Multimodal Signal Operations

Ryan Burns & Stuart Forth – MC Dean
ITS Maryland 2014 – Maritime Institute, Linthicum Heights, MD
November 6th, 2014
Multimodal Signal Operations
Traffic and Streetcar Train Control Interface
DC Streetcar H/Benning Line

Ryan Burns & Stuart Forth – MC Dean
ITS Maryland 2014 – Maritime Institute, Linthicum Heights, MD – November 6th, 2014
Multimodal Signal Operations

- Project Overview
- Operational Overview
- TWC and Request Process
- Active Monitoring
- Summary, Future, Discussion
DC Streetcar H/Benning Line

- 2.4 mile streetcar system
- 8 station stops
- 10 minute headways
- Design-Build Contract awarded Summer 2012
- Final Acceptance Aug 2014
- State Safety Oversight Committee Review and Simulated Passenger Service currently underway

Dean/Facchina Design Build Team responsible for:
- Overhead power and TPSS
- Special Trackwork
- Terminus at Union Station on Hopscotch Bridge
- Station Platforms
- Traffic Signal Modification
- Train Control and SCADA
- Car Barn and Training Center
Operational Overview

- Streetcars operate in mixed traffic
- Focus on minimal impact to normal traffic operations
- 24 signalized intersections
- Design Requirements called for VETAG TWC to actuate dedicated phase in traffic controller
- Four (4) “Special” intersections
Special Intersections

- Part 8 MUTCD 2009 compliant Transit Bar Signals
- Route requests sent after track conditions verified
- Transit bar signal indicates direction of track switches and routing
- Streetcar Control cabinet monitors all transit signals
Train-to-Wayside (TWC)

- Input from operator dictates actions from system
- Check in
- Route alignment and move preparation
- Phase Request Sent
- **Actuated Phase** via VETAG Loop
- Route Served
- Check out
TWC INTERFACE WITH TRAFFIC CONTROLLER
TWC INTERFACE WITH TRAFFIC CONTROLLER

- Control Panel
- TWC Transponder
- 2 to 4 Embedded Receiver Loops per Track
- Rail Area
- Wayside Signal Case or CIH
- Logic Processor
- Monitoring Interface
- Route Request Interface
- Load Switches
- Input Files
- Controller
- Local Intersection Traffic Controller
- Traffic and Ped Signals
- Lighted Warning Signs
- Bar Signals
TWC INTERFACE WITH TRAFFIC CONTROLLER

- Control Panel
- TWC Transponder
- Wayside Signal Case or CIH
- Logic Processor
- Monitoring Interface
- Route Request Interface
- Input Files
- Load Switches
- Local Intersection Traffic Controller
- Controller
- 2 to 4 Embedded Receiver Loops per Track
- Rail Area
- 4C#12 (copper)
- 7C#12 (copper)
- Traffic and Ped Signals
- Lighted Warning Signs
- Bar Signals
Monitoring

“Check out” my moves
SCADA Monitoring

- Networked all Special Intersections via fiber to Car Barn and Training Center
- Created SCADA screens for visualization by DDOT
- HMI shows spatial representation of all tracks at Special Intersections
- Indications of all transit bar signals affecting train movements are shown in real time
SCADA Monitoring
SCADA Monitoring
SCADA Monitoring

- Realtime monitoring of all track conditions and traffic lights
- Realtime route request indication
- Realtime fault monitoring.
- Detection indication throughout special intersections
- Fundamental to train control logic
SCADA Monitoring

Potential Upgrades:
• Timestamp function provides nearly limitless potential for further functionality
• Monitor transit signal green times
• Trend reports of check in and check out times to monitor driver improvement, decline.
• Alert municipalities to errors at traffic controller if no route is served after requests
• Event logs can be expanded to output reports based on time stamps
• Incorporate GPS/AVL data
Discussion

Thanks for the feedback!