been dispatched and maintained by CSX until that time. SFRTA informed FRA that it plans to complete wayside PTC system hardware installation in August 2018 and onboard hardware installation by December 2018. On May 30, 2018, in response to SFRTA's written request, FRA established substitute criteria that would permit SFRTA to initiate field integration testing on its entire 72.6-mile territory, subject to certain testing conditions and industry standards, for purposes of meeting substitute criteria under 49 U.S.C. § 20157(a)(3)(B)(vii)(II). Although SFRTA has put forward an achievable path to meeting the statutory criteria required to qualify for an alternative schedule, the highest risk lies with the timely delivery of SFRTA's new computer-aided dispatch system in the fall of 2018, which is a pivotal prerequisite to integration testing of the PTC system. SFRTA must remain vigilant, expeditiously manage and mitigate risks, and adhere to an aggressive installation schedule.

Trinity Railway Express (TRE)

TRE operates 47 weekday trains and 19 trains on Saturday over approximately 34 route miles of track between Dallas and Fort Worth, Texas, and currently hosts operations by Amtrak, BNSF, UP, and two short line railroads. FRA continues to consider TRE at risk as it had installed none of the hardware required for its PTC system as of March 31, 2018, based on self-reported data. TRE informed FRA that as of May 30, 2018, it has equipped two of its 17 locomotives with PTC system hardware. TRE projects that it will finish installing all onboard, wayside, and back office PTC system hardware by October 2018, although it noted serious concerns regarding its supplier's ability to deliver hardware kits and provide sufficient resources in accordance with the updated schedule, given the supplier's past delays and long lead times. TRE has noted that one primary challenge to beginning PTC system implementation was multiple failed solicitations due to pricing disputes from 2014 to mid-2017. TRE has indicated it will likely request FRA's approval to establish substitute criteria instead of the applicable statutory criterion that requires initiating revenue service demonstration "on at least 1 territory that is required to have operations governed by a [PTC] system."⁴⁴ TRE has put forward an aggressive path to meet the statutory criteria required to qualify for an alternative schedule, and TRE must closely manage its schedule, its supplier's performance, and any potential complications or further delays that arise due to its ongoing capital projects.

E. Observations

FRA continues to encourage railroads, particularly commuter railroads, to explore any and all options available to expedite the safe implementation of PTC systems. Options may include partnering with other railroads, sharing resources, reducing or halting capital construction on lines where PTC technology is being implemented, providing priority to test trains and PTC-related work zones, and even the suspension of service on certain lines or segments, as necessary, to facilitate hardware installation required for PTC systems. Although some of these options might not be ideal or desirable in the short term, including for the traveling public, some railroads might have few other available options at this point to ensure they comply with the statutory mandate.

⁴⁴ See 49 U.S.C. § 20157(a)(3)(B)(vii).

V. Industry Challenges

During FRA's meetings with the leadership of the 41 railroads subject to the statutory mandate in January and February 2018 and continued meetings to date, railroads commonly conveyed the following ongoing challenges:

- There is a limited number of PTC system vendors and suppliers, all of which are significantly resource-constrained and serving all 41 railroads and their tenant railroads;
- As reliability and stability of PTC systems is still immature, railroads are experiencing significant technical issues with both PTC system hardware and PTC system software that often take considerable time to diagnose and resolve, impacting current operations;
- Host railroads noted that many tenant railroads that operate on main lines requiring PTC system implementation have made variable, and often unknown, progress equipping locomotives with operational PTC technology, while some tenant railroads report that their host railroads are not providing opportunity for testing;
- Railroads have only recently begun testing PTC systems for interoperability;
- Many commuter railroads stated that negotiating legal agreements with certain vendors and suppliers often took multiple years to complete, given various insurance, liability, and state law issues; and
- Railroads noted concern about FRA's approval review and approval cycle, given the surge in submissions requiring FRA approval in 2018.

In addition, as summarized in **Figure 4** below, 78% of reporting railroads (32 of 41 annual reports received) specifically cited challenges they are experiencing with PTC system implementation in their Annual PTC Progress Reports for Calendar Year 2017.⁴⁵

⁴⁵ Form FRA F 6180.166, OMB Control No. 2130-0553.

