Mid-America Regional Council

Regional Models of Cooperation Case Study Series

Bi-State Planning for Operations Improves Traffic Flow and Air Quality

Traffic defies state boundaries. The Mid-America Regional Council (MARC), the MPO for the bi-state Kansas City region, addresses this reality by administering Operation Green Light (OGL), a traffic signal management system that uses wireless technology to coordinate traffic signals on major routes in the Kansas City area. The Kansas and Missouri Departments of Transportation (KDOT, MoDOT) and 24 cities and 9 counties on both sides of the state border participate in the system. OGL has enabled real-time responses to traffic changes in the region and reduced delays by 9 to 80 percent.

Motivation for Establishing the Collaboration

In the late 1990s, three events occurred that led to Operation Green Light. First, KDOT and MoDOT completed planning for the Kansas City (KC) Scout freeway management system, which concerned surrounding cities about potential impacts on the signalized street system. Second, both MoDOT and the City of Kansas City, Missouri began developing a common hardware standard for traffic signal controllers at intersections between their highway and street systems. Third, at the time the region was a nonattainment area for EPA's one-hour ozone standard. These events sparked interest in retiming traffic signals as way to mitigate both traffic and air quality. After the leaders of all three initiatives learned of each other's work, they met, identified common interests, and designated MARC to coordinate planning for OGL. Under TEA-21, KDOT became eligible for MoDOT's unused Congestion Mitigation and Air Quality (CMAQ) funds, providing the resources for MARC to plan OGL and implement it in 2008.[1]

Operation Green Light technician adjusts signal timing at traffic signal cabinet.
(Courtesy Mid-America Regional Council)

OGL connects to traffic signals along key corridors in the region using radio and fiber-optic communication networks. These networks provide real-time operations data from each intersection and enable MARC to remotely retime signals. Local cities paid to join the network because 80% of the cost was provided by federal funds, which they were usually too small to receive, and because it provided them connections to the new OGL communications network and access to MARC's regional ATMS software license.

Collaboration Structure

MARC operates OGL with oversight from a Steering Committee and ad hoc task forces. The OGL Steering Committee consists of KDOT, MoDOT, and MARC representatives as well as Public Works Directors and City

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[1] U.S.C. Title 23 §110(c)

Managers from the cities with signals in the OGL system. The group met monthly while developing and establishing the initiative, but now meets quarterly. Ad hoc task forces include traffic engineers and technicians from the member agencies, and meet as needed to discuss technical issues with the software, hardware and other issues. The Steering Committee also convenes focus groups and conducts strategic planning exercises prior to securing new procurements and updating corridors in the system.

To support the five-person work unit which operates the entire OGL system, MARC receives annual funds from each partner rather than relying on individual cities to help with operations. The funding agreement documents how much each partner contributes, the process for retiming signals on a corridor, and what to do if two partners disagree on signal timing changes.

MARC uses traffic flow, air quality, and operational metrics to measure the performance of OGL. Because of the project's goal to improve air quality, MARC focuses on reducing idling time, which in turn reduces fuel consumption and VOC and NOX emissions. Before and after retiming each corridor, MARC conducts and publishes travel time studies to document the project's impact on traffic flow and air quality. Internally, MARC also tracks operational metrics for its member agencies. These metrics include how often MARC responds to maintenance issues, the number of inter sections on which MARC collects data, and the uptime of various links in the communications network.

Collaboration Accomplishments

One of OGL's most significant accomplishments involves improving traffic flow in the region. MARC's studies show that OGL has reduced delay on the system's corridors by 9 to 80 percent, with a benefit-to-cost ratio of at least 7 to 1 and as high as 60 to 1.[2] Producing a convincing story about the system's tangible benefits helps encourage agencies to continue participating in the group and enabled OGL to retain full membership even during the 2008 financial crisis.

OGL has also strengthened MARC's relationships with the region's law-enforcement agencies. MARC has worked with these agencies to use the traffic signal communications network as a tool to improve safety and emergency response time.

Challenges and Lessons Learned

In spite of the strong relationships between the OGL partners, staff turnover has posed challenges in terms of retaining institutional knowledge and maintaining interest in the initiative. As top officials leave, MARC must re-convince their replacements that OGL is worth the investment. This is especially true now that MARC is negotiating a new funding agreement for OGL, as agencies must decide whether to continue committing funds to the initiative. To address this challenge, MARC is updating its strategic plan to include methods to educate high-level decision-makers and the public in each of its members' jurisdictions about the traffic flow and air quality benefits stemming from OGL.

Value changes in the community have also challenged the relevancy of OGL. In the late 1990s, when OGL began, stakeholders aimed to eradicate congestion in the region. Now, growing sensitivity to the need for

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[2] OGL Traffic Signal Coordination studies

multimodal transportation threatens to portray OGL as a highway project that promotes the use of single-occupancy vehicles. MARC has adapted to this shift by focusing less on reducing congestion, and more on maintaining the functionality of the existing roadway network.

MARC uses funding incentives as one strategy to encourage member agencies' participation. When cities participate in OGL and/or apply for funding for projects related to OGL, they receive points in the application review process and are more likely to receive KDOT, MoDOT, and MARC funding. These incentives help to ensure that existing partners remain committed to funding OGL.

Through OGL, MARC has significantly improved traffic flow and air quality in its members' jurisdictions. Sharing funds, data, and equipment has enabled 24 cities and two State DOTs to coordinate traffic signal timing across city and State borders in response to changing traffic patterns, thereby providing time savings and improved quality of life to residents throughout the Kansas City region.