



ATSPMs modernize traffic signal management by providing high-resolution data to actively manage performance and improve safety and customer service while cutting congestion and costs.

There are more than 330,000 traffic signals operating in the United States, and highway agencies typically retime these signals on a three- to five-year cycle at a cost of approximately \$4,500 per intersection. For the vast majority of these signals, citizen complaints are the primary measure of performance. Not having performance data drives retiming costs up by requiring software modeling to simulate performance, along with detailed, manually collected traffic data.

When agency professionals and consultants conduct retiming projects, they perform an ad hoc comparison of limited before and after travel-time data to demonstrate the effectiveness of optimization efforts. Typically, no ongoing performance

measurement capability exists, and agencies rely on citizen complaints to reactively detect maintenance or operational deficiencies. This lack of active performance management compromises safety and efficiency and contributes to congestion. It also institutionalizes public dissatisfaction with the operation and maintenance of signalized intersections.

The Federal Highway Administration (FHWA) is promoting automated traffic signal performance measures (ATSPMs) in the fourth round of Every Day Counts (EDC-4) as a means to improve on these traditional retiming processes by providing continuous performance monitoring capability. Signal retiming efforts can be based directly on actual performance without dependence on software modeling or expensive, manually collected data.

ATSPMs consist of a high-resolution data-logging capability added to existing traffic signal infrastructure and data analysis techniques. This provides agency professionals with the information needed to proactively identify and correct deficiencies. They can then manage traffic signal maintenance and operations in support of an agency's safety, livability and mobility goals.

The technology is cost effective, as ATSPMs can be applied to a wide range of signalized intersections and use existing infrastructure to the greatest extent possible. ATSPMs will also support the validation of other technologies and operational strategies, such as adaptive signal control and emerging connected vehicle applications.



ATSPMs make it possible to preserve the best possible traffic signal operation, rather than replacing noticeably failing operation at infrequent intervals.



STATE OF THE PRACTICE

This technology is the outcome of a collaboration among FHWA, the American Association of State Highway and Transportation Officials (AASHTO), state departments of transportation (DOTs) and academic research efforts. Most recently, a Transportation Pooled Fund study, "Traffic Signal Systems Operations and Management," led by the Indiana DOT with participation from the FHWA, 11 state DOTs, and the City of Chicago, produced an open source software option that provides a framework for continued innovation in data analysis techniques.

The collaborative development of ATSPMs has produced a number of implementation options to fit a range of agency capabilities and resources. Approximately 26 transportation agencies at both state and local levels are currently involved in implementing ATSPMs. The AASHTO Innovation Initiative led by the Utah DOT has resulted in early implementation of the technology in 12 states and a community of peers ready to share implementation experience.

BENEFITS

- ▶ **Targeted Maintenance.** ATSPMs provide the actionable information needed to deliver high-quality service to customers, with significant cost savings to agencies.
- ▶ **Improved Operations.** Active monitoring of signalized intersection performance lets agencies address problems before they become complaints.
- ▶ **Increased Safety.** A shift to proactive operations and maintenance practices can improve safety by reducing the traffic congestion that results from poor and outdated signal timing.

RESOURCES

EDC-4 ATSPMs: https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/atspm.cfm

Transportation Pooled Fund Study TPF-5(258)—Traffic Signal Systems Operations and Management: <http://www.pooledfund.org/Details/Study/487>

Signal Performance Metrics Technical Information and Background

Purdue e-Pubs: <http://docs.lib.purdue.edu/atspmw/2016/Presentations/>

AASHTO: <http://aai.transportation.org/Pages/AutomatedTrafficSignalPerformanceMeasures.aspx>

Live Signal Performance Metrics Case Study Sites

Las Vegas: <http://challenger.nvfast.org/spm/>

Seminole County, FL: <http://spm.seminolecountyfl.gov/signalperformancemetrics/>

Utah: <http://udottraffic.utah.gov/signalperformancemetrics/>

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Every Day Counts (EDC), a State-based initiative of FHWA's Center for Accelerating Innovation, works with State, local and private sector partners to encourage the adoption of proven technologies and innovations aimed at shortening and enhancing project delivery.

