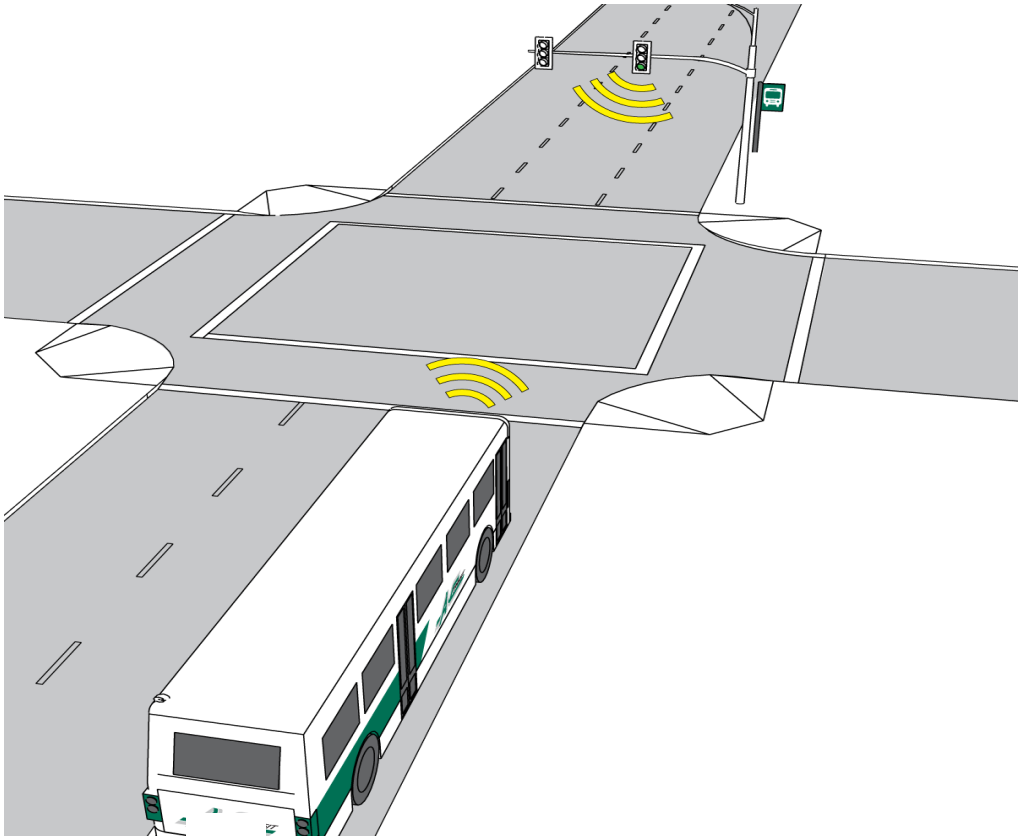
Massachusetts Bay Transportation Authority

Transit Signal Priority (TSP)

Fiscal & Management Control Board

October 23, 2017

Overview



- Service Delivery Context
- About TSP
- MBTA TSP Strategy
- TSP Signal Pilot Results
- Proposed TSP Corridor Pilots
- Proposed TSP Roll Out Strategy

