

Capturing data and turning it into action

**Building a foundation for reliable, fast, high
occupancy vehicle travel**

TriMet Fixed Route Bus

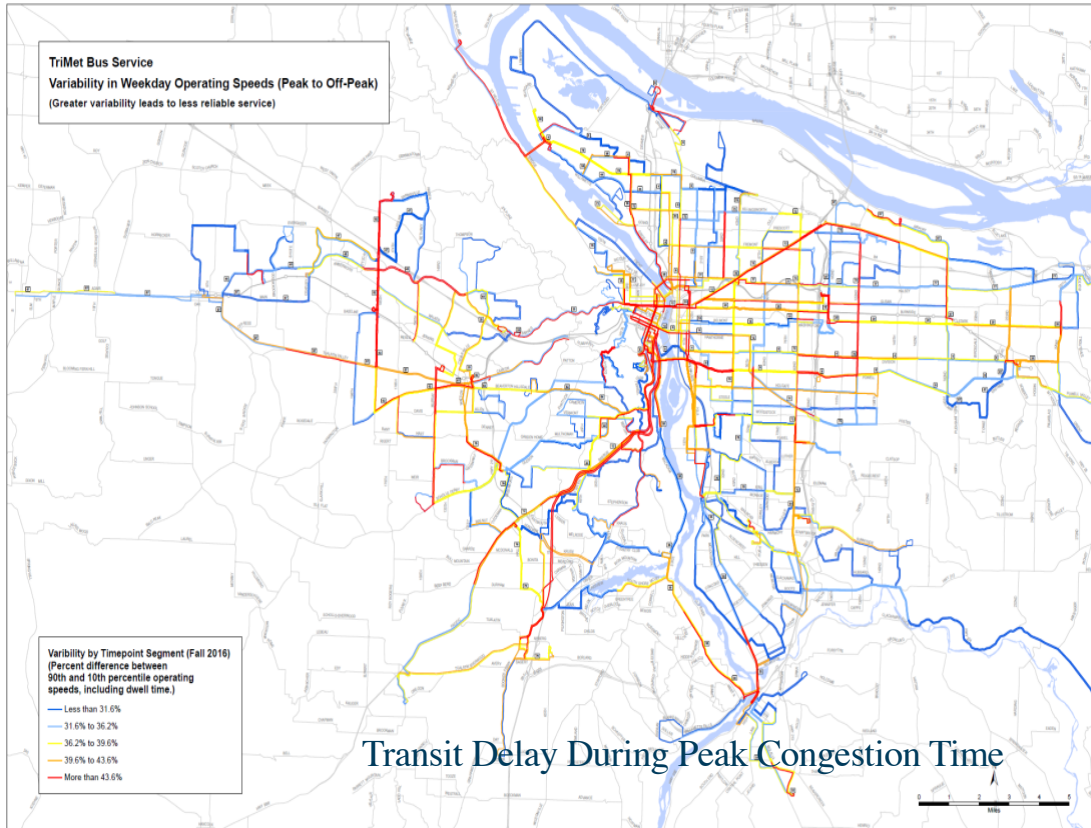
Collects:

- On time performance of
 - Vehicle
 - operator
- Passenger load
- Direction/Heading
- Accurate GPS Location

