Shortcut in Central Florida

By Florida Department of Transportation

11/4/2024

Benefits Statement

The FDOT District Five's Shortcut platform enhances traffic flow and safety by automating signal control across multiple jurisdictions. It helps save lives by reducing crashes on congested ramps through quick signal adjustments. Time is saved as motorists bypass traffic incidents faster, thanks to real-time updates and automated response. The platform also saves money by cutting labor costs through automation, reducing fuel consumption, and minimizing delays. This streamlined traffic management system improves efficiency and safety on Central Florida's roads.

In this case study you will learn:

1. How FDOT approached the challenge of coordinating traffic signals across different local agencies using various signal controller systems.
2. How the Shortcut platform automated signal control and integrated real-time traffic data to streamline corridor management.
3. How the platform successfully reduced congestion and improved safety on critical roadways like I-75 by enabling faster response to traffic incidents.

Case Study #197

Version Number: 1

BACKGROUND

The Florida Department of Transportation (FDOT) District Five actively manages Central Florida roadways in partnership with 14 local agencies overseeing more than 2,000 on-system signals. For years, the Transportation Systems Management and Operations (TSMO) program's goal has been to provide integrated corridor management (ICM) to assist motorists seeking to avoid adverse conditions on the interstates by providing better flowing arterial corridors. This initiative aims to increase green time for motorists bypassing congestion from incidents and closures. Several challenges faced the Regional Traffic Management Center (RTMC) staff:

- Each local agency selects signal controller vendors independently, making traffic signal plan coordination across agency boundaries nearly impossible.
- Signal plan deployment is often needed outside business hours, putting strain on the specialized arterial staff who are capable of using controller vendor advanced traffic management software (ATMS).
- There was no central platform to monitor roadway events, timing plans, and signal communication status across multiple signal controller types.

These challenges eventually led to the conceptualization of the Shortcut platform.

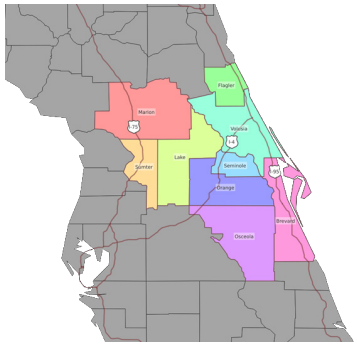

Figure 1: ShoFDOT District 5 spans 9 counties and 3 interstates in Central Florida

TSMO PLANNING, STRATEGIES AND DEPLOYMENT

In November 2021, two new RTMC operations management contracts were awarded for District Five. The Interstate 75 (I-75) team investigated solutions for the gaps outlined above along a critical segment of the state's primary freight and tourist corridor. Adjacent to this 60-mile stretch of interstate, traffic diversion plans cross multiple jurisdictions with local agencies employing four different signal controller types. The first approach was to automate the changing or manipulation of the signal controller's remote screen menus, simulating the action of a signal technician directly accessing the cabinet. Once it became clear that remote programmatic control was possible, a web map was added to allow users to select specific signals and activate the appropriate script from their browser. This web map was branded "Shortcut" with a simple traffic signal logo.

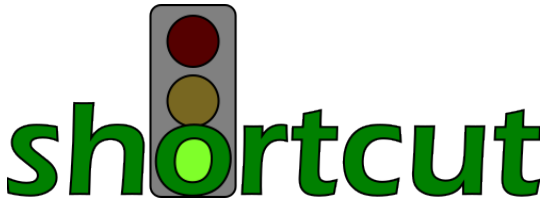

Figure 2: Shortcut application logo

At this point, potential users and subject matter experts were engaged to identify features needed in the application. Arterial management staff were provided a configuration page to update signal and timing plan configurations. User authentication via the Department's Active Directory was added to secure application functions with tiered access. The mapping team defined corridors in the Waze partners' platform for real-time travel speed visualization in the application to help identify slowdowns. SunGuide, Florida's ATMS, was integrated into Shortcut to overlay events on the map and associated deployments. Finally, the application entered production in October 2022.