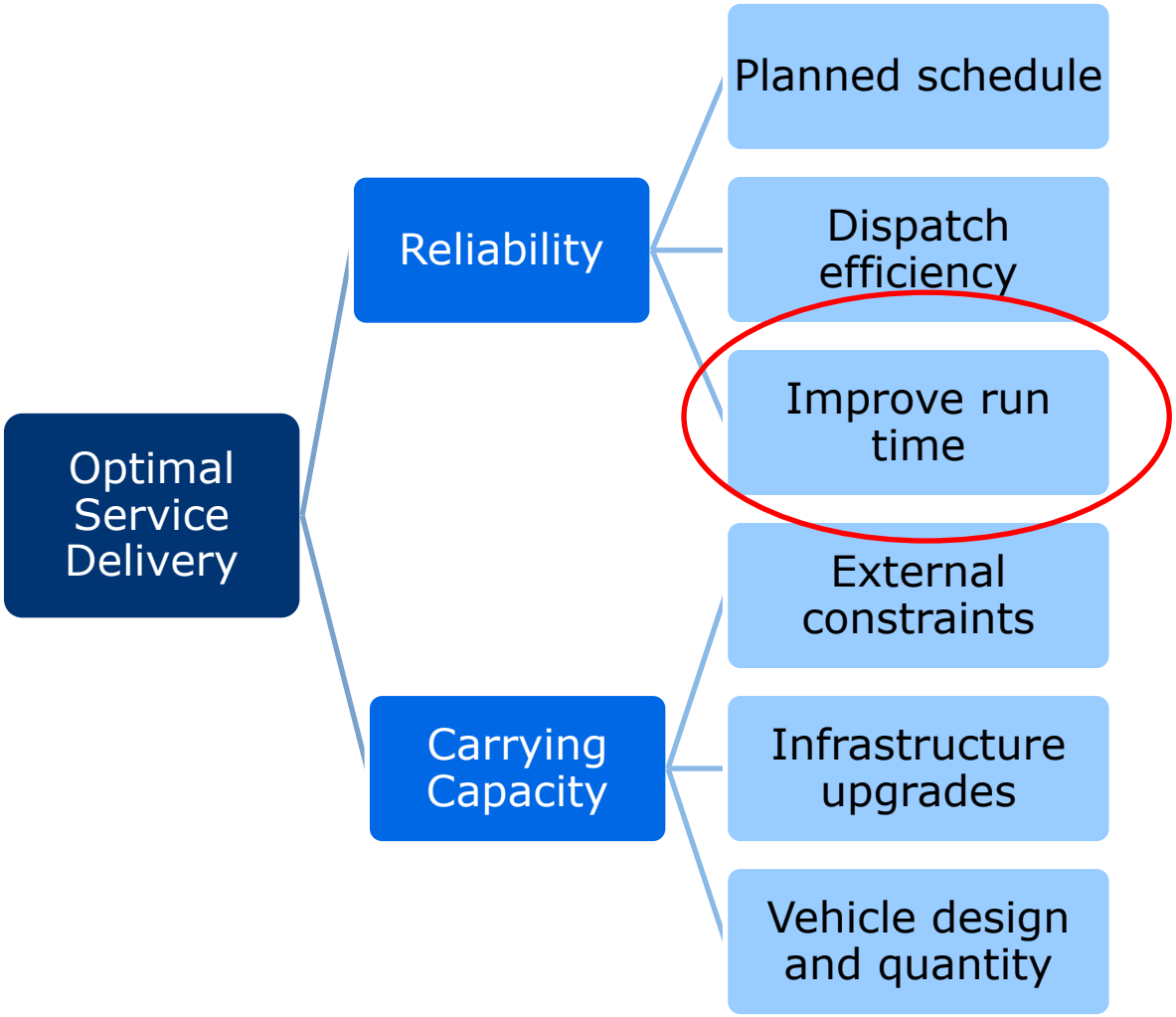
Image Source: AC Transit

Service Delivery Context

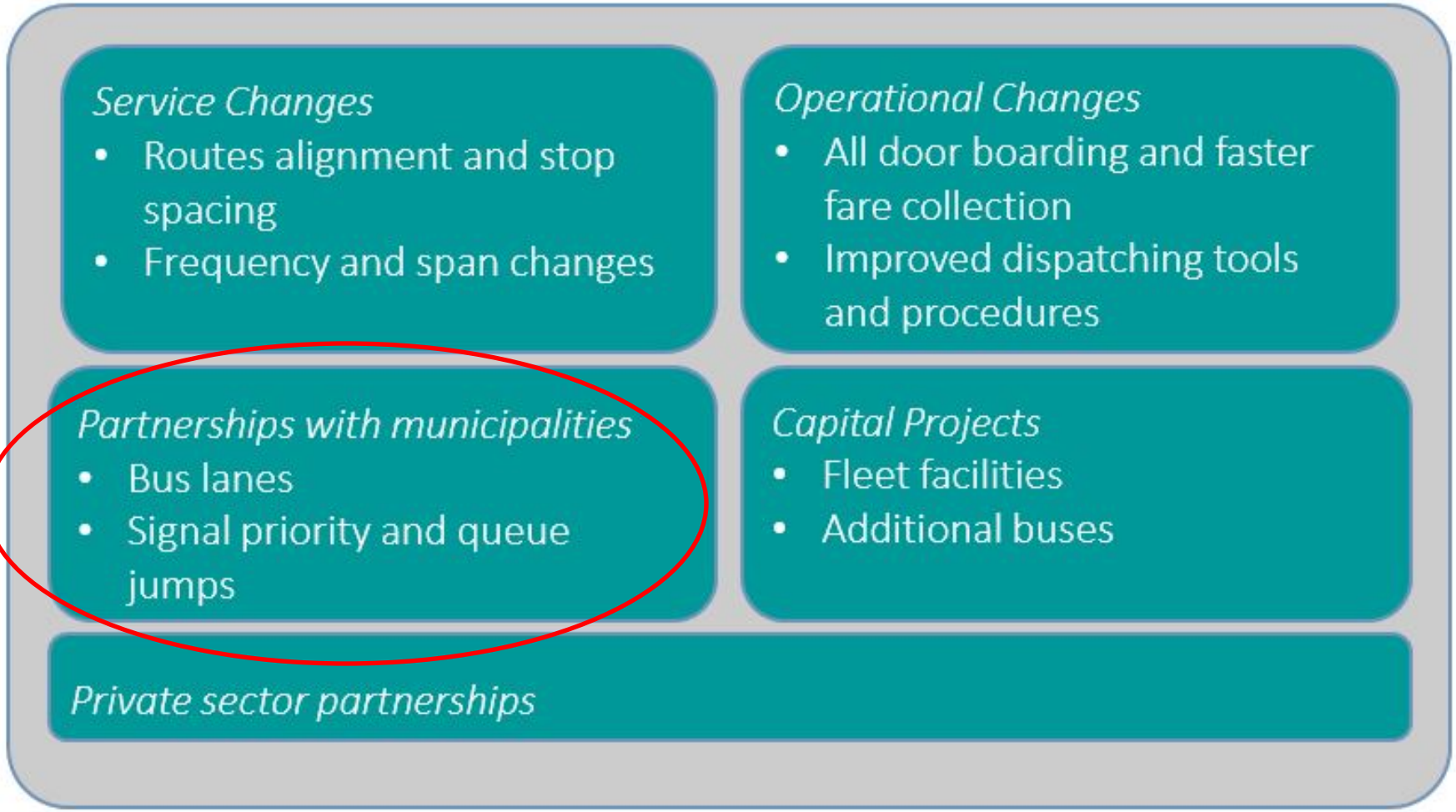
Image Source: @milesontheMBTA

TSP in Service Delivery Context

Optimal service delivery means trains/buses arrive within their scheduled headway, and with enough space for all passengers to board.



TSP: A Tactical Tool



About TSP

Image Source: @milesontheMBTA

What is TSP?

TSP uses technology to reduce dwell time for transit vehicles operating in mixed traffic by extending green-light-time, or shortening red-light-time.

TSP helps:

- Improve reliability
- Reduce travel time
- Increase network capacity
- Enhance OTP

