Active Traffic Management

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Active Traffic Management

- Proactive systems for controlling the flow of and otherwise managing traffic flow.
- Concentration areas
- Information gathering
- Traffic solutions

Active Traffic Management

Traffic problems

- Red light running
- Speeding
- Incident detection

Traffic priority

- Emergency vehicles
- Transit

Red Light Running

Red Light Running

- Almost 1,000 people killed and more than 150,000 injured in the USA in crashes that involved red light running.
- 96% of American drivers have some fear of being struck by a red light runner.
- Drivers in a hurry speed up, rather than slow down, when the signal goes yellow.

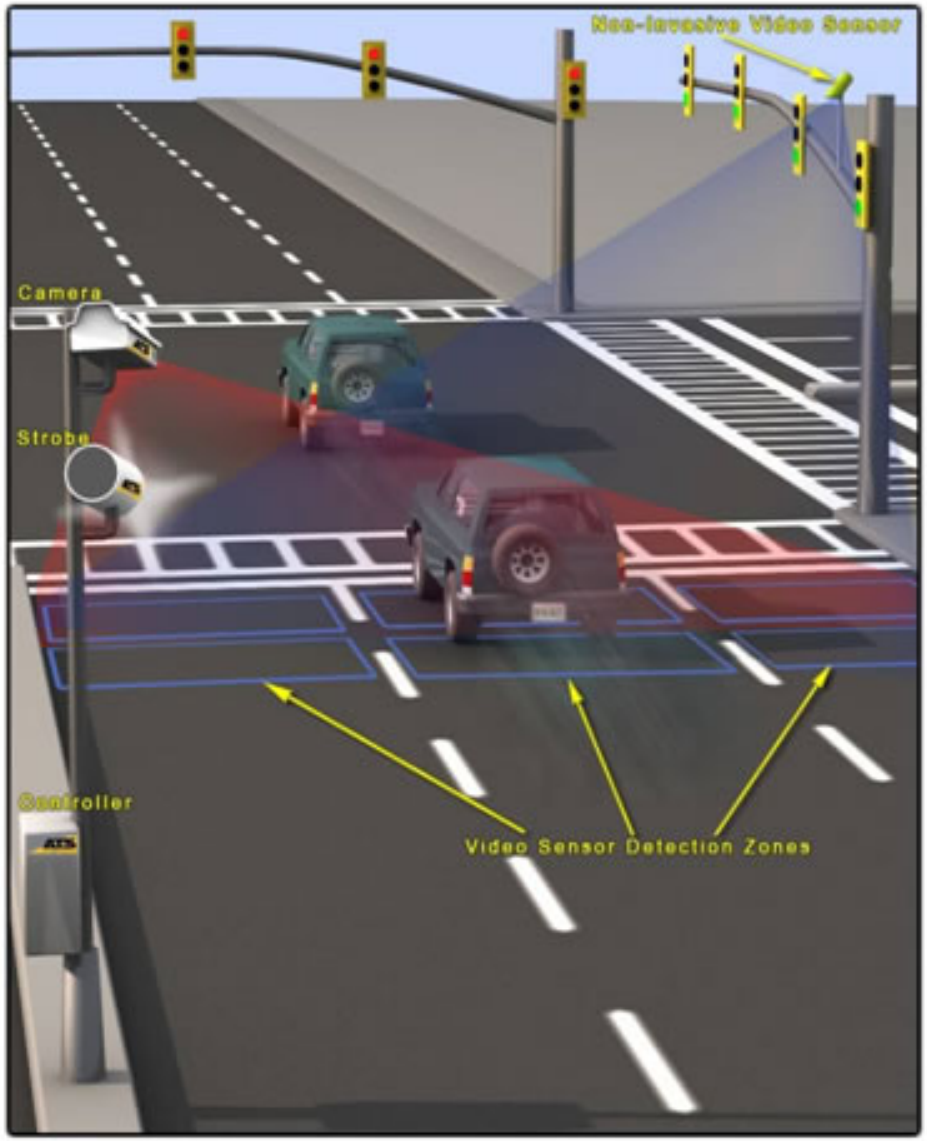
Photo Enforcement

- The use of cameras to take pictures of red light runners is a popular solution in the USA.
- Low variable cost with immediate return.
- Never sleeps.
- Equal protection issues – must fine the driver, not the vehicle.

