Expanding the Capabilities of Your Traffic Signal Management System By Centralizing Emergency Vehicle Preemption Management

Presented by: Alex Preston

2018 ITE Joint Western & Texas District Meeting

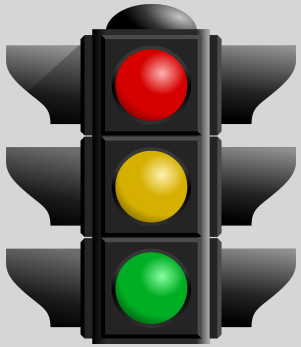
The Peak of Transportation 2018 Keystone Colorado ite Joint Western & Texas District Meeting

Trusted Transportation Solutions

Traffic Signal Management Systems provide a powerful tool to monitor and operate an agencies traffic signals

Traffic Signal Management Systems

But can it do more?



Required Components:

- Intersection infrastructure
- Communications network
- Central Server hosting the management system software

Abilities of a system

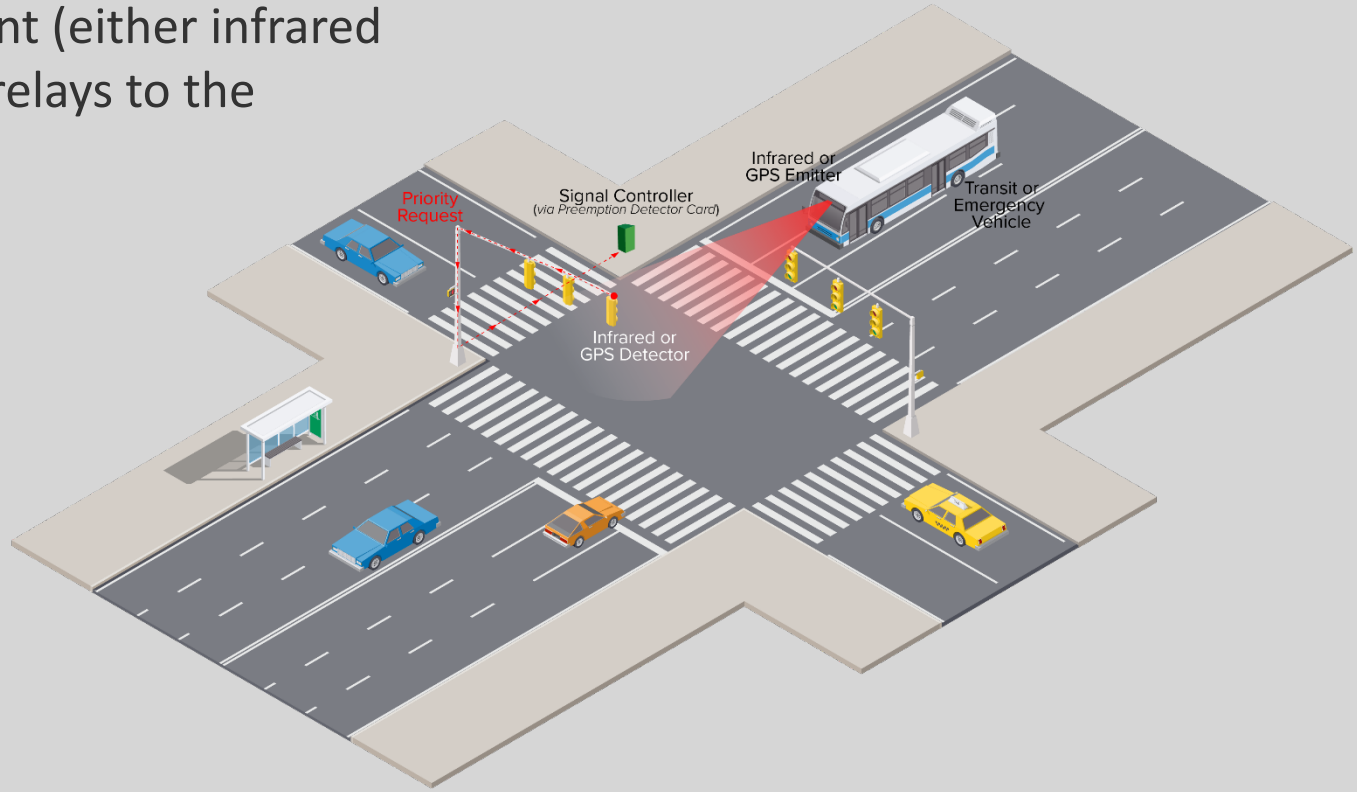
- Monitor
  - Control status
  - Communications
  - Error checking
- Control
  - Central
  - Local time of day
  - Manual
  - Traffic Responsive
  - Traffic Adaptive
- Manage
  - Upload/download controller databases
  - Manage timing schedules
- Reports
- Alerts

The City of San Jose had a problem….