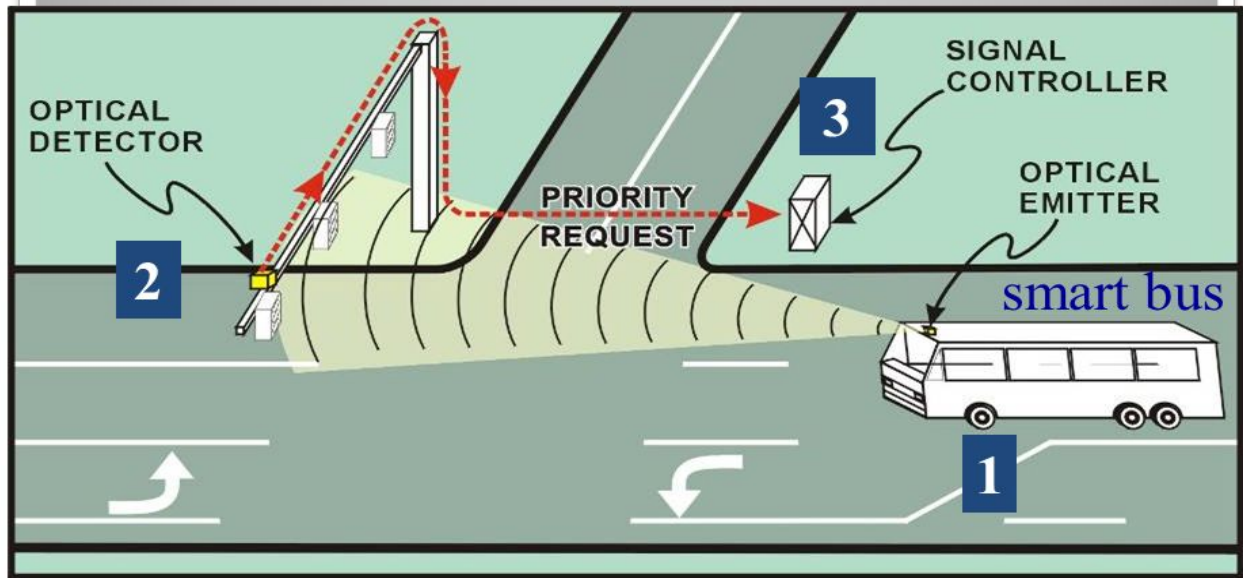
Provides:

- Automatic Stop Announcement
- Electronic Fare Validation
- Turn By Turn Direction
- First Generation TSP
- CCTV