First Image - Before Shot of Violation

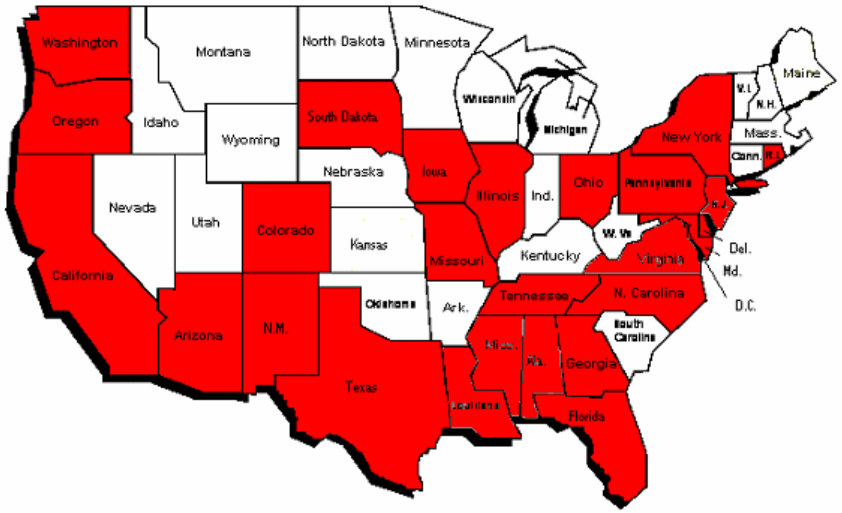
Second Image - Shot of Vehicle in Intersection

License Plate Close-up from one of the two violation images



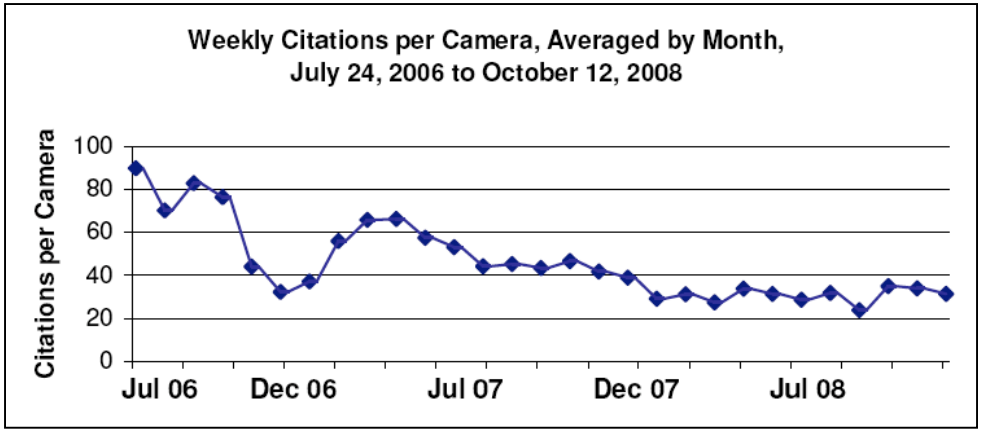
Pervasive Application

- Red light cameras are used by more than 400 US cities, large and small, in 25 states and the District of Columbia.
- Significant decreases in intersection violations and crashes, deaths and injuries.



Some Results

- New Orleans, LA — red light cameras led to an 85% drop in red light running and speed cameras led to an 84% drop in speeding.
- Council Bluffs, IA — a 90% reduction in red light running crashes.
- Washington, DC — red light running fatalities were reduced from 16 to 2 in the first two years of red light cameras.
- Fairfax, VA — a 44% reduction in red light running crashes.
- Oxnard, CA — a 22% reduction in red light crashes citywide.
- New York City — a 34% reduction in red light violations.