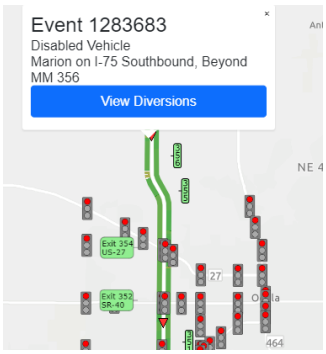

Figure 3: Integration with FDOT's SunGuide software provides situational awareness to RTMC operators

COMMUNICATIONS PLANNING AND EXECUTION

Shortcut could never have succeeded without the buy-in from local agency partners. With the early pilot deployment affecting both Marion County and the City of Ocala, outreach from the RTMC occurred early and often. An automated email notification system was created to allow those outside the RTMC to always know when plans are deployed in their area. The local agencies were invited to remotely cancel plans via a special link should any circumstance warrant. As a testament to the program's success, these safeguards were never needed.

The application went live just before the winter holiday season, an exceptionally busy time on this segment of I-75. The impact was immediate. Multiple activations per day in this corridor were common and have been ever since. Prior to the Shortcut deployment, certain problematic ramps tended to queue traffic into the mainline of I-75 and create significant safety concerns from potential crashes. The Shortcut system enables special "flush plans" to be deployed on demand to prioritize clearing the ramp. RTMC operators were now empowered to clear this condition with a single click.

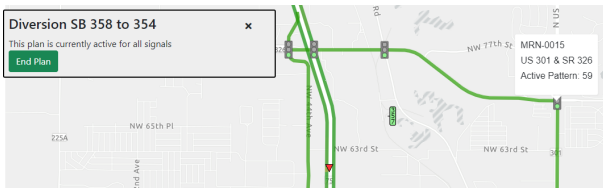

Figure 4: This southbound diversion modifies the active timing of 14 traffic signals in two jurisdictions.

This southbound diversion modifies the active timing of 14 traffic signals in two jurisdictions. The result for motorists is faster movement around the incident through the arterial corridors and less congestion on the interstate mainline.

Once it became clear that the ICM use-case was well addressed by Shortcut's simple interface, the team's focus shifted to extending the application to a wider range of arterial management needs. First, the communication libraries were migrated to the industry standard for controller management, known as National Transportation Communications for Intelligent Systems Protocol (NTCIP). Alarm monitoring was then added with automated alerting workflows, the most notable of which led to a notification process that guarantees that RTMC staff are informed of flash events within seconds of their occurrence. The culmination of these additional features is a real-time interface with notices for everything from preemption to Automated Transportation Signal Performance Metrics (ATSPM), based on continuous polling of over 1,200 connected signals. All these signal management tools are available via this web-based application without the need for VPN connections or software installation.

OUTCOME, BENEFITS AND LEARNINGS

As of summer 2024, alternative timing plans have been activated in Shortcut over 800 times. In most cases, this was done to relieve off-ramp backup and the plans were deactivated within an hour after dramatic improvement could be confirmed via closed circuit television (CCTV). Large-scale operations have also been per-

formed. Perhaps the most notable of these was a full northbound diversion deployed in response to a bridge strike in 2023 that closed I-75 for over 11 hours. Traffic was almost immediately diverted onto nearby rural roads running timing plans specifically prepared for this purpose, easing a very serious congestion issue. Going into the hurricane season, plans are already in place for use should evacuations warrant special movement prioritization.

Figure 5: This I-75 incident resulted in over 11 hours of full northbound closure on I-75 in Marion County.

This I-75 incident resulted in over 11 hours of full northbound closure on I-75 in Marion County, approaching the City of Ocala. Shortcut empowered operators to adjust signal timings to alleviate strain on local roads in both jurisdictions.

A key lesson learned by the District Five team was that convenient access to alternative timings greatly increases their use. Prior to Shortcut, these plans would only be deployed under extreme or long-term conditions, if at all. The ease of access of Shortcut proved to be its key strength, encouraging users to act much more quickly and frequently. The benefit of doing so adds up over time, resulting in better safety and mobility without any additional cost.

More fundamentally, the goal of the Shortcut application is to shift the industry away from vendor-specific signal management applications. Vendor lock-in is a common problem in the TSMO industry, where providers have shifted from hardware manufacturers to Software as a Service (SaaS) providers, reducing the quality and availability of features that form the backbone of the industry. The best defense against this is for agencies to insist on adherence to open standards like NTCIP and to use platforms reliant upon them.

Every step of the development of Shortcut, from concept to maintenance, was performed directly for FDOT District Five under their RTMC operations contract. The team is currently preparing for deployments outside of the District, with a ground-up rewrite of the application that focuses on long-term stability and modularity. It is the goal of the Shortcut team to have this software become the standard for signal management in much the same way that the Utah Department of Transportation (UDOT) leads the ATSPM initiative.