



WMATA Bus ITS Planning: Application of Signal Priority

Presentation at the
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WMATA ITS
Project Team



PARSONS

Palisades

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Presentation Outline

- Goals and Challenges of Implementing TSP
- WMATA's On-board Bus Systems
- Operational Concepts for TSP
- Priority/Preemption Detection Equipment
- Feedback

WMATA's Goal for TSP

Improve transit performance



- Reduced delay at traffic signals
 - - >> increases speed
 - - >> reduces person delay
- Reduced travel time variability
 - - >> improves on-time performance
 - - >> reduces bus bunching



WMATA's Challenges

- Significant challenges related to the extent of WMATA's service area
- Integration of AVL system and technical requirements of ITS system



WMATA's Goal

- * Move beyond regional demonstrations *
- Washington DC
 - Under design
- Montgomery County, MD
 - Centralized Priority System
 - Discontinued
- Fairfax County, VA
 - Distributed System
 - Operational
- Arlington County, VA
 - Distributed System
 - Operational testing

Resolution #1 Implementation requires cooperation

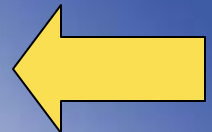


- Signal system must be able to handle a request
→ Responsibility of the traffic agency
- Buses need to be equipped with technology to submit a request;
- Scheduling needs to take advantage of priority
→ Responsibilities of the transit agency

WMATA's Directive



- Develop a system of Conditional Priority
 - Priority requests tie to specific conditions
 - Schedule Adherence, Location, etc
 - Requires integrated systems on-board the bus
- Not just better for Transit, more palatable for traffic agencies
- Develop a system that can operate across jurisdictions



On-Board Bus Systems – Orbital AVL



- GPS based system
- Communication via radio
 - 2 minute poll rate
 - Montgomery County Lesson Learned
- Future integration into scheduling system

On-Board Bus Systems – Clever Devices IVN

- Uses GPS
- Requires operator sign-on
- Provides:
 - Destination signs
 - Voice annunciation
 - Vehicle monitoring
 - Automated Passenger Counters
- Communicates with garage wirelessly within 1,000 feet



On-Board Bus Systems – Farebox



- Communicates with garage with infrared
- Not integrated with other systems
- Can use current ridership data to improve TSP

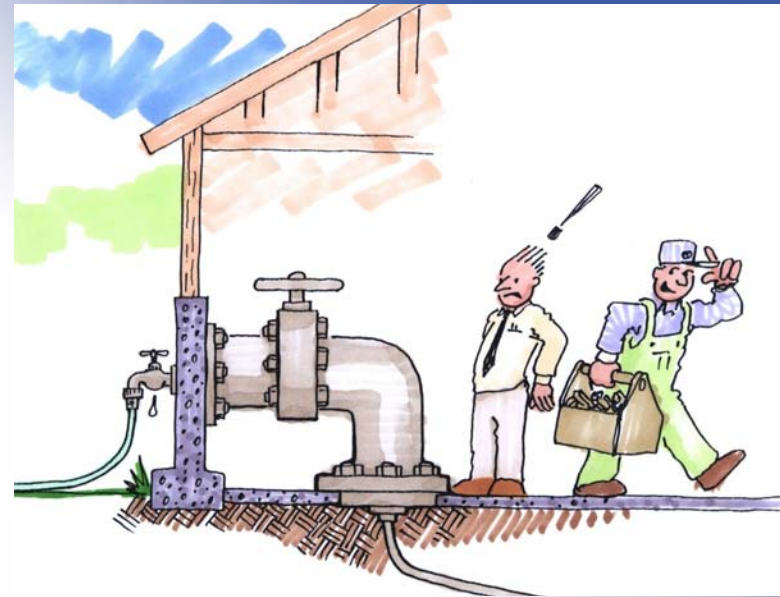
On-Board Bus Systems - Issues

- Multiple operator sign-on
- Multiple GPS systems
- Systems not integrated
- Not sharing data
- Not integrated to schedule