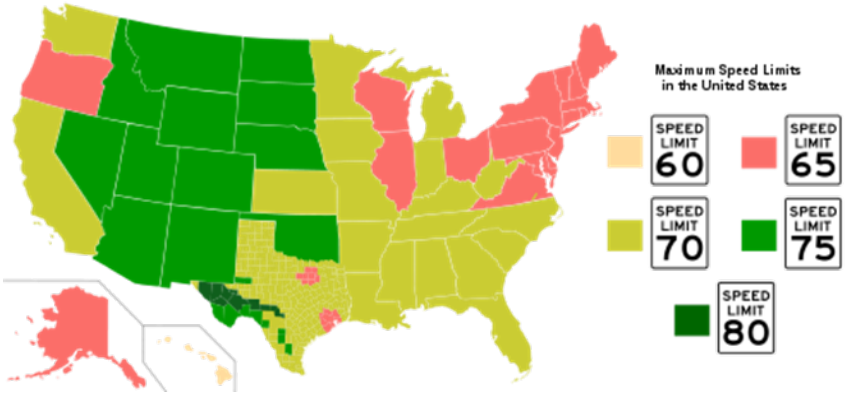
Unintended Consequences

- Red light running down, but rear-end collisions up in some controlled intersections.
- Allegations that contractors operating red light running systems had shortened the yellow signal (to increase the number of violators) have led to removal of some systems.

Speed Cameras

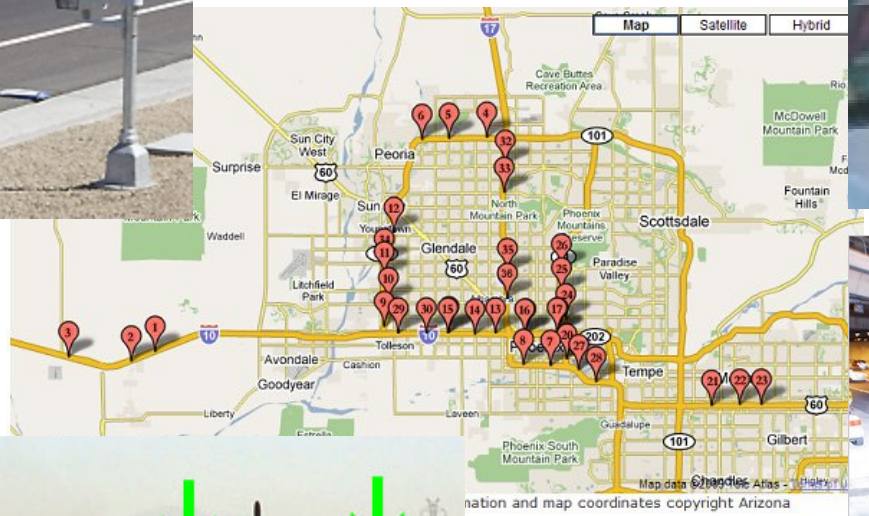
Speed Cameras

- The USDOT found that excessive speed contributed to about 1/3 of all traffic crash deaths in the USA.
- Speed is an issue when vehicles are traveling at different speeds.
- "Naturalistic" speed limits generally higher than the traffic manual recommends, but there are fewer crashes.
- Enforcement for its own sake not welcome by US drivers.



Speed Cameras Around the World

Speed Cameras in Arizona



Incident Detection

Traffic Incident Management

Traffic Incident Management is a planned and coordinated process to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible.