- Fire Department consistently failed to meet mandated response times
  - This put millions of dollars in funding at risk
- The best solution to this problem is the implementation of Emergency Vehicle Preemption

Traditional EVP Operations

- Transit and Emergency vehicles are outfitted with emitter equipment (either infrared or GPS based)
- Intersections are outfitted with receiver equipment (either infrared or GPS) that receives the preemption request an relays to the preemption detector card.
- Preemption detector card validates request, determines phase to be preempted and sends request to traffic controller
- Traffic controller implements preemption requests



Emergency Vehicle Preemption in San Jose

- By 2016 EVP equipment installed at 1/3 of the intersections in the city (~300 signals)
- Cost to deploy EVP at remaining 600 Signals is $9 million
  - $15k per intersection, excluding maintenance costs
  - Lengthy deployment process would be required

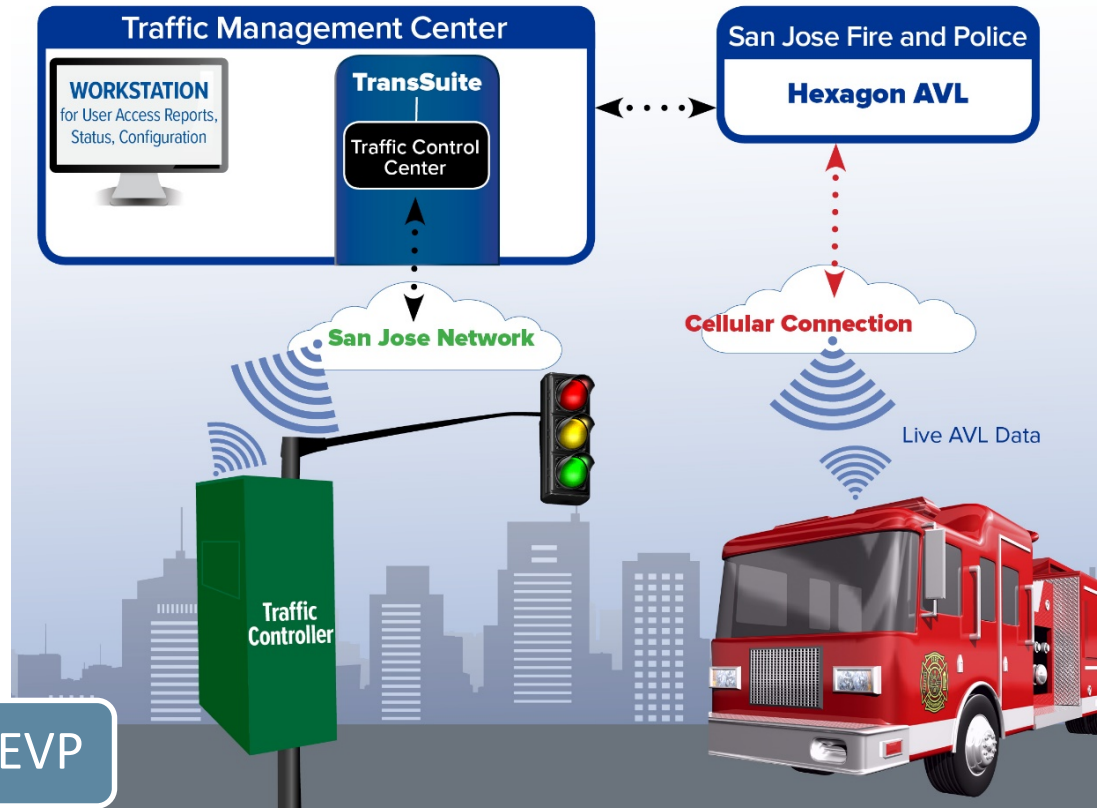
There had to be a better solution

- The DOT, Fire and Police Departments collaborated on a centralized solution leveraging existing systems
  - Fire and Police use Hexagon/Intergraph Computer Aided Dispatch (I/CAD) System
  - DOT uses TransCore's TransSuite Traffic Control System (TCS)
  - DOT already has an extensive communication network communicating to over 99% of its 950 traffic signals (via fiber, wireless radio and cellular)