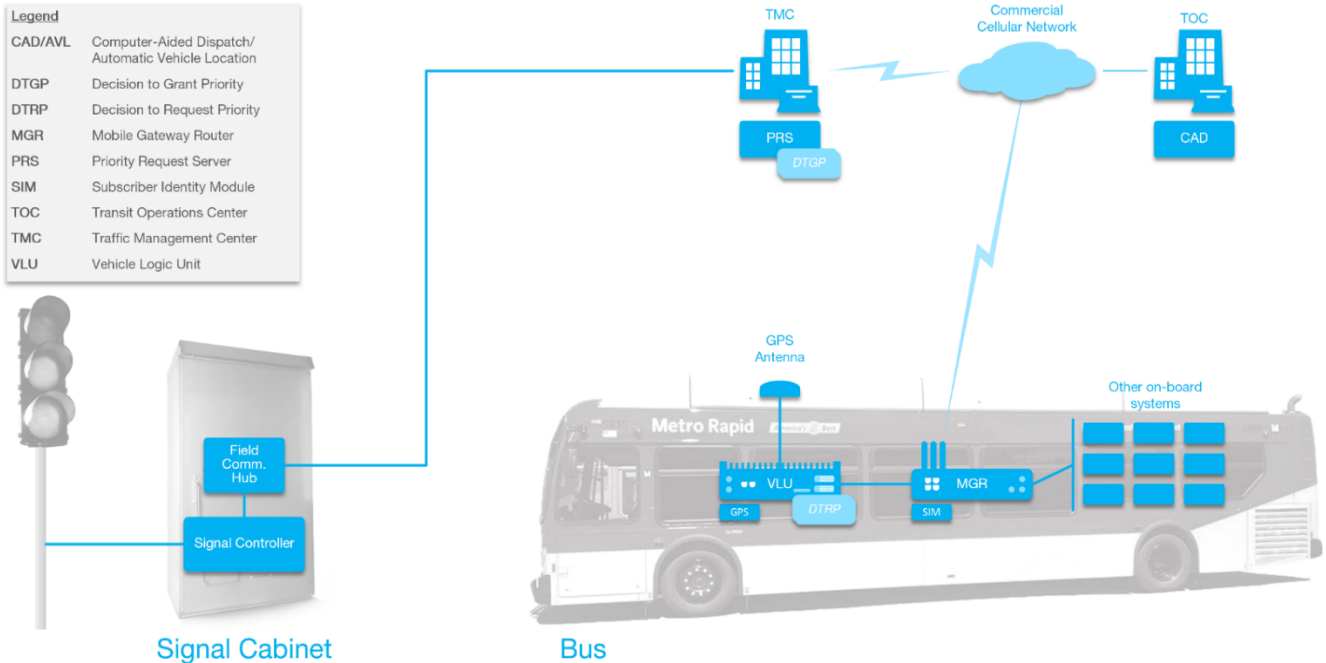




Bus Priority circa 1999



Vehicle to Center (V2C) Next Gen TSP



First Gen versus Next Gen TSP (V2C)

1990's TSP

Required equipment on poles to capture Infrared signal

Regular maintenance for reliability

Simple TSP requests, behind schedule and on TSP equipped route.

Next Gen TSP

Nothing to install and maintain on poles.

Available to any signal connected to central system

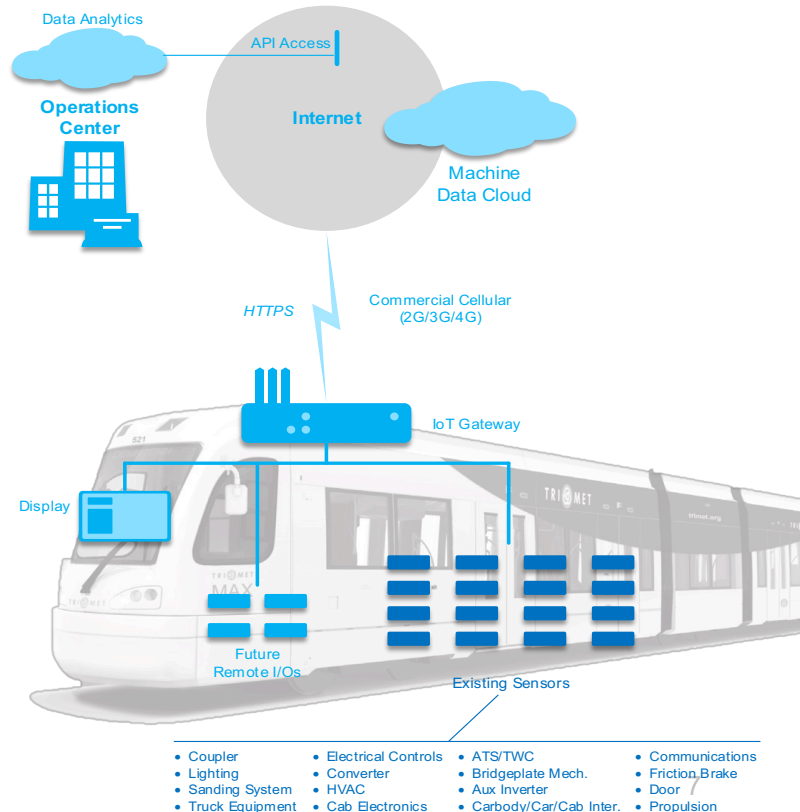
Sophisticated TSP, multi factors for request

- **Passenger load**
- **Direction and headway (bus right behind or in front)**
- **Possible to use CV J2735 Message set, enabling more intelligence**

ROOT Concept Overview

Six main categories of functionality:

1. Customer Information
2. On-Time Performance
3. Maintenance
4. Safety and Security
5. Transit Signal Priority
6. Infotainment



Pilot Project with Siemens scope and timeline

Project start: November 8, 2017

Phase 1 “Proof of concept” / “Pilot”

- **connect four Light Rail Vehicles, two substations and chosen rail automation equipment**
- **start data acquisition**
- **agree on KPIs and its baseline**

Phase 2 “Proven concept implementation”