The coordinated process involves a number of public and private sector partners, including:

- Law Enforcement
- Fire and Rescue
- Emergency Medical Services

First Responders

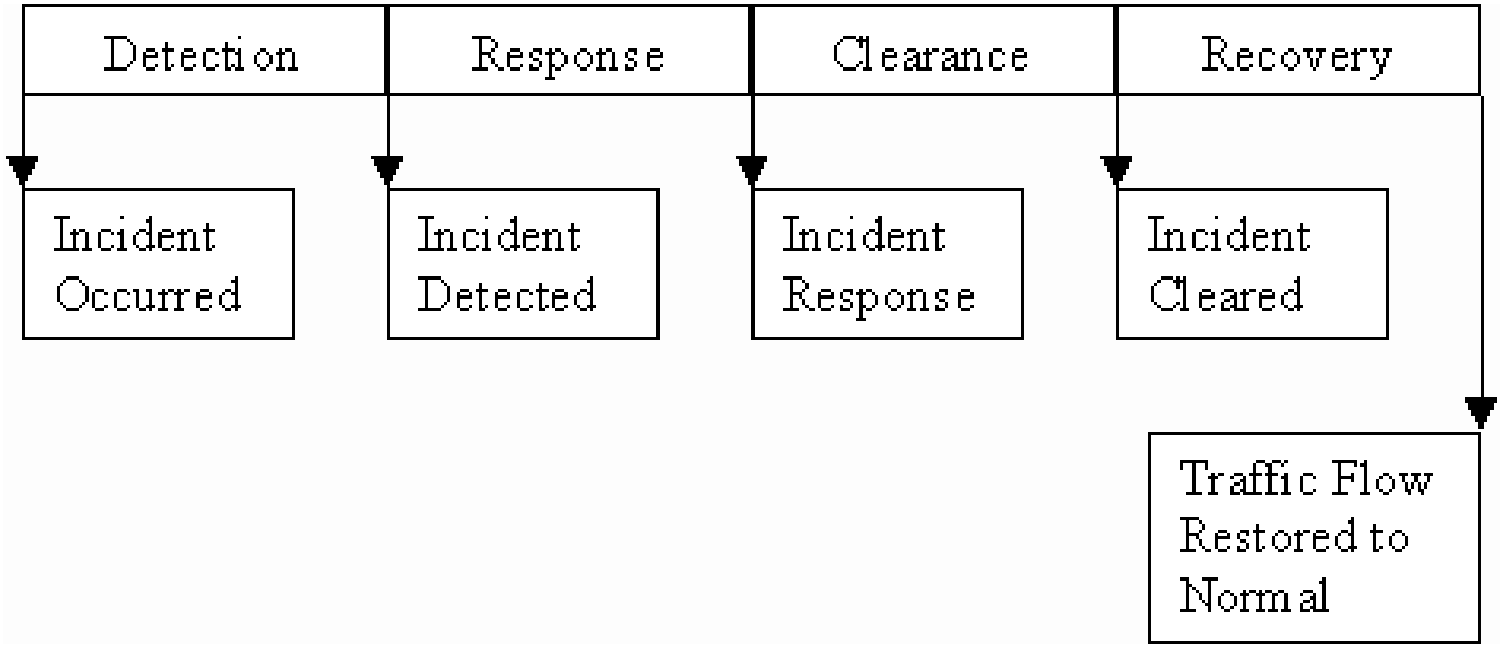
- Transportation
- Public Safety Communications
- Emergency Management
- Towing and Recovery
- Hazardous Materials Contractors
- Traffic Information Media

Secondary Responders

TRAFFIC INCIDENT MANAGEMENT HANDBOOK
EXIT
NORTH
U.S. Department of Transportation
Federal Highway Administration

