Transit Signal Priority Project in the City of Dallas Downtown Transit Mall

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Presentation Outline

• Background
• Study Limits
• Project Goals
• Partial Priority System Overview
• Detection
• Communications
• Peer-to-Peer
• Closing
**Background**

- Partnership between City of Dallas and DART
- DART – Additional rail line
- Downtown Dallas – All lines share tracks
- Increased number of trains in Downtown Mall

**Study Limits**

- DART tracks in Downtown Dallas
- Four rail stations
- Fourteen signalized intersections
  - Trains
  - Vehicles
  - Pedestrians
Project Goals

- City of Dallas
  - Pedestrian Service
  - Maintain existing level of service
  - Vehicle progression
  - No intersection blockage
- DART
  - Support 2.5 minute headways
  - Non-stop Station-to-Station travel

TSP Elements

- Partial Priority Logic
- Train Detection
- Holding Blocks
- Communication
- Peer-to-Peer Messaging
Train Progression

Pearl Station

Olive

Harwood

Saint Paul Station

Detect train presence in stations
- Normal boarding
- Hy-block boarding
- Activate Countdown Timers
- Train Roll-up
  - Sends track clear input upstream
  - Calls for Partial Priority

Detect train presence at intersections
- Track not clear
- Call for Partial Priority
Detection Types

• Wireless Magnetometers
• Operator-Initiated Train-To-Wayside (TWC)
• Time-of-Flight Infrared

Time of Flight Infrared Detection

• Used extensively in other industries
• Compact
• Ability to set detection limits
• Detects top edge of trains
Infrared Detection

Station Enclosure

Intersection Enclosure
Communication Network

- Implemented and maintained by DART
- Provides connection between intersections and stations
- Redundant system
  - Wireless
  - Fiber/Wireless
  - Ethernet over Twisted Pair

Peer-to-Peer Messaging

- Utilizes ModBus Protocol
- Transmits Trains detector inputs between intersections
- Interfaces with Controller
- External logic capabilities to assist 170 controller
  - Pre-processes detector inputs
- Creates virtual presence
- Monitors loss of communications
Peer-to-Peer

Warning – Don’t try this at home

Detector Inputs Transmitted
Phase I Complete

- Accommodates 2.5 minute train headways
- Provides nonstop station to station travel
- Eliminates intersection blockage
- Maintains vehicular levels of service

TSP Phase II

- Vehicle queue detection system
- All-way pedestrians
- Integration with Junctions
- Eliminate Hy-Block Boarding
- Train length detection
- Controller Upgrade
The TSP TEAM

- DART
- City of Dallas
- The TEAL Team
  - TEAL Engineering Services
  - Cactus Computer Inc.
  - Highway ITS
  - HDR Engineers
  - Savant Group, Inc.
  - DKS
  - TTI
- Abed Abukar
- Mark Titus
- Gary Jost
- Jake Smith
- David Steffen
- Paul Luedtke
- Susan Langdon
- Mike Wobken
- Roberto Macias

Closing

- Stretched the capabilities of 170 controllers to its limits
- Implemented Out-of-the-box solutions
- Lesson learned valuable for Phase 2

- TSP complete and working in Downtown Transit Mall
Questions