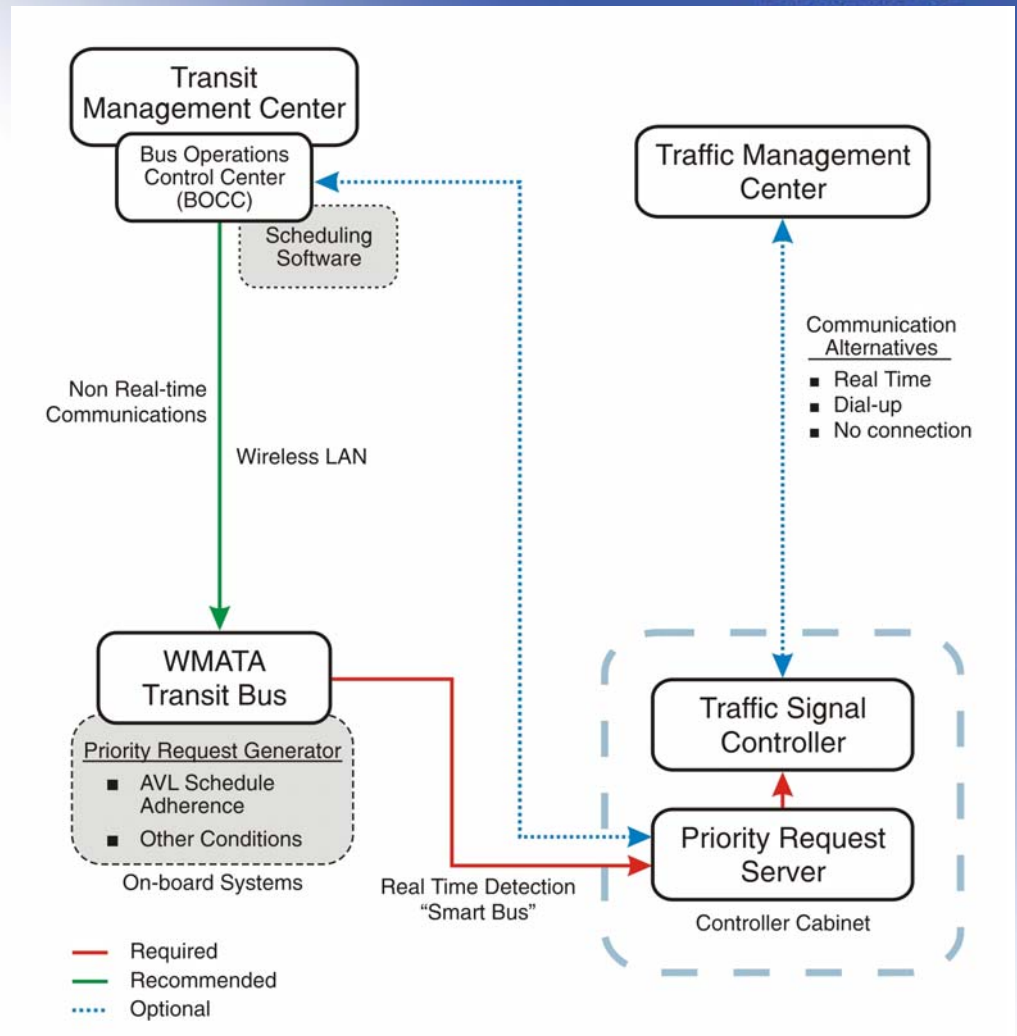
Resolution #2: Procurement Needs to Consider ITS

- Stovepipe approach to procurement
- Agency suffered without an ITS architecture
 - No consensus related to use of existing devices for new functionalities
 - No integration between new and old devices
 - No recognition of standards that could reduce proprietary nature of systems