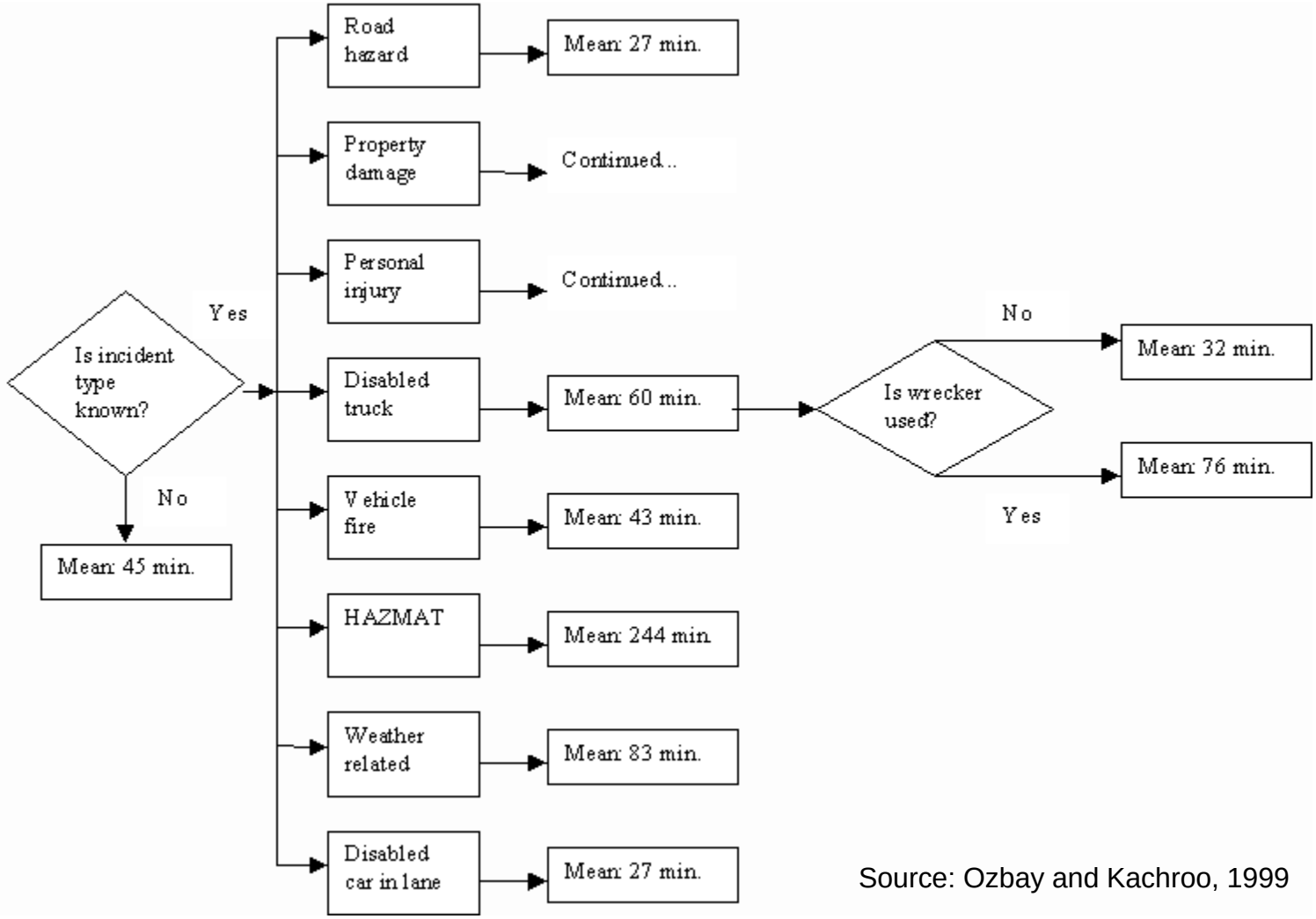
Incident Management in Southeast Michigan

Incident Management Cycle



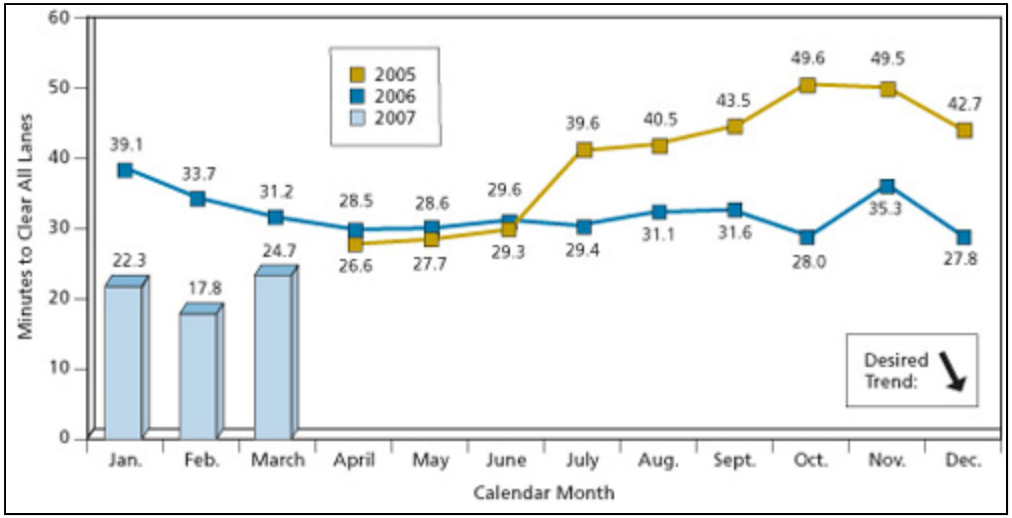
Source: Transportation Research Board, USA

