

Advanced Signal System

FAQ | November 2015



1. WHAT IS CBOSS PTC?

The Communications Based Overlay Signal System (CBOSS) Positive Train Control (PTC) is an advanced signal system project that will monitor and control train movements, providing significant safety improvements, increased reliability and operating performance, and improved capacity and service. The project also fulfills a federal mandate that requires implementation of a Positive Train Control (PTC) system on all commuter corridors. PTC is intended to prevent train-to-train collisions, over-speed derailments, and movement into established work zones or through a misaligned switch.

CBOSS PTC installation began in fall 2013 and is moving north from San Jose to San Francisco. Work includes the installation of a Data Communications System, consisting of conduit, fiber optic cable, and 10 radio base stations. Installation is anticipated to be complete in 2016.

CBOSS PTC is a key element of the Caltrain Modernization Program, which includes electrification of the corridor and replacement of the system's diesel trains with high-performance electric trains.

2. WHY IS THE CBOSS PTC PROJECT NEEDED FOR CALTRAIN?

The CBOSS PTC Project is needed to meet two specific criteria:

- Comply with the Positive Train Control Enforcement and Implementation Act of 2015, which mandates implementation of PTC by December 2018; and
- Increase system operational capacity and performance to accommodate future increases in ridership demand. The Caltrain CBOSS PTC project is also necessary to facilitate the construction and operation of the "Blended System" that will support a modernized Caltrain and future high-speed rail.

3. WHAT IS THE FEDERAL PTC MANDATE?

In response to a fatal train collision in September 2008, Congress passed the Rail Safety Improvement Act (RSIA) of 2008, which updated the Code of Federal Regulations (CFR) to require PTC to be installed along every passenger rail corridor prior to December 31, 2015. In 2015, Congress passed an PTC extension which mandates implementation of PTC by December 2018. For Caltrain, the core safety enhancements provided by PTC include the prevention of:

- Train-to-train collisions by **enforcing movement authority limits**;
- Over-speed derailments by **enforcing speed limits**; and
- Incursions into established work zones by **protecting track work zones** throughout the corridor.

The PTC mandate also requires that all tenant railroads be equipped with PTC solutions that are interoperable, (i.e. allow trains to freely and safely move between different railroads). This is important to Caltrain as its tenant operators include other commuter and intercity railroads, freight, and the future high-speed train service.

4. HOW DOES POSITIVE TRAIN CONTROL (PTC) WORK?

PTC allows individual trains to receive information about their location and where they are safely allowed to travel, also known as "movement authorities." Equipment on board the train then enforces these movement authorities, preventing unsafe travel.

5. WHAT FUNCTIONS ARE UNIQUE TO THE CALTRAIN CBOSS PTC PROJECT?

The CBOSS PTC project includes additional capabilities, beyond those required by the Federal PTC mandate, including:

- **Enhanced crossing safety and performance**—travelers crossing the tracks will benefit from reduced gate-down time and improved local traffic circulation.
- **Improved headways and operation flexibility**—more frequent and dependable passenger service will be possible with trains that are able to travel closer together.
- **Enforcement of scheduled station stops**—a train will no longer be able to overshoot a station stop or platform.
- **Schedule management**—there will be better accountability and management of train schedules.
- **Employee in Charge**—when work is being performed on the rail corridor, there will be an employee (in charge) that has a device that interfaces with the approaching train to enforce work zone safety measures. This helps remove human error and will increase worker safety.
- **Integrated communications**—better communication among all subsystems, such as the Central Control Facility (CCF), train and Wayside, and a new Backup Central Control Facility (BCCF), for improved safety performance for highway vehicles and the riding public.

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6. HOW IS CALTRAIN'S CBOSS PTC SYSTEM FUNDED?

CBOSS PTC is a key element of the CalMod Program, which includes electrification of the corridor and replacement of the system's diesel trains with high-performance electric trains. Of the overall CalMod Program, the CBOSS PTC project accounts for \$231 million of the total cost.

- **Local funds:** \$ 71 million (San Francisco, San Mateo and Santa Clara counties)
- **State funds:** \$113 million (includes \$106M in High Speed Rail Connectivity funds)
- **Federal funds:** \$ 47 million
- **Total Budget:** \$231 million

7. WHEN WILL CBOSS PTC BE INSTALLED AND FULLY OPERATIONAL?

CBOSS PTC completed its final design in summer 2013. Installation and testing will take place through early 2016. The system is anticipated to be in service in 2016.