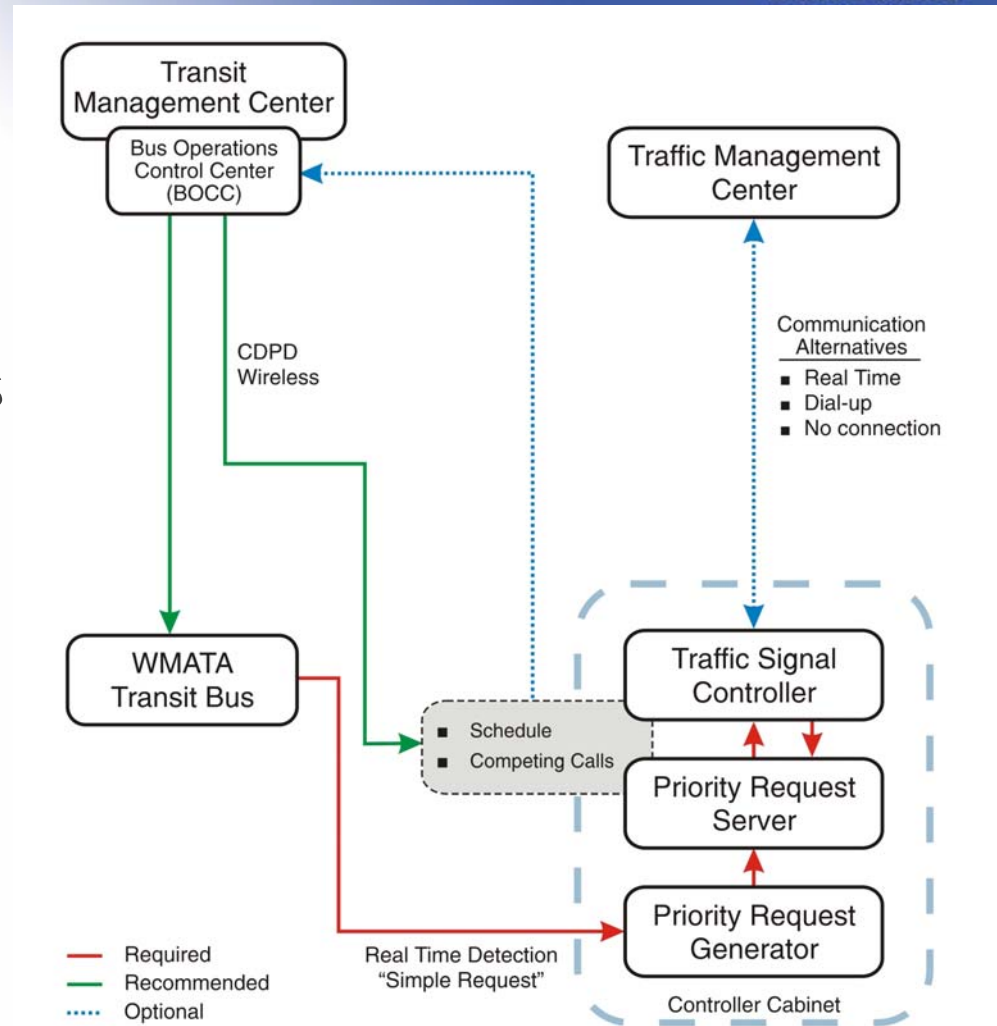
Concept of Operations Alternative #1

- Smart Bus
 - Example - Portland, OR
 - AVL and schedule is integrated on bus
 - Bus requests priority at local controller
 - Priority Granted at local controller