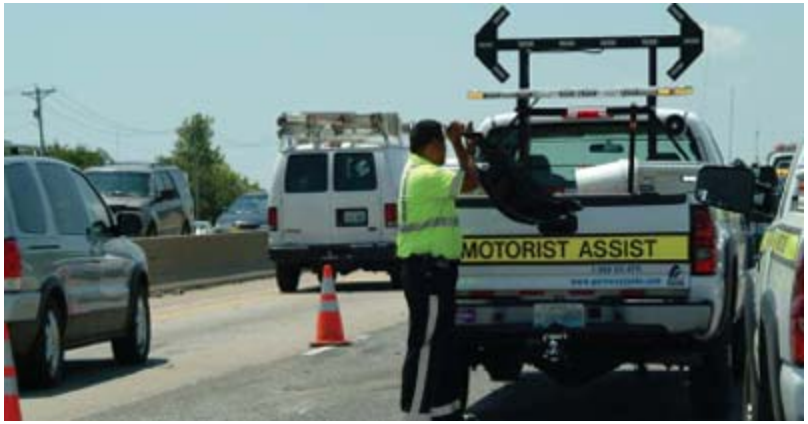
Incident Clearance Prediction



Source: Ozbay and Kachroo, 1999

Kansas City, Missouri, Experience





- Missouri Motorist Assist and the traffic operations centers track the time for all lanes to be cleared following an incident.
- This tracking approach has continued to reduce incident clearance times.
- Increased efforts by Motorist Assist and police coordination continue to support MoDOT's objective of quick clearance and open roadways.

Traffic Priority

Traffic Priority

Emergency Vehicle Signal Preemption

Transit Signal Priority

Emergency Vehicle Preemption (EVP)

- Emergency Vehicle Preemption systems give emergency response vehicles a green light on their approach to a signalized intersection. They may also be able to clear traffic lanes in congested intersections allowing faster, safer response to incidents.
- Benefits of EVP systems include:
  - Reduced incident-response time for law enforcement, fire and EMS personnel
  - Improved safety of emergency personnel through crossing traffic crash reduction
  - Increased efficiency for emergency resources and investment

Line-of-Sight EVP Systems

- Line-of-sight traffic signal preemption vehicles are equipped with an emitter which sends a narrow infrared or strobe signal forward, at a specified frequency, towards traffic signals ahead of the vehicle…
- …in an attempt to obtain right-of-way through the intersection prior to the vehicle arriving there.
- Traffic signals need to be equipped with a compatible traffic signal preemption receiver in order to obtain the activation signal and respond accordingly.
- Some systems have varying frequencies assigned to specific types of vehicles, sot that an intersection's preemption equipment is able to differentiate between a fire engine and a bus sending a signal simultaneously and then grant priority first to the fire engine.