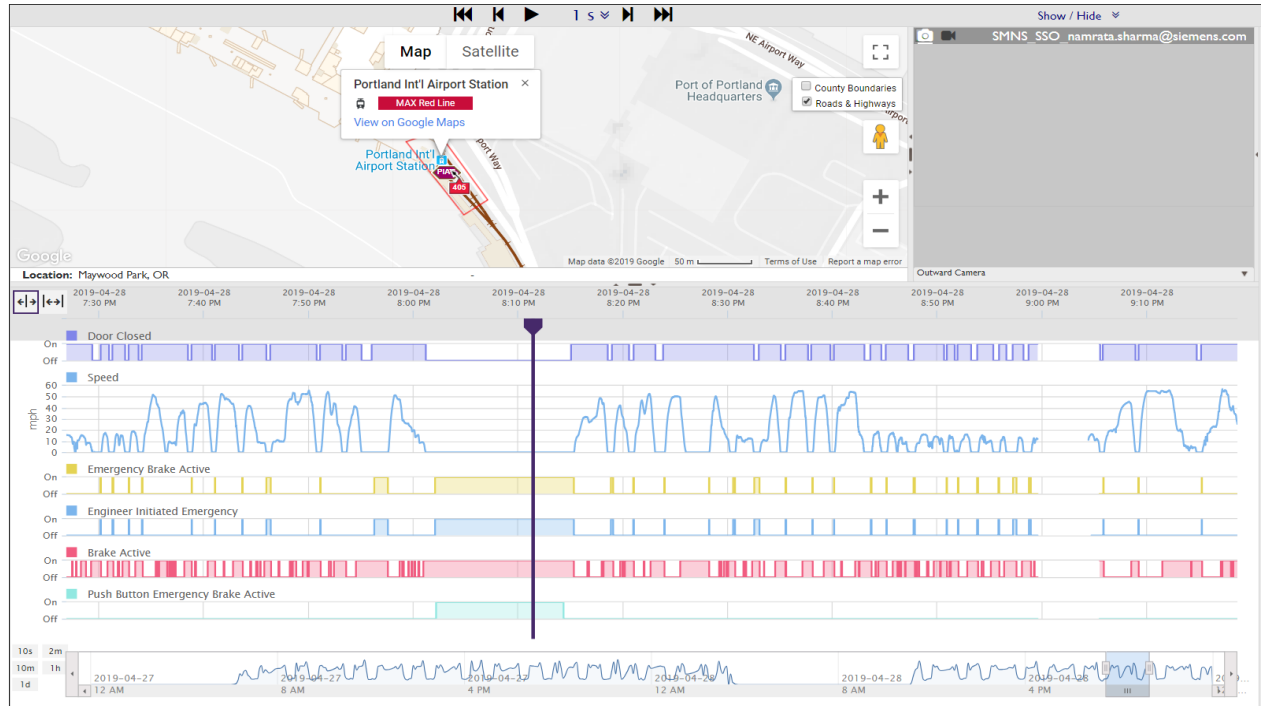
- **connect rest of the assets based on proven concept**
- **continuous work on KPIs improvement**

Phase 3 “Continuous improvement”

Below is the screenshot of multiple emergency braking event of the vehicle MAX 405 when it is boarding/parking.

MAX 405 [Change](#) [Scan Data](#) [Share](#)