MBTA TSP Communications Scheme

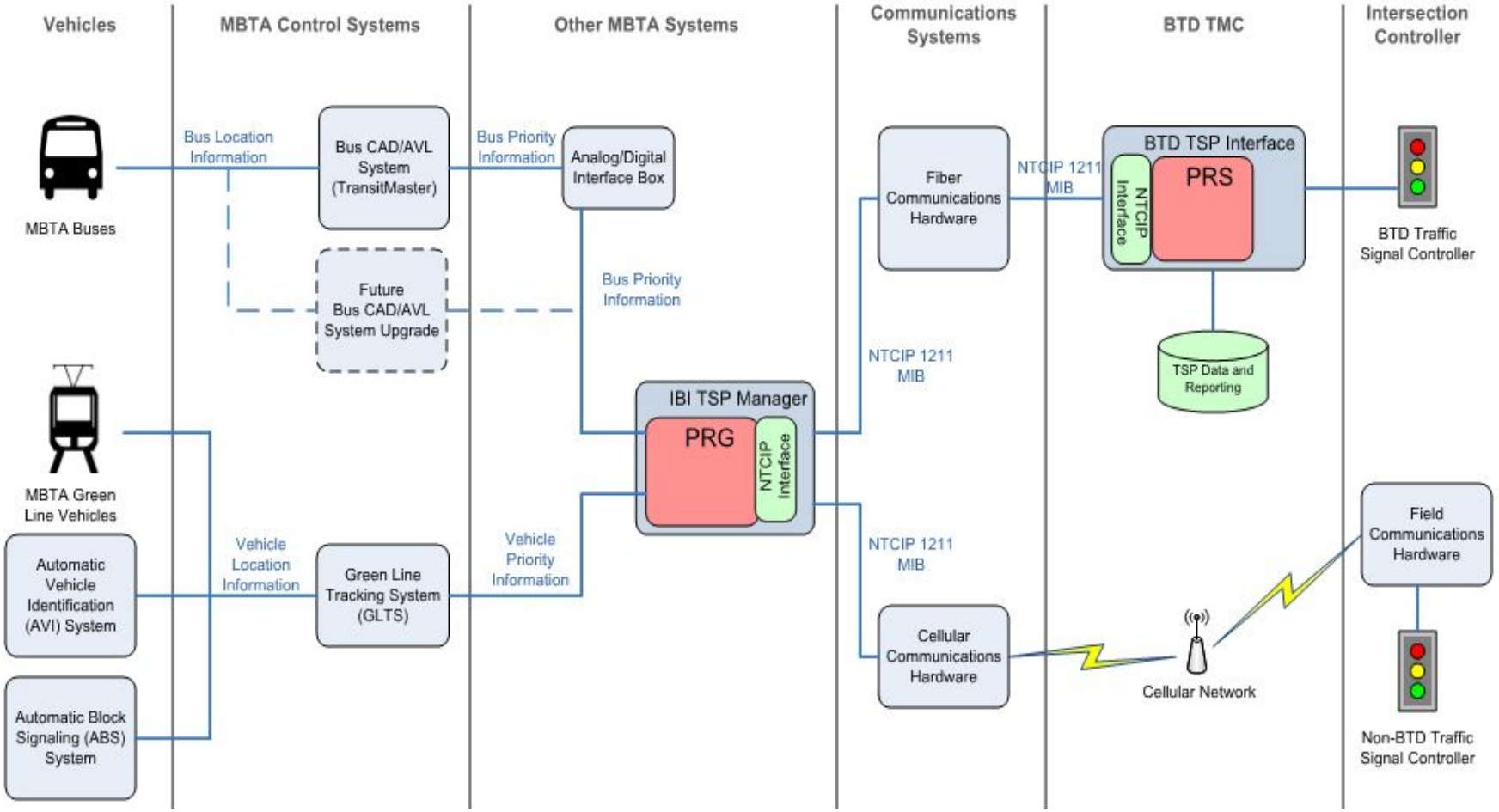


Image Source: IBI Group

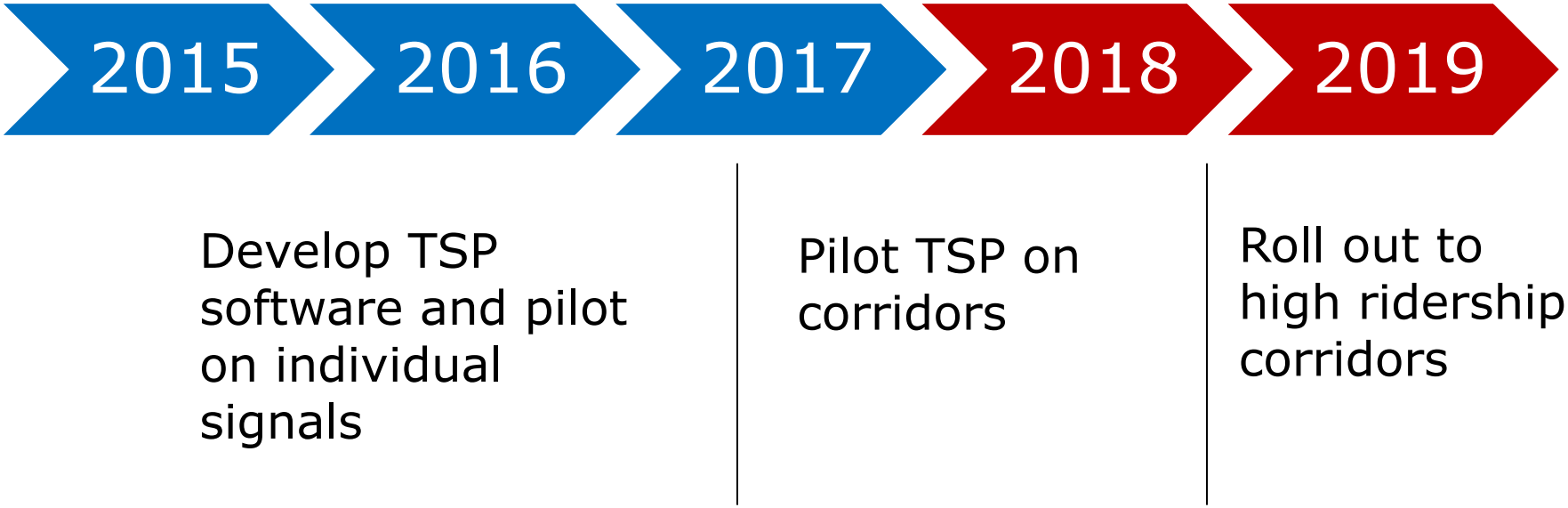
MBTA Requirements for TSP Implementation

- Municipal partnership
- Availability of green/red-light-time to "borrow"
- Modern traffic control device with space for additional hardware
- Far side or no stop at intersection
- Applicable to bus and light rail (surface)

MBTA TSP Strategy

Image Source: MBTA

MBTA TSP Pilot Strategy



- Municipal partnership has been continuously cultivated, and TSP implementation will continue with city/town support.

TSP Signal Pilot Goals

- Develop software to connect light rail, buses, and municipal signals
- Develop protocols to send and receive TSP requests
- Create a scalable, transferable, and feasible implementation process
- Successfully give priority to MBTA vehicles in the field

TSP Signal Pilot

TSP Signal Pilot Summary

- Eight signals at six intersections in three municipalities
- Two modes: bus and light rail; three Green Line branches
- Varying data collection time periods – 5 to 9 days

Signal	Arterial	Mode	City/Town	Route or Branch
Brookline St. (IB/OB)	Massachusetts Ave.	Bus	Cambridge	1, CT1
Carlton St. (IB)	Beacon St.	Light Rail	Brookline	C Branch
Evans Way (IB/OB)	Huntington Ave.	Light Rail	Boston	E Branch
Longwood Ave. (IB)	Huntington Ave.	Light Rail	Boston	E Branch
Saint Mary's St. (OB)	Commonwealth Ave.	Light Rail	Boston	B Branch
Silber Way (IB)	Commonwealth Ave.	Light Rail	Boston	B branch

Signal Pilot Results – Green Line B & E Branches

Results from 9 days of data from 5 signals at AM peak:

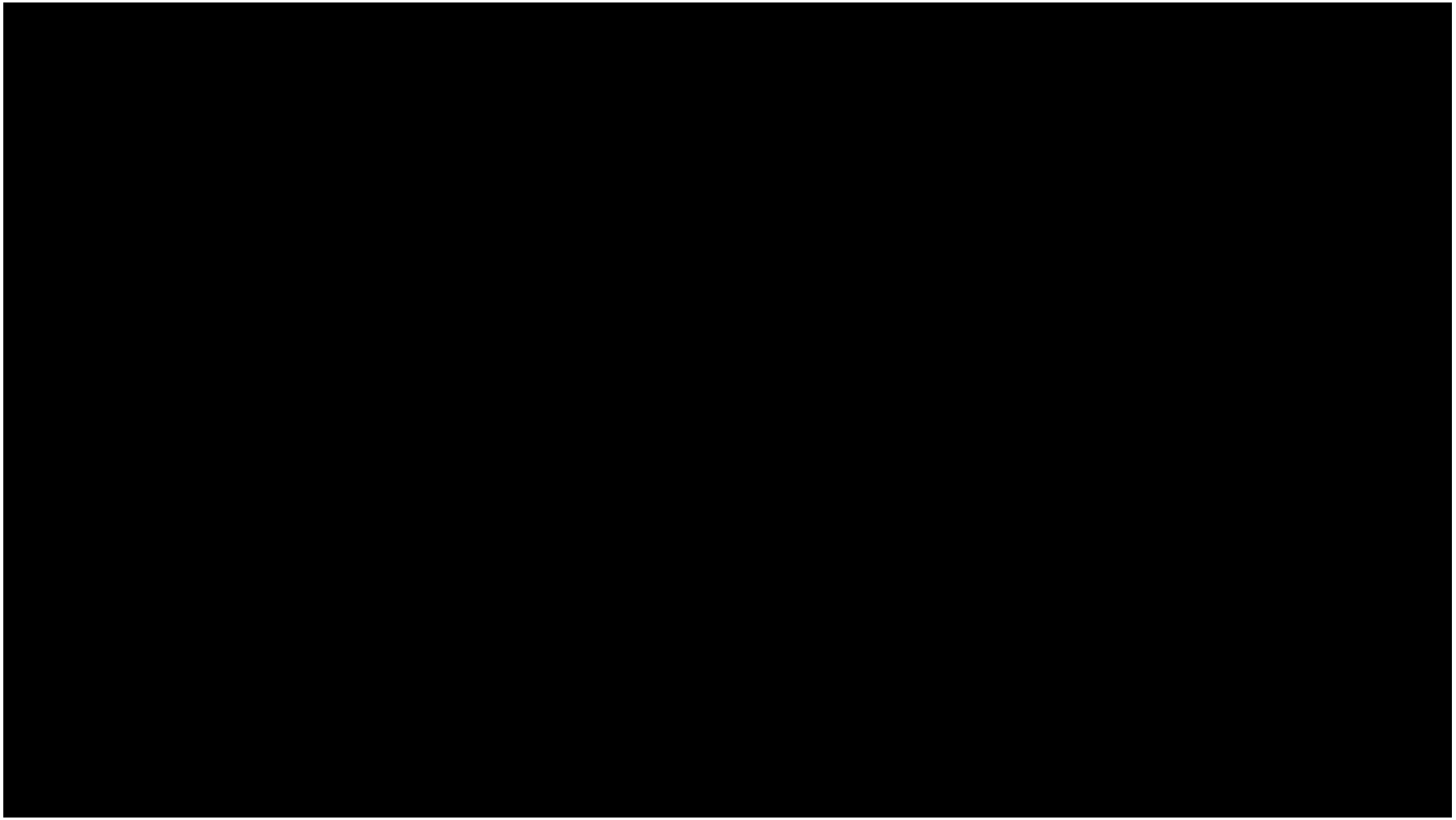
- Priority was granted 390 times
- Green-light-time extended by 14 seconds (average)
- Red-light-time reduced by 8 seconds (average)
- No demonstrable negative effect to general traffic
- Operational since May 2017

Signal Pilot Results –Green Line C Branch

Results from 5 days of data from 1 signal at AM peak:

- Priority was granted 83 times
- Green-light-time extended by 10 seconds (average)
- Red-light-time reduced by 6 seconds (average)
- No demonstrable negative effect to general traffic
- Operational since June 2017

Signal Pilot Results – Bus Routes 1 & CT1 (Video)