8. WHAT IS LIMITING CALTRAIN'S SYSTEM OPERATIONAL CAPACITY?

To date, Caltrain has been able to meet the year-to-year increases in customer service demands. However, Caltrain's peak hour system capacity, or the number of trains it can operate using current infrastructure during the busiest commute times, has reached a point where significant service increases are not possible. Caltrain's current signal system limits operational capacity by requiring train separation based on the poorest performing type of train in a worst case manner. CBOSS PTC will minimize the separation of trains to match the safe braking needs based on specific train type(s). CBOSS PTC will also provide positive control over crossing warning systems, allowing trains to avoid missed stops, improve quality of service, and reduce environmental impact. In addition to the capacity improvements offered by CBOSS PTC, Caltrain is proposing to operate high-performance electric-multiple unit (EMU) trains that are more efficient than the current diesel-powered locomotives. These EMUs will help improve operational capacity as EMUs can accelerate and decelerate faster than diesel trains. This means EMUs can provide faster and/or more frequent service to more stations and more riders.

In May 2010, the Federal Railroad Administration (FRA) granted a waiver to Caltrain allowing EMUs to operate on the Caltrain corridor as long as the corridor is equipped with PTC technology.

9. HOW WILL CALTRAIN'S CBOSS PTC INTERACT WITH CALIFORNIA HIGH SPEED RAIL?

Federal law requires the CBOSS PTC system to be interoperable with all rail service along the Caltrain corridor, including high-speed rail. Caltrain is working in close coordination with the California High Speed Rail Authority (CHSRA) to ensure the project is compatible with future high-speed rail service.

10. INTEROPERABILITY: WHAT IS IT, WHY IS IT NEEDED, AND HOW WILL IT BE ACHIEVED?

A key provision of the federal mandate is that host and tenant railroads must be equipped with PTC solutions that are interoperable and allow trains to freely and safely move between the different railroads.

The Caltrain CBOSS PTC project will ensure that Caltrain, the host railroad, is interoperable with its tenant operators, which include:

- Union Pacific Railroad (UPRR), which operates freight rail service; and
- Passenger rail operators including Capitol Corridor Joint Power Authority, Altamont Commuter Express (ACE), and Amtrak. In addition, the California High Speed Rail Authority (CHSRA) or its designated operating agent is considered a future tenant operator with planned HSR service between San Francisco and San Jose. Class 1 railroads in the United States have formed the Interoperable Train Control Committee that is in the process of developing protocol/communications standards to provide for interoperability. Caltrain and its tenant operators, which are all Class 1 railroads, have committed to following the developed interoperability standards. The signal system and on-board equipment being developed and procured through the Caltrain CBOSS PTC Project will utilize these standards to ensure interoperability to enable transparent, seamless operation on tracks belonging to Caltrain and the UPRR.

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11. WHY NOT PROCURE AN OFF-THE-SHELF PTC PRODUCT?

The most promising radio based PTC technologies are in the development stage and, while they show great promise for the railroad industry, all have been designed largely to respond to the needs of the freight rail industry and are not tailored for the unique requirements of passenger rail operations. PTC provides core safety capabilities that are intended to benefit all operators. However, the manner in which intervention mechanisms are implemented may result in decreased operating performance if care is not taken to incorporate specific passenger operating needs. The specifications of the signal system designed for the Caltrain CBOSS PTC Project have been developed to meet the core safety functions of PTC and to fill in the gaps by addressing specific passenger rail and Caltrain needs.

12. WHAT IS INCLUDED IN THE CALTRAIN CBOSS PTC SCOPE OF WORK?

Caltrain's CBOSS PTC includes a complete and fully functional PTC system that is integrated with its existing systems and complies with federally mandated requirements. The scope of work includes:

- Design, procurement, manufacture, installation, and testing, inclusive of any necessary modifications to Caltrain's systems, subsystems, vehicles, and facilities
- Caltrain PTC system fixed infrastructure that is interoperable with Caltrain's tenant railroads' PTC equipped trains
- Safety engineering and system safety certification
- Training simulator and training service
- Updated Caltrain operating rules, maintenance and inspection procedures and other documents required to support the operation and maintenance of the Caltrain PTC system
- Coordination and support of FRA requirements
- System integration, project coordination, and management

Caltrain CBOSS PTC system consists of the following major elements:

- Wayside subsystem
- Data Communications Subsystem, including backhaul system
- On-board subsystem
- Back office subsystem
- Employee in Charge (EIC)
- Backup Control Center Facility (BCCF)

13. WILL CBOSS CHANGE A CITY'S EXISTING SIGNALING INFRASTRUCTURE?

No, CBOSS is an overlay system and the existing wayside signal system will remain intact. The interface to the city's traffic signal system from the highway-grade crossing system will remain the same.

14. WOULD CBOSS PTC PREVENT AN INCIDENT SIMILAR TO THE JULY 2013 TRAIN DERAILMENT IN SPAIN?

Yes, CBOSS PTC will prevent over-speed derailments by enforcing speed limits. If an operator ignores the speed limit, the PTC equipped train will automatically activate the brakes to slow the train down and prevent unsafe travel.

FOR MORE INFORMATION / PARA MÁS INFORMACIÓN

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