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
Transit Delay During Peak Congestion Time
Bus Priority circa 1999

1. Smart bus
2. Optical detector
3. Signal controller

Optical Emitter

Priority Request

Diagram showing a bus priority system with signals and detectors.
Vehicle to Center (V2C) Next Gen TSP

Legend:
- CAD/AVL: Computer-Aided Dispatch/Automatic Vehicle Location
- DTGP: Decision to Grant Priority
- DTRP: Decision to Request Priority
- MGR: Mobile Gateway Router
- PRS: Priority Request Server
- SIM: Subscriber Identity Module
- TOC: Transit Operations Center
- TMC: Traffic Management Center
- VLU: Vehicle Logic Unit

Diagram showing the connection between a signal cabinet, bus, and various systems including TMC, TOC, CAD, DTGP, PRS, and a commercial cellular network.
<table>
<thead>
<tr>
<th>First Gen versus Next Gen TSP (V2C)</th>
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<tr>
<td><strong>1990’s TSP</strong></td>
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<tr>
<td>Required equipment on poles to capture Infrared signal</td>
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<td>Regular maintenance for reliability</td>
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<td>Simple TSP requests, behind schedule and on TSP equipped route.</td>
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- 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 events of the vehicle MAX 405 when it is boarding/parking.
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 breakdown and delays

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