ATCS System and Train Control Upgrade Program

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Presentation Outline

• SFMTA Overview
• What is Train Control?
• ATCS System Overview
• Current Challenges
• Roadmap for the Future
SFMTA Overview

• Over 73,000 daily boardings
• 71.5 Miles of track (5.8 Miles in tunnel)
• 9 Subway stations; 24 Surface stations
• 87 Surface stops
• 2 LRV Yards
What is Train Control?

Primarily, train control is a safety system which is designed to prevent train-to-train collisions.

Generally, train control systems do not address the risk of collision between trains and other vehicles, bicycles, or pedestrians. These capabilities are currently being researched.
What is Train Control? (cont)

Secondarily, more modern train control systems can be used to manage rail service, giving operations staff the tools to monitor and adjust trains’ speeds and dwell times to ensure the trains stay on schedule and maintain consistent headways.
What is Train Control? (cont)

Generally, there are two types of train control:

Fixed block

Moving block
Existing Signaling Systems

• Above Ground
  • Line of sight manual operation with Transit Signals
  • VETAG for Train Operator switch position request
  • VETAG for Traffic Signal interface
  • VPI and relay based interlockings

• Market St. and new Central Subways
  • Thales Seltrac IS: loop based, with ATO
  • Secondary Train Detection using Axle Counter Blocks
A Surface Interlocking (3rd & 25th)
ATCS System Overview
VCC – Vital Control Computer

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PG 1
ATCS System Overview
Station Controllers
Wayside Equipment
ATCS System Overview
Carborne Equipment (VOBC)
ATCS System Overview

Abbreviations/Acronyms
- ACE: Automatic Control Evolution
- ATCS: Automatic Train Control System
- CCOT: Control Room Operator Terminal
- CEB: Central Emergency Stop Button
- DDU: Driver's Display Unit
- DVA: Digital Voice Announcement
- EAK30C: Axle Detector Electronics Unit
- EFID: Entry Feed In Device
- FID: Feed In Device
- LSMC: Local System Management Center
- OCC: Operator Control Center
- PESB: Passenger Emergency Stop Button
- RFB: Remote Feed Box
- RTB: Remote Terminating Box
- SER: Station Equipment Room
- Sim: Simulator
- SIC: Axle Detector Headers
- SMC: System Management Center
- TMC: Transportation Management Center
- UPS: Uninterruptible Power Supply
- VCC: Vehicle Control Center
- VUOC: Vehicle On-Board Controller

Legend
- Inductive Loop Cable
- Interconnection Cable
- Wireless Signal
- Station Controller Subsystem
- Central Control
- Inductive Loop Communication Subsystem
- Ancillary Wayside Equipment
SMC – System Management Center
ATCS System Overview
Current Challenges
Geography
Portal Delays
Communication Issues
Breakdowns
System Failures
Surface Variability / Turnbacks
Roadmap for the Future

- Technology Upgrades
- System Expansion
- New Capabilities
Technology Upgrades

• Replace loop cable with wireless
• New onboard computers
• New central computers
• New axle counters / secondary detection

Would address:
System Failures  Communication Issues
Portal Delays
System Expansion

Expanding the system to the surface would eliminate some key geographic issues, specifically

**Portal Delays:** Reduced by the trains staying within the system

**Communication Issues & Breakdowns:** Reduced by the trains entering at yards, where issues can be addressed.

**Subway Congestion, Surface Variability, and Turnbacks:** Controllers would be able to ‘see’ trains in the entire system, allowing them better opportunity
Connection to Traffic Signals
New Capabilities

• In-cab signaling
• Coordination with traffic signals
• Enforcement of signal violations
• Automatic Fault Monitoring
• Adaptive headway management
• Reverse running and special events
Questions?