City of Fairfield
Wireless Traffic Signal Communication

Kevin Daughton, Transportation Manager
Steven Harris, Traffic Signal Technician

Elbert Chang, Senior Engineer
Presentation Outline

- **ITS System Overview and Goals** (Kevin Daughton)
- **System Design and Construction** (Elbert Chang)
- **Planned Upgrades & Maintenance Experiences** (Steve Harris)
System Overview and Goals

- Fairfield, California (pop: 105,000) is located half-way between San Francisco and Sacramento.

- System implementation part of a larger City and Countywide ITS program.

  ✦ Need to consider interactions of controller and communications system with other elements (e.g. emergency vehicle pre-emption, transit priority and AVL).
City of Fairfield Intelligent Transportation System (ITS) Program
10/12/05

[Diagram showing the connection between the Fairfield ATMS Server, ATMS Workstations, Intersection Controller, Spread Spectrum Communication, and Intersection Traffic Signal.]
City of Fairfield Intelligent Transportation System (ITS) Program
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Fairfield ATMS Server

ATMS Workstations

Intersection Controller

Spread Spectrum Communication

Pre-emption/transit priority detectors (first phase completed)

Intersection Traffic Signal

Fire Vehicle pre-emption emitters (completed)
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Fairfield ATMS Server

ATMS Workstations

Intersection Controller

Spread Spectrum Communication

Intersection Traffic Signal

Transit Priority emitters (completed)

Pre-emption/transit priority detectors (first phase completed)

Fire Vehicle pre-emption emitters (completed)
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Fairfield ATMS Server

ATMS Workstations

Intersection Controller

Spread Spectrum Communication

Pre-emption/transit priority detectors (first phase completed)

Transit Priority emitters (completed)

Signal Maintenance Van (completed)

Intersection Traffic Signal

Fire Vehicle pre-emption emitters (completed)
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Fairfield ATMS Server

FST AVL Server (future)

ATMS Workstations

AVL/ Transit Priority System (in design)

Intersection Controller

Transit Priority emitters (completed)

Spread Spectrum Communication

Pre-emption/transit priority detectors (first phase completed)

Signal Maintenance Van (completed)

Intersection Traffic Signal

Fire Vehicle pre-emption emitters (completed)
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Fairfield ATMS Server

FST AVL Server (future)

AVL/ Transit Priority System (in design)

ATMS Workstations

Transit Priority emitters (completed)

Intersection Controller

Pre-emption/transit priority detectors (first phase completed)

Wireless communication (future)

Spread Spectrum Communication

Signal Maintenance Van (completed)

Intersection Traffic Signal

Fire Vehicle pre-emption emitters (completed)
Project Costs

- Engineering $209,000
- Equipment $577,000
- Construction $118,000
- Total $904,000

(40 signals/$904K = $23K/signal)
Project Scope and Existing Interconnect

- Upgrade 40+ controllers (on six arterials) and provide communications between them and ATMS.
  - Wireless method chosen for quicker deployment, reduced installation cost over wireline.

- Existing Copper Interconnect
  - Gateway Avenue (3 signals)
  - Downtown West Texas Street (4 signals)

- Wireless Interconnect on North Texas Street (6 signals)
System Design and Features

- Upgrade equipment on existing wireless interconnect
  - IP/Ethernet-based, faster bandwidth
- ATMS at the Fairfield Transportation Center
- Repeater site located at Martin Hill (to address line of site issues)
- Interface with existing wireless and copper interconnect
Fairfield Arterial Management Network
System Diagram
Typical Intersection Installation
Intersection Antennas
Controller Cabinet
Martin Hill
Repeater Site
Panoramic View from Martin Hill

Future NE development

Air Base/ Peabody Intersection

Pennsylvania Ave

FTC

MTC Technology Transfer Program
October 25, 2005
Fairfield Transportation Center
Signal Maintenance Van
Some of the technical challenges addressed during the design and construction (1/2)

- **Signal Strength/Background Interference**
  - Site-and-path analysis (Need to rely on copper for some locations)

- **Repeater Site Design**
  - Number of radios, antenna separation

- **Communications Equipment**
  - City procurement of equipment
  - Bench test
Some of the technical challenges addressed during the design and construction (2/2)

- **Antenna Cable Signal Loss**
  - Antenna length less than 100 feet recommended for small cable (1” bending radius)
  - For longer distances, low loss antenna cable (thicker) needed. Used smaller cable from antenna to nearest adjacent pull box and then connected to low loss antenna cable.

- **Changes in Wireless Technology**
  - System Design in 2002. If restarting design may consider other technologies (e.g. Wi-Max?, Mesh?)
Planned Upgrades

- Communication equipment for remaining City signals (approx 40)
- Use wireless system to interface directly with pre-emption phase selector
  - County-wide vehicle pre-emption codes
- Access to Streetwise ATMS server over internet (secure connection)
- Wireless communication with service van
Maintenance Experiences

- Save time/ labor by loading timing plans remotely
- Streetwise ATMS Server has gone down
  - Van to serve as back-up to server.
  - Firmware upgrade of radios, server, controller needed to allow this to happen.
- E-mail signal trouble notification implementation
Questions and Answers

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