King County Metro
RapidRide ITS

Technology Review and Lessons Learned

Presented by:
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Six Bus Rapid Transit corridors deployed between 2010 and 2013.

Two non-BRT corridors (additional planned).

More than 75 total miles.

More than 250 WAPs

~200 TSP installations.

~100 BRT coaches.

Thirteen local partner jurisdictions.
RapidRide

Intelligent Transportation Systems

- Unified ITS Communications
- V2I, V2C, C2I, C2C
- Transit Signal Priority
- Electronic Fare Payment (ORCA)
- Next Bus Arrival Signs
- Signal Interconnect
- Automatic Vehicle Location
- Automatic Passenger Counting
ITS Architecture

On-board Equipment

- V2I Connected Vehicle
- On-board fare payment
- Transit Signal Priority
- High frequency location updates
ITS Architecture

Bus Stop Amenities

- Real-Time Passenger Information Sign
- Off-board fare payment
- Common network components
- Standard design and installation options
ITS Architecture

- ITS Network node
- Transit Signal Priority
- Common network components
- Power back-up
- Signal Control (separate from ITS equipment)
- Two standard designs
Successes
Successes

- **Single communications architecture reduced systems’ deployment costs.** *(Especially civil capital costs.)*
- **Common on-board platform enabled ITS on the entire fleet.**
- **Defined architecture allowed the City of Seattle to independently deploy an ITS corridor.**
Successes

- High bandwidth V2C for AVL.
- Vehicle data updates available on ITS corridors.
- Open data enables development of new applications without purchasing new systems.
Successes

- On-board generation of the TSP request message eliminated roadside bus detection.
- Integrated into the on-board system using software.
- Can operate in any of the five TCIP standard signal priority scenarios.
Successes

- **ITS network operation and maintenance using existing IT resources and staff.**
- **Modular system upgrades, additions and replacements.**
- **Upgradable network using IP standards, including DSRC.**
Lessons
- Adequate project management staff resources.
- Inter-agency agreement process.
- Coordination within partner jurisdictions.
- Grant language in blanket contracts.
- Integration with existing business processes.
Lessons

- Systems Engineering process, especially specifications and testing.
- Layer-3 network compatibility.
- Integration of the ITS network with the agency WAN. (ITS ≠ IT, unless it does.)
- Communicating ITS concepts to management and non-technical staff.
- Lack of new-project coordination with ITS architecture.
Lessons

- AVL accuracy and resolution affects TSP system performance.
- TSP implementation varies between signal controller vendors.
- Signal installations vary by jurisdiction.
- On-board system update schedule restricts modifying TSP settings.
Lessons

- **O&M costs not forecast in project.**
- **Establishing and maintaining wireless line-of-sight – particularly street trees.**
- **UPS equipment not cost effective.** (Prefer IP managed power distribution unit.)
- **4.9GHz wireless equipment life cycle.**
- **Desire for new technology vs. expectation of system lifespan.**
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