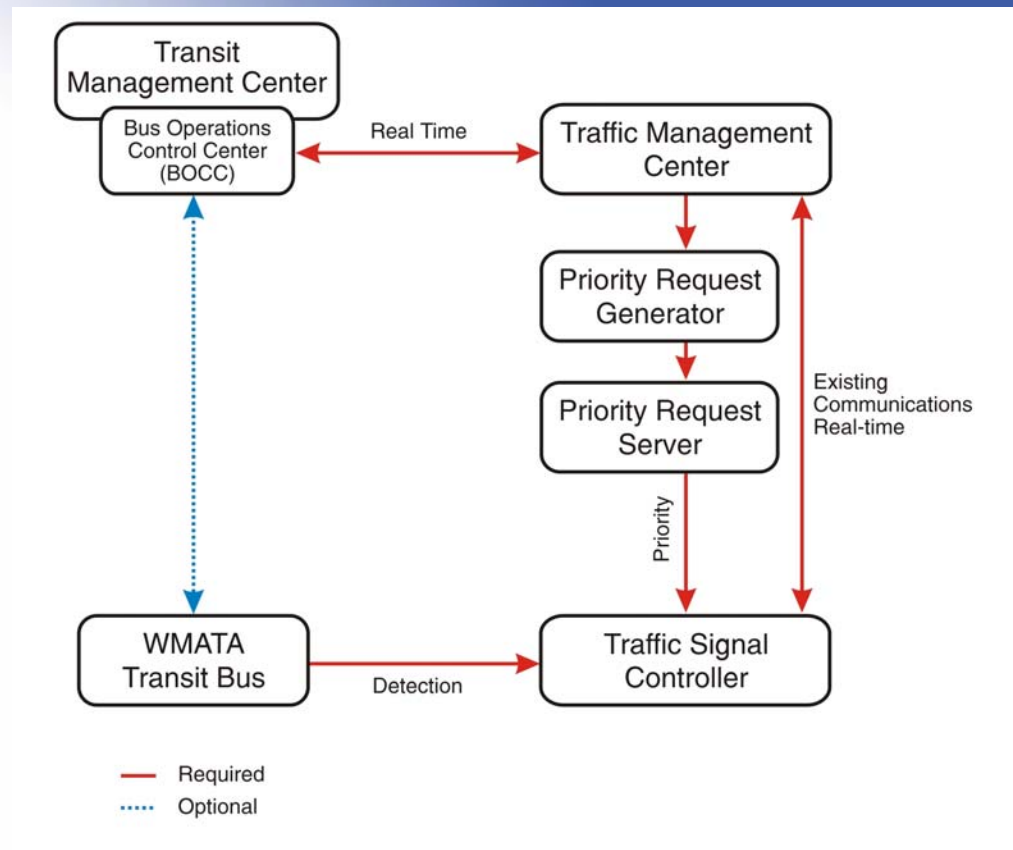
Concept of Operations Alternative #2

- Simple Request
 - Example - King County, WA
 - AVL and schedule not integrated on bus
 - Local controller contains schedule information
 - Local controller detects bus and grants priority



Concept of Operations Alternative #3

- Centralized
 - Example - Los Angeles, CA
 - Transit Management Center and Traffic Management Center are connected
 - Decisions to grant priority are granted by the Traffic Management Center

