FDOT NTCIP Based Emergency Vehicle Preemption

By Florida Department of Transportation

8/21/2025

Benefits Statement

The Emergency Vehicle Preemption (EVP) system deployed in Seminole County enhances emergency response by cutting average arrival times by 90 seconds. Using cellular communication and upgraded traffic signals, the system alerts intersections ahead of emergency vehicles, clearing paths more efficiently. This innovation saves lives by accelerating emergency response, saves time with reduced delays at intersections, and saves money through lower maintenance costs—projected at $200K annually—and cost-effective deployment ($650 per fire apparatus). The scalable, under-budget solution also improves traffic signal data, enabling future traffic system refinements.

In this case study you will learn:

1. How modern EVP systems can reduce emergency response times by up to 90 seconds.
2. How FDOT upgraded cellular communication to lower ongoing maintenance costs.
3. How FDOT used collaborative, scalable solutions to improve safety and traffic management while enhancing real-time signal data for future refinements.

Project #212

Version Number: 1

BACKGROUND

With the benefits of Emergency Vehicle Preemption well established, there was a desire to enhance the effective radius in a controlled manner. Queues at critical intersections often exceeded the distance of line-of-sight preemption calls, delaying the arrival of emergency vehicles. Concurrently, FDOT was approached by an OEM interested in using DSRC technology for EVP in Seminole County, which had allocated $5M for a proprietary technology solution. Through coordination between the two agencies, discussions about needs led to an agreement to jointly explore DSRC due to its potential additional benefits for V2V safety, potential OEM proving ground, and potential improvements in arrival times.

TSMO PLANNING, STRATEGIES AND DEPLOYMENT

Development of the DSRC solution revealed that RSU providers were converting J-2735 messages to NTCIP, necessitating upgrades to DSRC enabled traffic controllers. FDOT and MetroPlan Orlando managed funding and license procurements for signal upgrades, while Seminole County updated hardware, firmware versions, and configurations. During this period, debates over DSRC and PC-5 technology slowed the project for months. Testing of PC-5, which appeared to be the future, showed its functionality was virtually nonexistent. After an 18-month delay, the team began exploring direct NTCIP solutions at the suggestion of the developer.

Discussions between the agencies covered business rules, cybersecurity, and architecture. With agreement, the first prototype was tested and deployed within months. The patience of Seminole County Fire cannot be overstated; despite having an approved budget for an alternative solution, they waited patiently through technology changes, never wavering. Their commitment to a longer-term solution and collaboration with traffic groups is truly unique.

With a functioning pilot, FDOT began the painstaking work of adjusting speed/look-ahead distance, testing each approach against metadata, and working on unique EVP configurations and call placements. Nearly a year of testing and refining produced a product that addressed key factors: increasing look-ahead distance when appropriate, automatically holding calls when stopped, providing feedback to the apparatus operator, and offering performance statistics. After four long years of refinement, a fully functional product is now in place. PC-5 is used for V2V safety applications, while EVP is handled over cellular.

COMMUNICATIONS PLANNING AND EXECUTION

The region has a history of cooperation and teamwork from the MPO to FDOT to Counties to Cities. With established relationships and open communication, team members worked together with trust throughout the process, in an ad hoc manner throughout development, sharing successes and setbacks.

With a functioning product, refinement continues through open communication. The Department is spreading the word about the potential cost savings and improved performance compared to other options. Meetings to share findings via traffic engineering (TIM teams and TETC presentation), fire (various Regional FireMeetings), and TIM meetings (both parties).

OUTCOME, BENEFITS AND LEARNINGS

Performance achieved; under budget; with lower O&M; and it is scalable.

Cellular and confirmation lights have cost $90,073 for 138 fire apparatus (around $650 each). Controller upgrades cost $1,294,400 and offer additional benefits. Response times have improved by approximately 90 seconds on average. 1,100 activations are occurring daily with an average duration of 29.7 seconds. Maintenance costs are expected to decrease by $200K annually. FDOT is expanding the system to other partners with the assistance of Seminole County.

A significant benefit has also been improvement in Signal Phasing and Timing data. The NTCIP allows for conversion to J2735 SPaT messages. MAP association of direction versus phase are being verified with each use (similar to CIMM).

NTCIP is proving to be a valuable tool in allowing for the free flow of information, which will allow for more refinements from central communication as time goes on.

Preempts (19717)

Signal	Vehicle	Direction	Timestamp	Duration
SEM1130	1300	EB	3/4/2025, 12:01:08 PM	18
SEM1310	1300	EB	3/4/2025, 12:01:21 PM	34
SEM1315	1300	EB	3/4/2025, 12:01:38 PM	35
SEM1320	1300	EB	3/4/2025, 12:02:03 PM	28
SEM1325	1300	EB	3/4/2025, 12:02:18 PM	29
SEM2260	1212	SB	3/4/2025, 12:02:19 PM	34
SEM1330	1300	EB	3/4/2025, 12:02:37 PM	29
SEM2265	1212	EB	3/4/2025, 12:02:54 PM	26
SEM2263	1212	EB	3/4/2025, 12:02:54 PM	13
SEM2830	1225	WB	3/4/2025, 12:03:06 PM	43
SEM2270	1212	SEB	3/4/2025, 12:03:27 PM	28
SEM1595	1225	SWB	3/4/2025, 12:03:43 PM	49
SEM2275	1212	EB	3/4/2025, 12:03:56 PM	29
SEM1755	1300	NWB	3/4/2025, 12:03:57 PM	38
SEM2405	1212	EB	3/4/2025, 12:04:25 PM	49
SEM1590	1225	NWB	3/4/2025, 12:04:46 PM	25
SEM1585	1225	NWB	3/4/2025, 12:05:00 PM	26
SEM1580	1225	NWB	3/4/2025, 12:05:06 PM	26
SEM2410	1212	SB	3/4/2025, 12:05:14 PM	21
SEM1155	1225	NWB	3/4/2025, 12:05:17 PM	30
SEM1545	1212	SB	3/4/2025, 12:05:17 PM	43