GPS-Based EVP

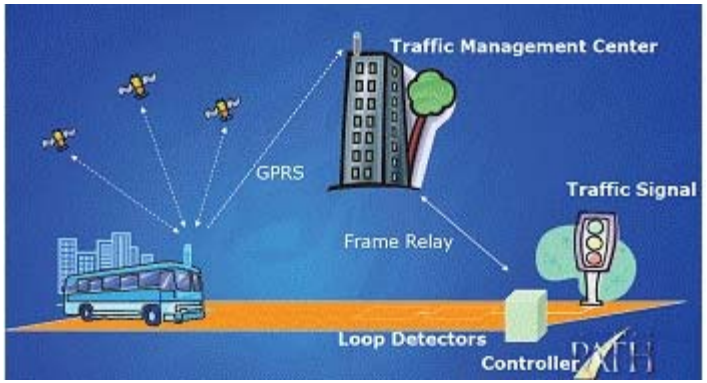
- The widespread availability of GPS hardware and software has enabled GPS-based traffic preemption systems.
- These systems require software and a communications platform:
  - to determine where the activating vehicle is located,
  - in which direction it is headed,
  - which traffic lights should be preempted, and
  - the ability for the traffic or emergency management center to activate the desired traffic signals promptly.

RF-Based EVP Systems

- Radio-based traffic-preemption systems use a local, short-range radio signal in the 900 MHz (DSRC) band. Recently, the US FCC set aside a portion of the 700 MHz band for emergency traffic operations.
- It still utilizes a directional signal transmitted from an emitter, but being radio-based, its signal does not have to be line-of-sight and it is not hindered by unfavorable weather conditions.
- The operating range can be adjusted by varying the radio signal strength so that traffic lights are activated only nearby or out to greater distances.
- The hardware utilized by radio-based systems and installed on a vehicle is also capable of interacting with other equipped vehicles, providing collision avoidance warnings when two or more vehicles approach each other while operating their preemption systems.

Transit Signal Priority (TSP)

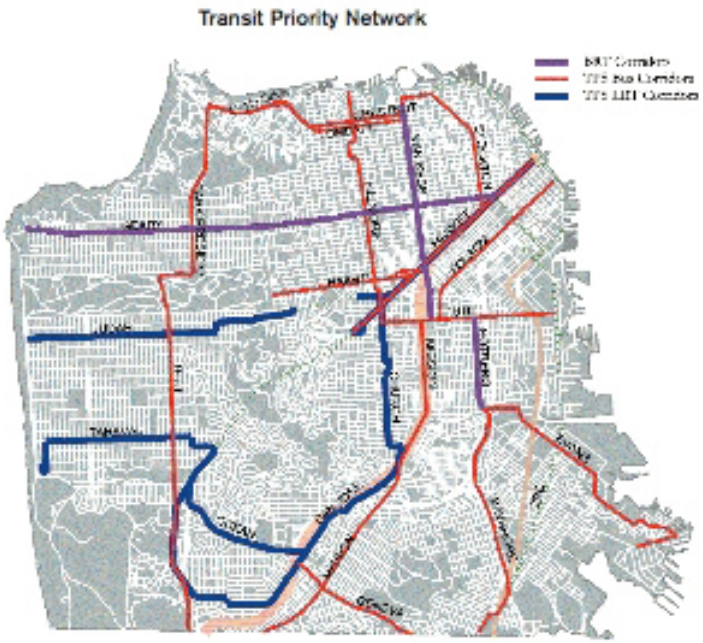
- Transit Signal Priority systems provide preferential treatment for transit vehicles when traveling through signalized intersections.
- It is a recommended ITS technology for bus rapid transit (BRT) systems.
- Benefits include:
  - Shorter, more consistent travel times
  - Improved schedule reliability and adherence
  - Lower fuel consumption
  - Improved air quality and environmental sustainability



Does TSP Work?