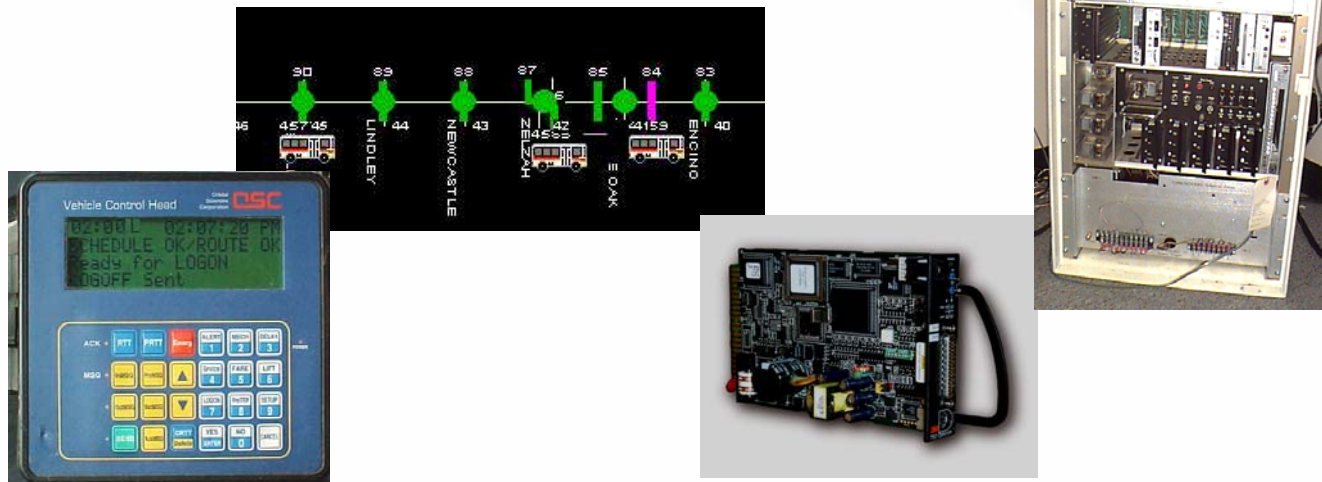


Resolution #3 Standards based approach

- Utilize NTCIP 1211 Standard to direct TSP planning for WMATA
 - Isolate and identify the various signal improvements necessary within the jurisdictions
- Provide fair and equitable investment for the regional partners
 - Upgrade regional signal systems
 - Include other local transit agencies

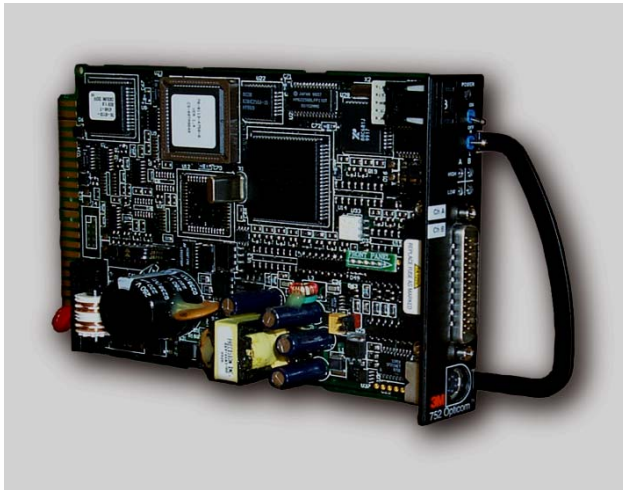
Transit Signal Priority System Components

1. Support Systems / Management Centers
 - AVL Technology
2. Traffic Signal Systems
3. Bus Detection
 - Other users (emergency vehicle, other)



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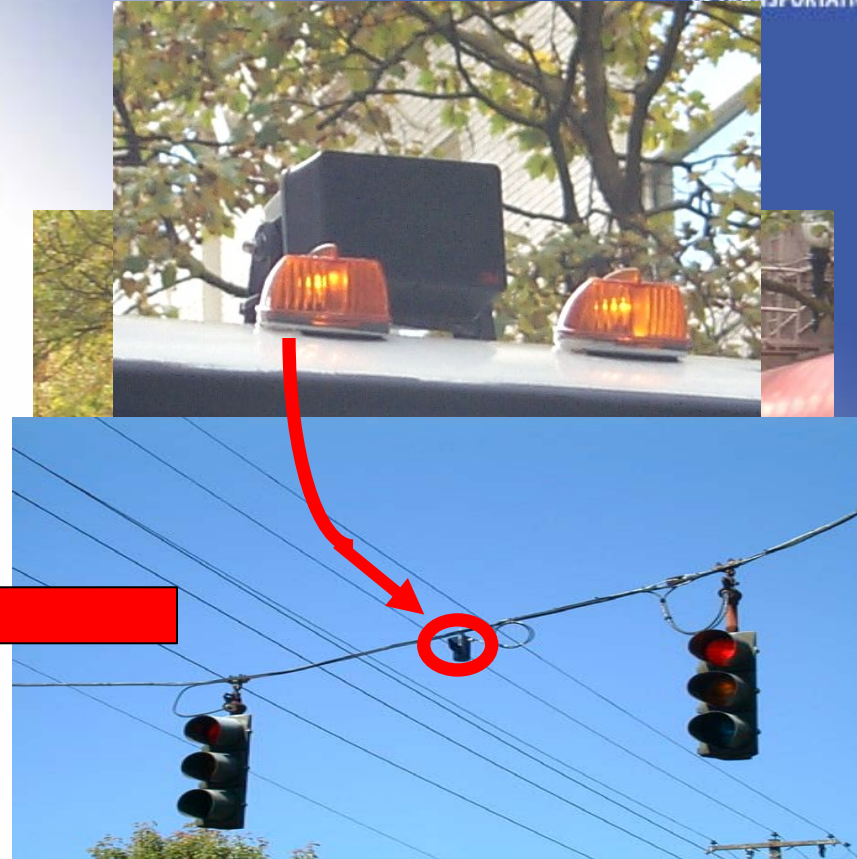
Bus Detection System

