Communications Based Train Control Update

October 12, 2023 | BART Board of Directors Meeting
Overview

Legacy Train Control 01

Benefits of CBTC 02

Wayside Progress 03

Software/Hardware Progress 04

Vehicles Progress 05

Current Status 06
Legacy Train Control

Fixed-block signaling system

Animation Slide
Limitations of Current Fixed-Block Train Control

**Speed and Throughput**
- Fixed Speeds Within Track Circuit 27, 36, 50, 70, 80 mph
- Headway Limited Between Trains
  - Avg 1500ft
- Delays from Incidents Unrecoverable

**Physical**
- Equipment Located Within Trackway
- Equipment Wayside Limited Access
- Environmental Impacts
Oakland Wye “A triangle of railroad track used for turning trains. All mileposts are measured from the wye”
30 Trains Per Hour through the Wye only with CBTC

- Richmond
- Antioch
- West Oakland
- Transbay Tube
- 3.8 Miles
- Oakland Wye
- Dublin/Pleasanton
- Berryessa/North San Jose
- Millbrae

Travel Times:
- 25 mins
- 45 mins
- 55 mins
CBTC Train Control

Moving - block signaling system

Animation Slide
The Future is CBTC

Tracking CBTC Benefits

- Frequency
- Flexibility
- New Technology
- Smoother Ride
- Sustainable
CBTC Basics

- Carborne Controller
- Wireless Communications Unit
- Wheel Speed Sensor
- Transponder Interrogator Antenna
- Transponder
- Rooftop Wireless Antenna
- Central ATS
- Train Control Room
- Local ATS
- FrontAM
- Microlok ViPro Interlocking
- Zone Controller
- Wayside Wireless Antenna
- Axle Counter
- Wayside
- Software/Hardware
- Vehicles
- BART
CBTC Implementation at BART - Scope

- Test Concepts and overlay Test Tracks with new CBTC equipment.
- Implement a new Automatic Train Supervision (ATS) System.
- Install new onboard CBTC equipment on the Fleet of the Future vehicles.
- Deploy Hitachi Rail’s new CBTC System across the BART Network.
- Meet capacity of 28 trains per hour through the Transbay Tube with Phase 4 Implementation.
- Final capacity of 30 trains per hour through the Transbay Tube with CBTC across system after phase 8.
Wayside, Software/Hardware, & Vehicles

**Wayside**
- 4500 Transponders
- 1100 Radio Antennas
- Train Control Houses
- Fiber Optic Cables
- Switch Power Cables
- Signal Cables
- Enabling Works

**Next Milestones**
- K line Enabling Works Contract NTP Q124
- Hayward Test Track Train Control House Q224

**Software/Hardware**
- CBTC Core Software - Phoenix
- Automatic Train Supervision (ATS)
- Data Communications System (DCS)
- “Yams” Intelligent Asset Management System (IAMS)
- SCADA

**Next Milestones**
- ATS Software Release #6 Q124
- CBTC Core Phoenix #2 Q324

**Vehicles**
- Radio Antenna
- Carborne Controller
- Speed Sensor
- Transponder Interrogator Antenna
- Pilot Vehicle
- Captive Fleet

**Next Milestones**
- Test Antenna on Pilot Car Q423
- Finalize Design for all Components Q423
Wayside Progress

Hayward Test Track (HTT)
- 320 Feet of Duct bank
- 90 Feet of Armorcast cable raceways
- Survey/assessment and power load analysis

A-Line, C-Line, K-Line, R-Line
- 27 Train Control rooms Asbestos Assessment

M-Line
- 8 Train Control Rooms Asbestos Mitigation
- 5 Cabinets installed
Software/Hardware Progress

**Automatic Train Supervision (ATS)**
- Software Release #5 test running at BHQ
- ATS Hardware Factory Acceptance Test

**Data Communications System (DCS)**
- Hardware under construction

**Intelligent Asset Management System (IAMS)**
- Software Release V2 running at BHQ
Vehicle Progress

• More than 2000 Design Reviews

• Sleep mode on train cars

• Technology Development to use existing under car-to-car cables for CBTC on E cars

• Critical Component Designs complete
CBTC SYSTEM

WaySide

Vehicle

Software/ Hardware

Operations
Installing CBTC throughout the System

2-Year Look Ahead

- Vehicle FDR
- Pilot Vehicles Procurement
- Pilot Installation & Testing
- ATS
- Phoenix

- Fiber Optic Cable Pull
- Train Control House
- CBTC (Wayside)
- Communications (Wayside)
- Testing & Commissioning
- Communications (OCC)
- Automatic Train Supervision
- Testing & Commissioning
- Survey - Wayside
- Train Control House
- Wayside Equipment

- Design
- Procurement
- Field Installation
- Factory Test / Release
- Field Test
- Survey

2023
2024
2025

- ATS Rel 6
- ATS Rel 7
- ATS Rel 8
- Phoenix 1
- Phoenix 2
- Phoenix 3
- Phoenix 3.X

- Wayside Survey Performed on Oct 2, 2023
- Through Jan ’26

- Through Jan ’26
Thank You