

Improving Rail Safety using Non-Vital Solutions

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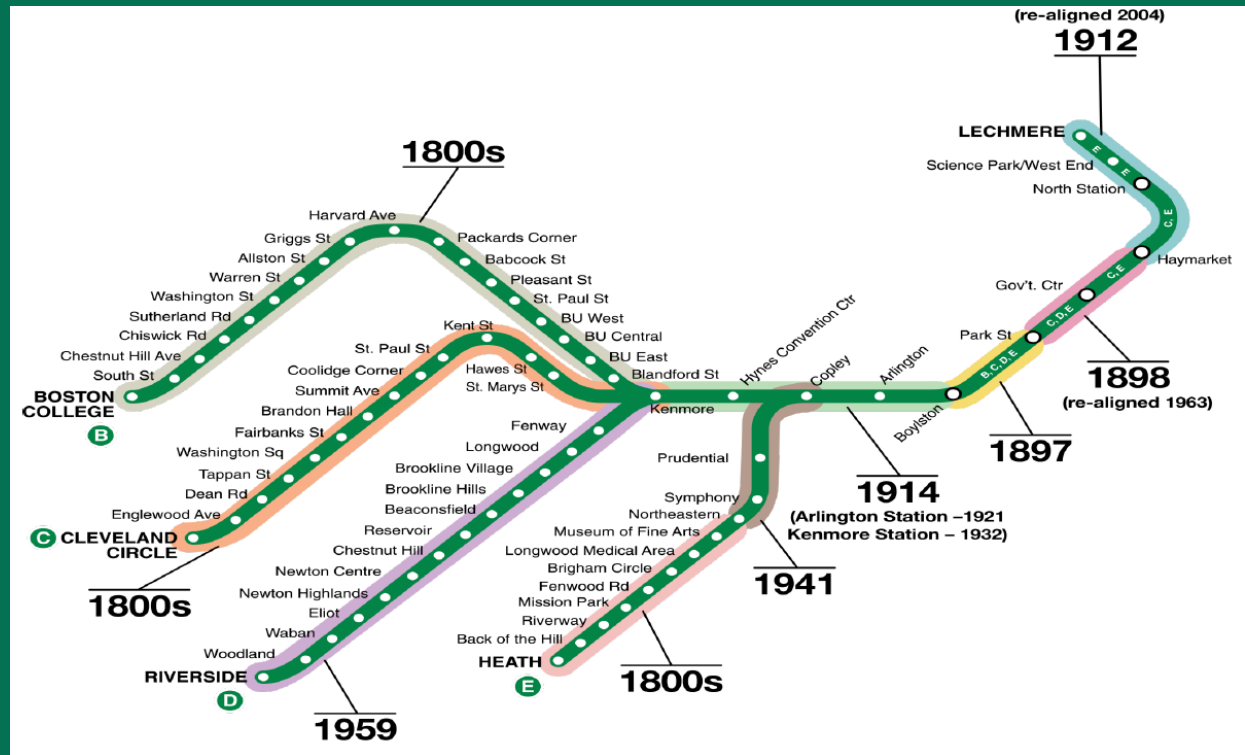
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Rail Conference



Case Study: The MBTA Green Line

- First Subway in the Nation
- 31 Miles of Track (Tunnel, Street and dedicated ROW)
- 225,000+ Passenger trips daily
- 66 Stations
- 228 Vehicles
 - 110 High Floor (Type 7)
 - 94 Low Floor (Type 8)
 - (+24 on order) (Type 9)



MBTA Signaling

- The Green Line currently uses an Automatic Block Signaling (ABS) system
- No onboard ATC/ATO/PTC
- Line of sight signals combined with manually operated trains
- Track circuit constraints
- Power related constraints
- Tightly spaced signal blocks



Background

- July 2009: NTSB Safety Recommendation
- December 2012: Green Line PTC study completed
- January 2013: MBTA Safety Assessment completed
- September 2014: Green Line PTC Alternative Study completed
- March 2016: Conceptual Design Finalized
- October 2016: GLTPS RFP Released



Green Line PTC Study

- Significant capital costs
- Lengthy project duration
- Extensive infrastructure upgrades required leading to wide-scale system shutdowns
- Significant loss of throughput and increase in average trip time
- Increased track investment and maintenance

MBTA Safety Assessment

- Train-on-train collisions
 - Signal Violations
- Over-speed derailments
- Work zone incursions
- Movement of a train through a main line switch in the incorrect position



Major Functionality Identified

- Most Safety Critical Functions to the Green Line
 - › Reduce the risk of red signal violations
 - › Reduce the risk of train-to-train collisions
- Additional Functionality
 - › Overspeed Protection (Permanent and Temporary)
 - › Right-of-Way (ROW) Worker protection



PTC Alternatives Study

1. Mechanical Trip Stops
2. Collision Avoidance Warning Systems
3. Inductive Trip Stops
4. Cab Operator Alerter with Penalty Brake
5. Train Proximity Alerter with Penalty Brake
6. Autonomous Automatic Emergency Braking
7. Radio-Based Train Protection
8. Other Properties Reviewed:
 - Calgary Transit
 - Toronto Transit Commission
 - Maryland Transit Authority
 - SEPTA (Philadelphia)
 - MUNI (San Francisco)
 - Metro Houston



Strengths & Weaknesses

Strengths

- Integrates into existing system
- Scaled implementation
- Low maintenance
- Expandability
- Lower cost
- Shorter project duration

Weaknesses

- Limited use in transit
- Cannot provide instantaneous speed restrictions
- Limited customer base for proving new technologies



GLTPS RFP Release

- October 11, 2016 Green Line Train Protection System (GLTPS) RFP released
- Moving into Proof of Concept Demonstrations



Lessons Learned

- Know your system
- Proof of Concept to reduce technical risk
- Phased procurement which doesn't just take lowest bidder. (Best Value instead of Lowest Price)
- Contact the MBTA if desired