- Various technology alternatives based on system architecture
 - Optical detector
 - Wayside reader
 - Inductive loop
 - AVL-based
 - Other



Optical Detection System

- Common detection with emergency vehicle system
- Detection range is easy to change
- "Simple" request



Wayside Detection System

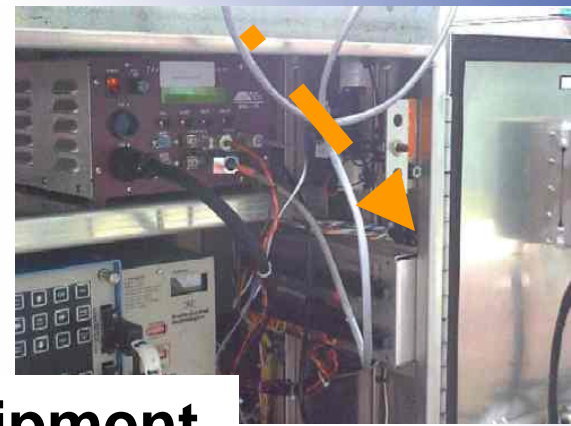
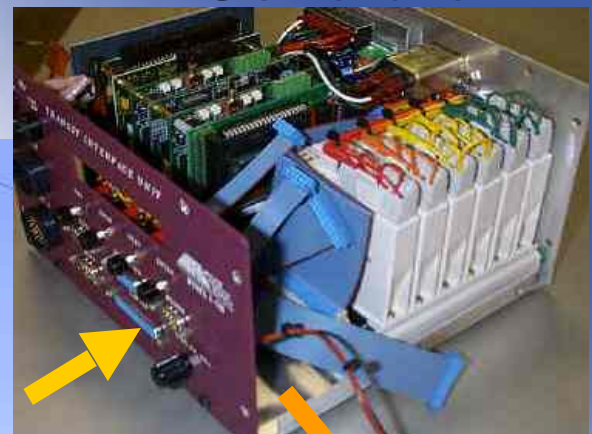


**Tag Interface Unit
for Dynamic
Message**

Antenna



TPR Generator



**More Equipment,
Improved Range**

NTCIP 1211 Standard Bus Detection



- Suggests message should be broader than simple request
- Message could include:
 - Estimated time to arrival (ETA)
 - Status (lateness)
 - Updated ETA
 - Class of vehicle (level of priority)
 - Other information used to make strategic decisions

Key Questions to Ask Bus Detection System



- Do we want one detection system regardless of cost?
- Where do we put the detection system, or
- Does the bus know when to request priority or is that understood at the traffic signal?
 - Maintenance and responsibility issues
 - Reliability and latency of messages
 - Extent of reliance on communications
- What interface do we want with the bus driver?

Questions