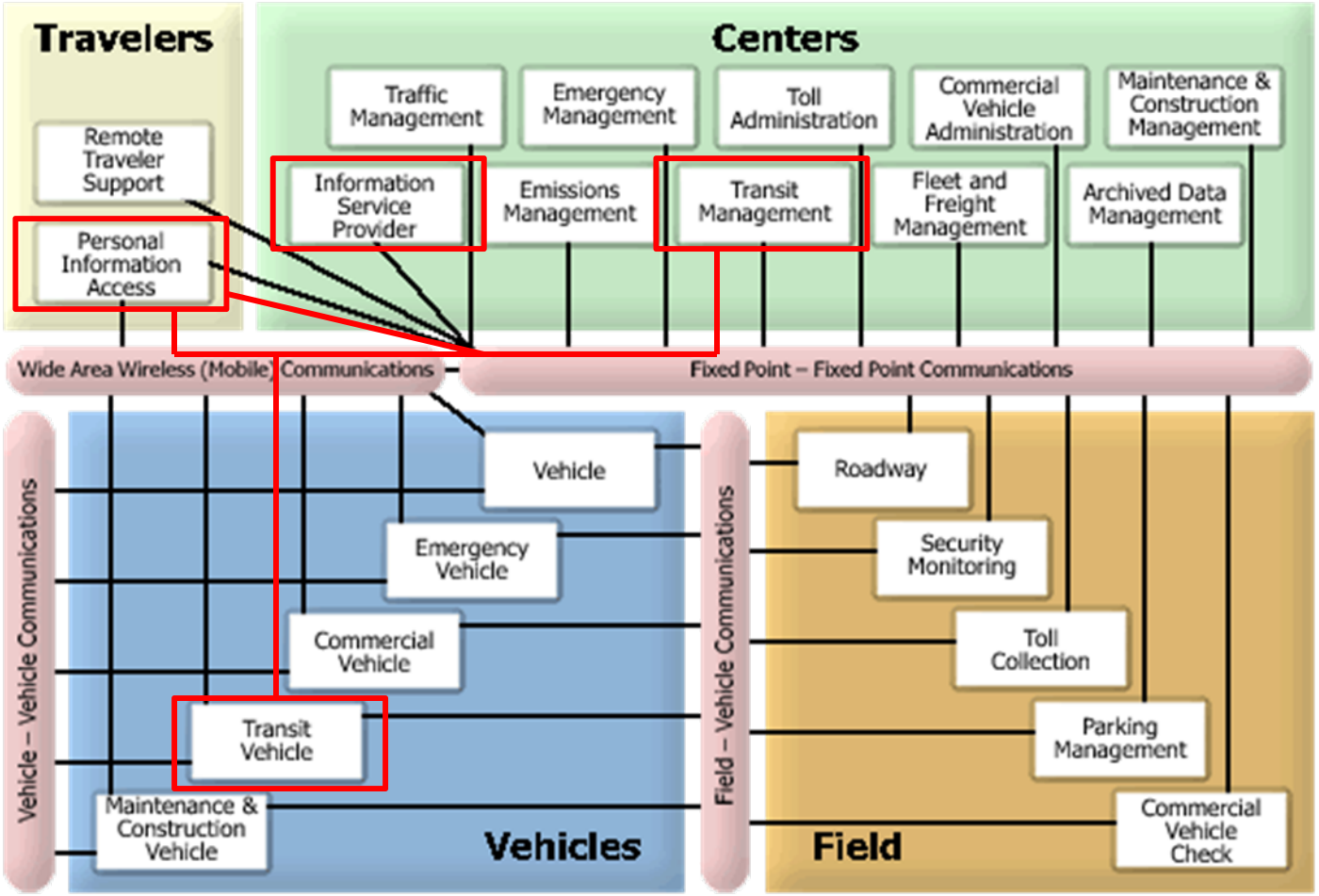
Location	% Running Time Saved	% Reduced Intersection Delay
Anne Arundel County, MD	13-18	-
Bremerton, WA	10	-
Chicago: Cermak Road	15-18	-
Los Angeles: Wilshire-Whittier Metro Rapid	8-10	-
Pierce County, WA	6	-
Portland, OR	5-12	-
Seattle: Rainier Avenue	8	13

The San Francisco Experience



- San Francisco has implemented a “citywide rapid network” combining Bus Rapid Transit with transit vehicle signal priority.
- BRT is a lower investment approach to moving large numbers of people along relatively narrow streets particularly at rush hour.
- TSP is the key to making BRT operate predictably, on time and efficiently.

US ITS National Architecture



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