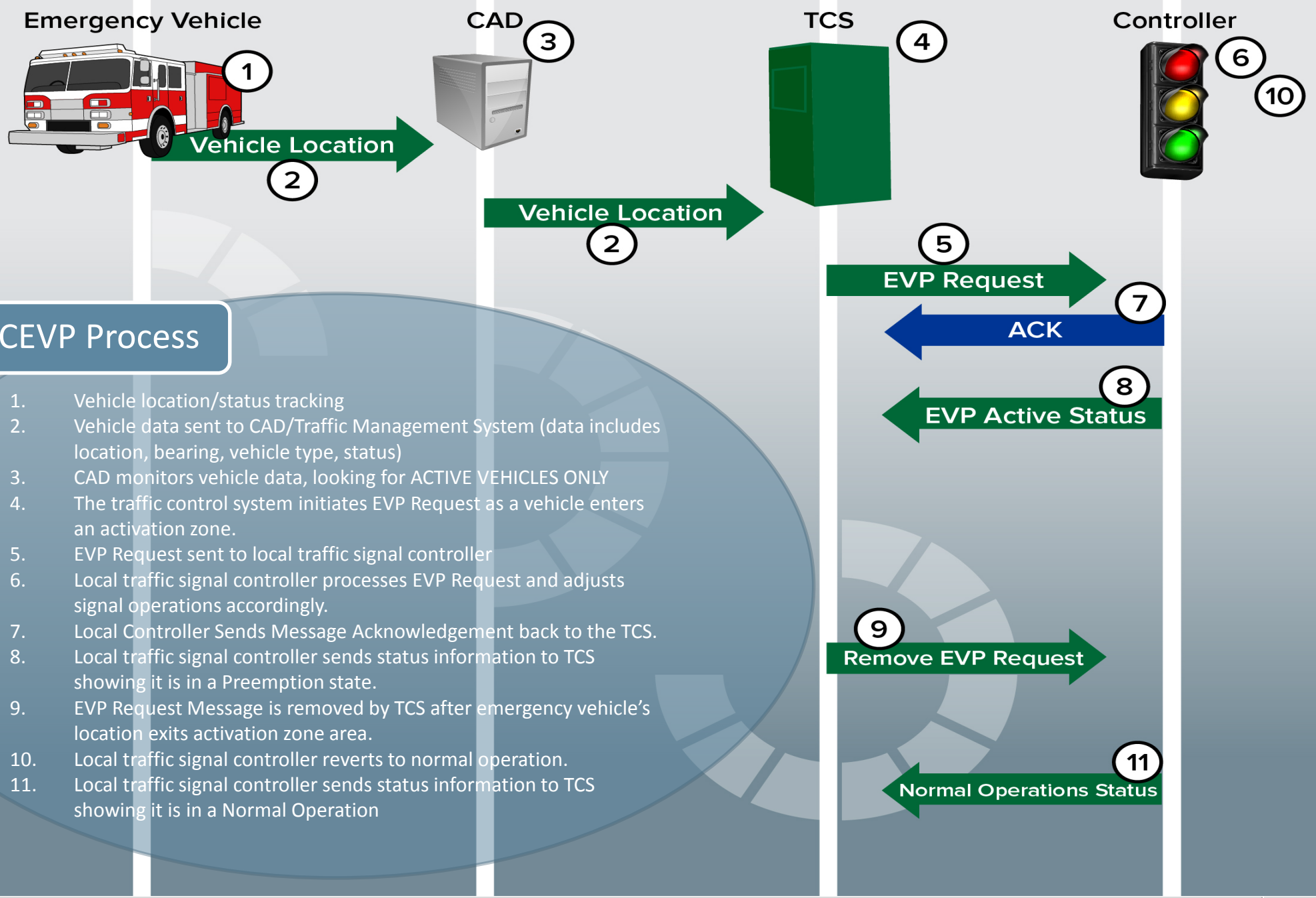
The Solution: Central EVP

Four main components of the system

- Hexagon AVL System
- TransSuite TCS
- San Jose Communication System
- Traffic Controller