4/27/2019 12:00:00 AM - 4/29/2019 12:00:00 AM



Pilot with Siemens

Very Accurate vehicle location and reporting

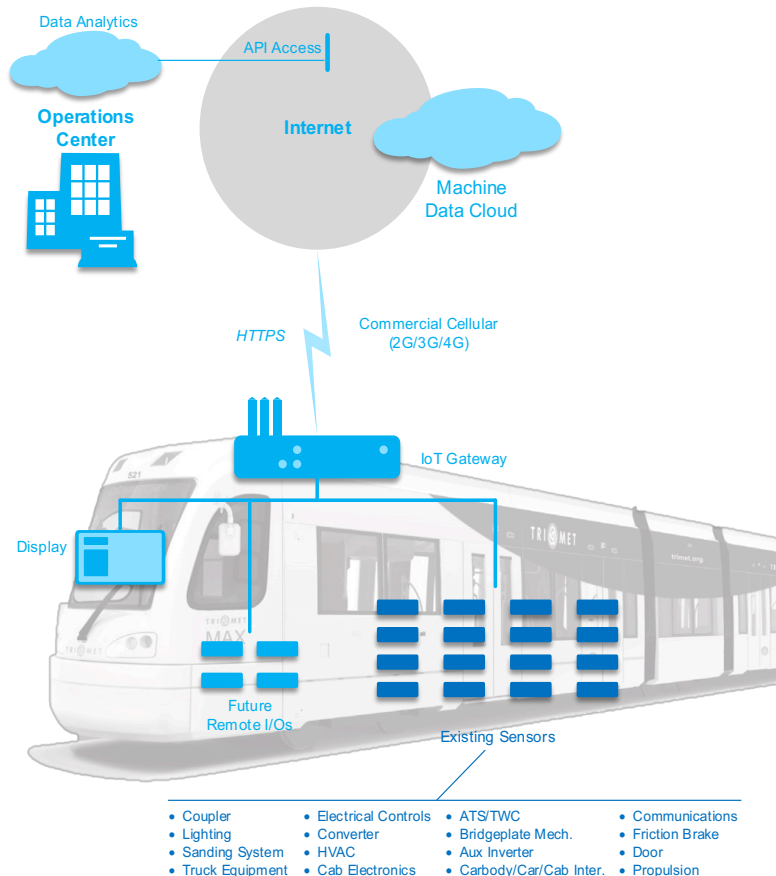
Greatly improved location data that will feed customer information and trip planning applications

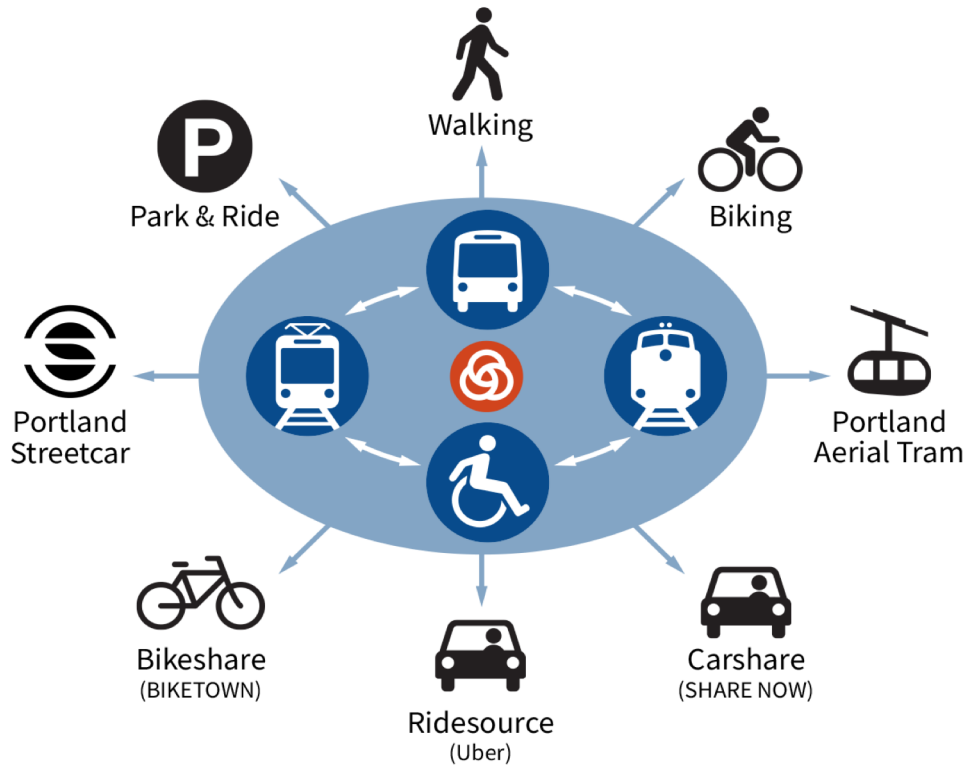
Vehicle Health Monitoring

Captures and analyzes data to improve traditional preventative maintenance. Edge computing to predict failures before they happen preventing vehicle break down and delays

Operator Performance Monitoring

Capture Operator performance data to improve on time performance, and adherence to performance standards





Discussion