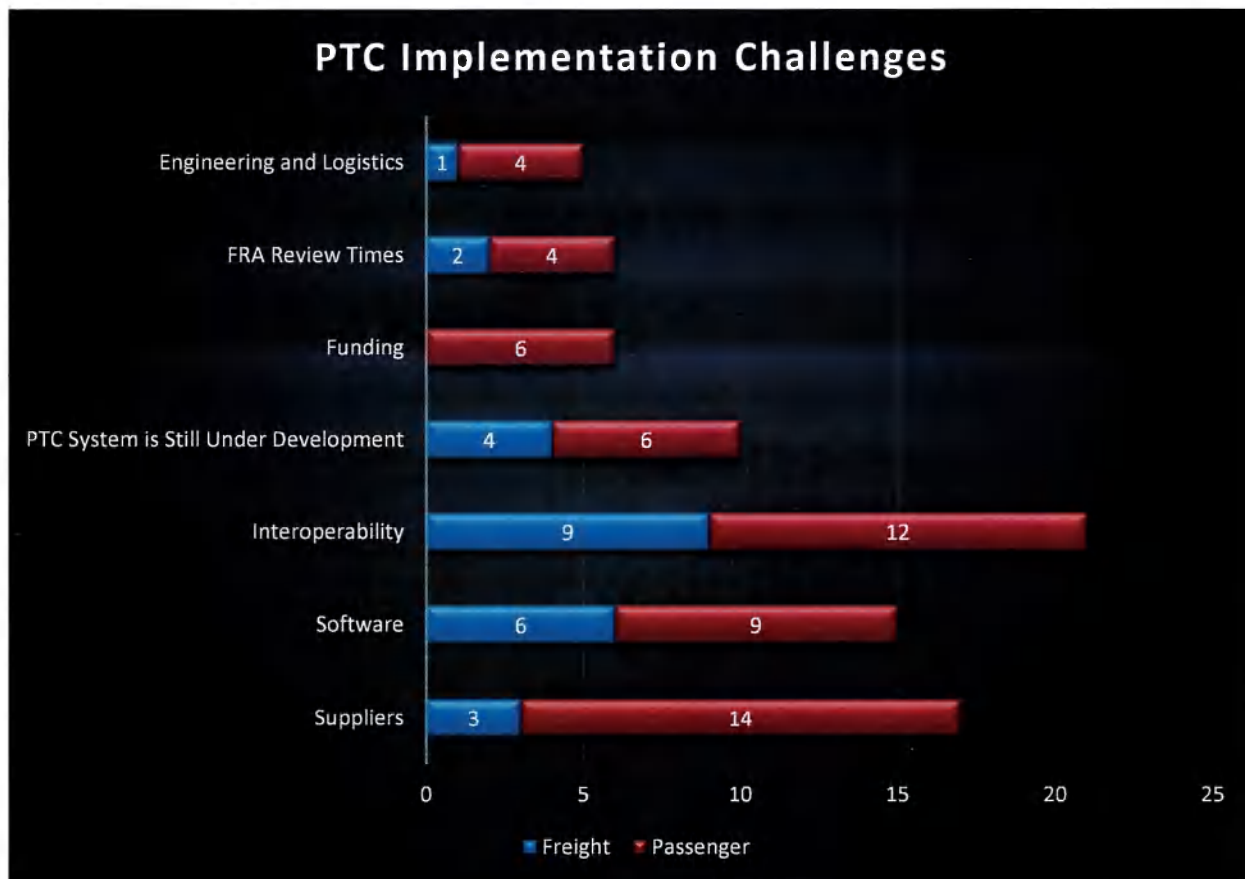


Figure 4 – Challenges Reported in Railroads’ 2017 Annual PTC Progress Reports.

Consistent with previous reports, the key challenges railroads continue to face relate to the limited capacity and resources of PTC system suppliers and vendors, PTC system maturity (including software and system development), and testing and achieving interoperability among host railroads and tenant railroads that operate on the same main lines. These reported challenges echo the discussions and conclusions drawn by FRA during its meetings with railroads’ executive leadership and technical teams and the supplier and vendor industry. These noted challenges are also interconnected, as they relate to the overall maturity of PTC systems as a whole, particularly given the wide-scale deployment required. Before each individual railroad can address interoperability testing with each of the other railroads that operates on the same main lines, a railroad must first achieve stable operation of its own PTC system. Railroads continue to address reliability and capacity issues born from the rapid deployment of PTC systems and the ongoing changes necessary to achieve proper performance of these software-driven and highly complex systems. To support railroads and help address their concerns regarding testing, FRA will hold a second symposium on July 16, 2018, to discuss best practices for PTC system field testing and interoperability testing.

VI. Conclusion

FRA understands that throughout 2018 and continuing in 2019 and 2020, there will be an increase in railroads’ requests for FRA approval of Requests for Amendments to PTC Implementation Plans, requests to conduct PTC system field testing and revenue service

demonstration, and thereafter more railroads will submit PTC Safety Plans to FRA for review and approval, in order to obtain PTC System Certification. To address these needs in a manner that supports accelerated timelines, FRA has increased its PTC workforce through hiring and training, expanded contracts with existing PTC support contractors, and initiated one additional contract to provide technical support to FRA regarding the review of PTC Safety Plans.

At this time, FRA believes that—with limited exceptions—the vast majority of railroads subject to the statutory mandate will meet, and in many cases, exceed, the statutory criteria required to qualify for and obtain an alternative schedule and remain in compliance with this critical mandate. Given the imminent December 31, 2018, statutory deadline, FRA continues to compel each railroad and all stakeholders to carefully consider and evaluate each railroad's PTC system implementation progress to date. It is imperative that railroads understand and properly account for any remaining technical and schedule-related risks.

FRA is strongly urging railroads to achieve full implementation of FRA-certified and interoperable PTC systems on all main lines subject to the statutory mandate in accordance with the congressional deadlines. FRA will continue to transparently track and report on the railroad industry's progress toward full PTC system implementation and to provide technical assistance to railroads to the greatest extent possible to help ensure PTC systems are fully implemented as safely and efficiently as possible.