TransSuite CEVP



The CEVP Process

1. Vehicle location/status tracking
2. Vehicle data sent to CAD/Traffic Management System (data includes location, bearing, vehicle type, status)
3. CAD monitors vehicle data, looking for ACTIVE VEHICLES ONLY
4. The traffic control system initiates EVP Request as a vehicle enters an activation zone.
5. EVP Request sent to local traffic signal controller
6. Local traffic signal controller processes EVP Request and adjusts signal operations accordingly.
7. Local Controller Sends Message Acknowledgement back to the TCS.
8. Local traffic signal controller sends status information to TCS showing it is in a Preemption state.
9. EVP Request Message is removed by TCS after emergency vehicle's location exits activation zone area.
10. Local traffic signal controller reverts to normal operation.
11. Local traffic signal controller sends status information to TCS showing it is in a Normal Operation

TransSuite ATMS Map

File Edit View Layers Help

Editing CEVP Activation Zone Layer

CEVP Activation Zone Properties

General

ID: 4

Type: Fire

Name: San Jose Fire Station 26 EB

Description:

Map detail level: 5

Activations

Direction	Heading	Variance	Range
North	45	15	30 to 60

Ctrl ID	Name	Preempt ID (High)	Preempt ID (Low)
202	SENTER RD & TULLY RD	1	5
40101	D4	1	5

Add

Configuration: Vehicle Class Definitions

System Options

Details

Vehicle Type	High Priority	Activation Zone Type
ADMIN		Fire
AE	Yes	Fire
AR	Yes	Fire
AU		Fire
BC		Fire
BP	Yes	Fire
CAPT	Yes	Police

Add / Edit

Vehicle Type: ADMIN

High Priority: ☐

Activation Zone Type: Fire

Cancel Add New Apply

CEVP Operations

System Help

CEVP Operations Status

Enabled

Communication Status

0 days 00:02:49

Established: 04/06/2018 08:45:14 AM

Vehicle Updates

4

Heartbeats Rec'd

5

TransSuite CEVP

© 2018 TransCore ITS, LLC - For Help, press F1 | 121.883915 W | 37.302337 N | 3.70 miles, Detail 1 (15.1) | Find Address Failed: Error calling ReverseGeoCodeGet: Unable to connect to the remote server

CEVP Deployment Responsibilities

San Jose DOT:	• Will make EVP available to all intersections connected to TransSuite TCS (916 intersections) once TransSuite update is completed
San Jose Fire Department:	• Will utilize EVP on all vehicles with existing AVL • In the process of deploying AVL equipment across entire fleet
San Jose Police Department:	• Will utilize EVP once police cruisers are equipped with AVL
TransCore ITS:	• Will enhance TransSuite TCS to support CEVP Operations
Hexagon:	• Will enhance the ICAD system to support CEVP Operation

What is the cost?

Centralized emergency vehicle preemption

- Able to deliver the ability for emergency vehicle preemption city-wide very quickly
- Cost for development and deployment are 1/10th of the cost of a traditional EVP system

Traditional EVP	Central EVP
$15,000/intersection for hardware	Budget: $600,000 to $750,000
597 intersection requiring hardware	Enhancements to Traffic Control System and CAD/AVL System to provide EVP functions
Total Cost: $8,955,000	Total Cost: $600,000 to $750,000
Central EVP delivers the desired solution at 1/10th of the cost	

Lessons Learned

Partnership Required:

- All parties need to work together towards a common goal
- Need a clear vision and strong leadership

System Testing is key:

- TransCore and Hexagon testing throughout the development process guided further operational decisions
- Identified critical errors that were not readily apparent

Traffic Signal Controller:

- Required testing and coordination with vendor to ensure CEVP operations could be support
- City is standardizing on a minimum firmware version to ensure compatibility
- City had to develop TSP standard to be used at all intersections

Adaptive Signal Systems:

- Initially overlooked existing and planned adaptive signal systems (SCATS and KITS)
- City determined that SCATS will be phased out due to cost to support CEVP with system
- Change order issued to TransCore to ensure smooth CEVP operations with KITS

Next Steps

- Software deployed
- Acceptance testing in process
- City will begin configuring TransSuite for CEVP operations on test corridors
- System Acceptance Test will be complete
- City will continue configuration for all intersection

Questions?

alex.preston@transcore.com