Signal Pilot Results – Lessons Learned

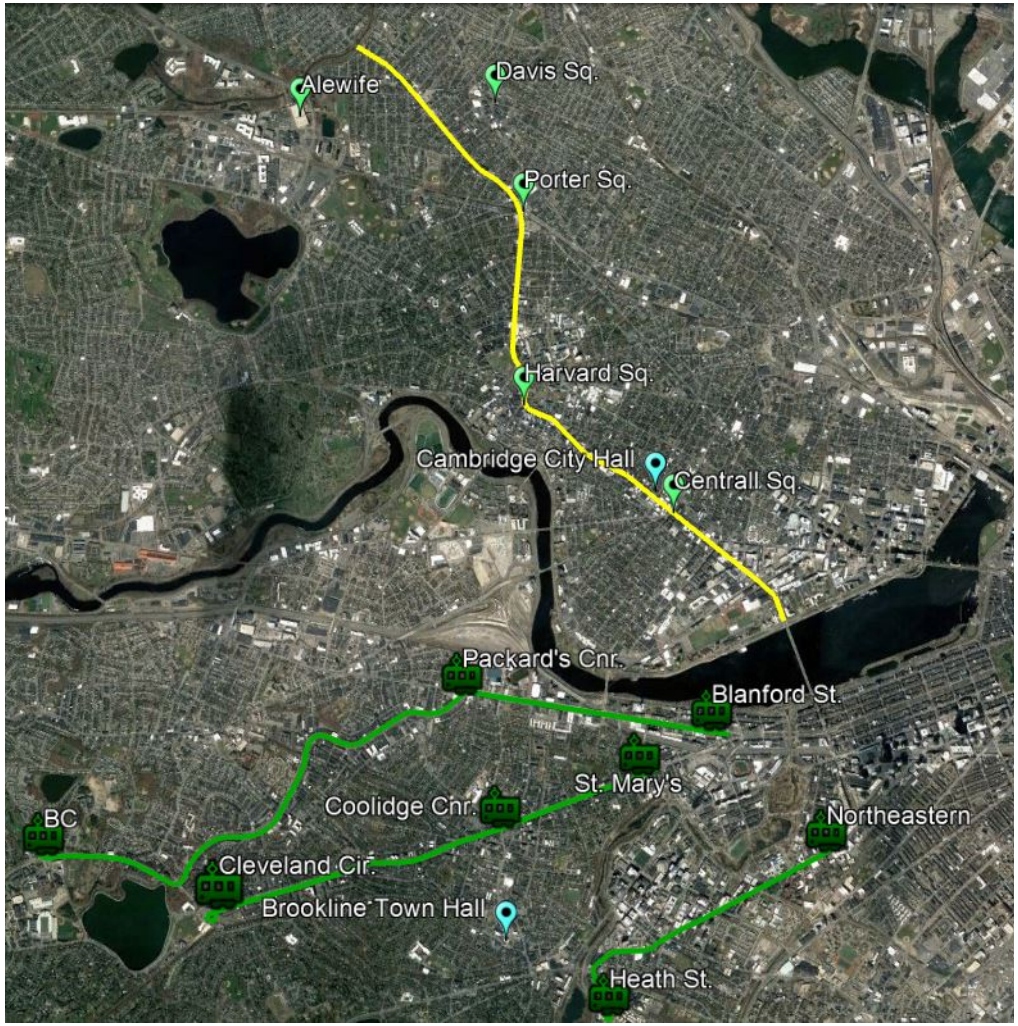
- TSP moves buses and train through signals faster.
- Impact on customers is difficult to measure at the signal-level. A corridor approach is recommended.
- Success depends on fast processing time, municipal support, and internal resources.

Proposed TSP Corridor Pilots

Image Credit: @milesonthembta

Four TSP Corridor Pilots Proposed

- Beacon Street in Brookline
- Commonwealth Avenue in Boston
- Huntington Avenue in Boston
- Massachusetts Avenue in Cambridge



Proposed Green Line Pilot Corridors

Beacon Street:

- 9 additional signals serving the Green Line C branch

Commonwealth Avenue:

- 20 additional signals serving the Green Line B branch

Huntington Avenue:

- 10 additional signals serving the Green Line E branch

Proposed Bus Pilot Corridor

Massachusetts Avenue:

- 50 additional signals between the Boston and Arlington borders in Cambridge.
- Serving segments of bus routes: 1, CT1, 47, 64, 68, 69, 70, 70A, 71, 72, 73, 74, 75, 77, 77A, 78, 83, 86, 96

Image Source: @milesontheMBTA

Estimated Cost for Proposed Corridor Pilots

City or Town	Pilot Corridor	# Signals
Boston	Commonwealth Avenue	20
Boston	Huntington Avenue	10
Brookline	Beacon Street	9
Cambridge	Massachusetts Avenue	50
		89

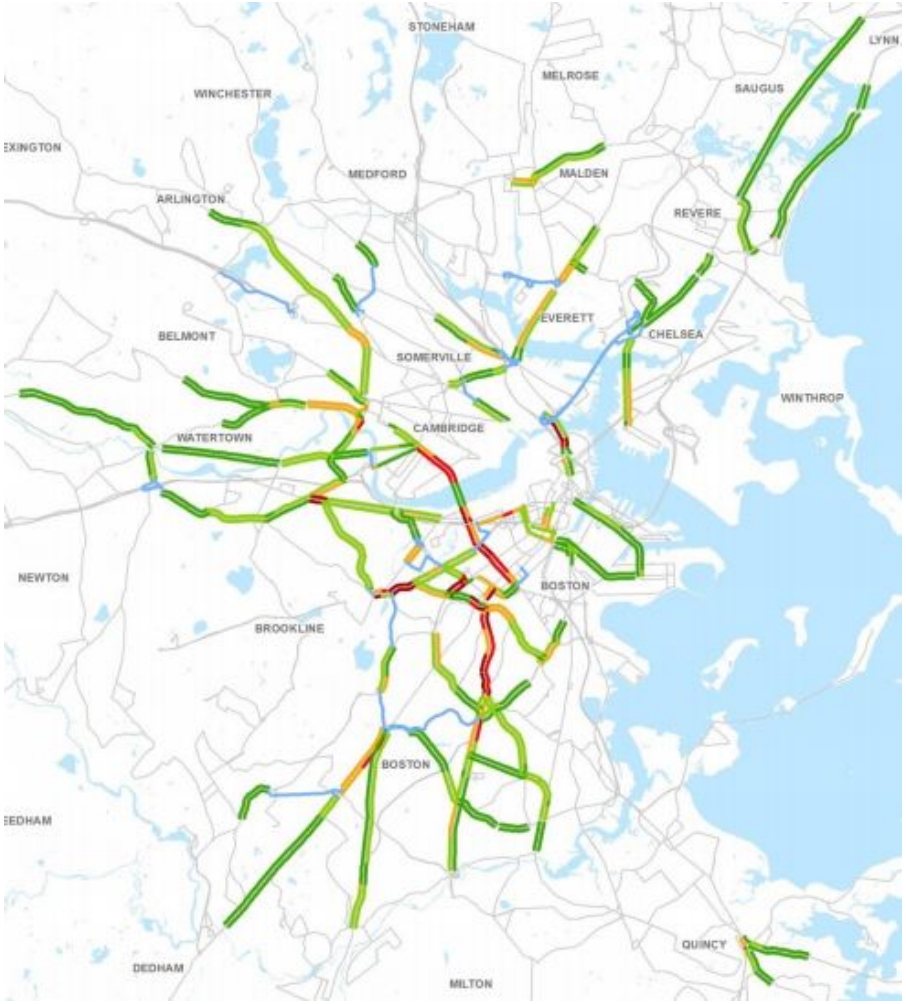
- Estimated pilot cost: $1.125 million, or $12,640 per signal

Proposed TSP Roll Out Strategy

Post-Pilot TSP Roll Out Strategy

1. Focus on high-ridership, high-delay corridors
2. "Piggyback" on other traffic signal projects to add TSP
3. Emphasis on municipalities eager to partner
4. Concentrate on dedicated bus lane corridor candidates

Roll Out: High Ridership & High Delay TSP Corridors



2016 CTPS study of high-ridership bus corridors with high rates of delay.

- Roads identified in 20 communities serving dozens of MBTA bus routes.
- All Key Bus Routes operate on parts of these corridors.

Image by CTPS

Roll Out: Piggybacking on Existing Projects

Case Study: Blue Hill Ave. & Warren St. Traffic Signal Improvement Project

- Joint Highway/BTD initiative to rebuild 16 intersections, including new traffic signals by 2019
- MBTA is working to ensure that TSP is included in the project during design.
- Touching on bus routes 14, 19, 23, 28, 29, 44

Image Credit: @milesonthembta

Thank you!