



# ACS Lite

## Description

A significant cause for traffic delays and congestion can be traced to inadequate signal timing. Traditional signal timing is largely based on a few timing plans programmed using small peak hour data samples. Adaptive Control Software Lite (ACS Lite) is a low cost system which samples traffic data as it happens in order to dynamically adjust offsets and splits to improve signal timing. Agencies unable to evaluate and retime traffic signals according to the FHWA's recommended 3-5 year interval can benefit substantially by employing ACS Lite. As traffic demands change from hour to hour or over long periods of time, ACS Lite provides agencies with a cost effective way to respond. With a minimal investment in additional infrastructure, training, and maintenance, agencies can benefit by using existing stop-bar and advance detection commonly found at fully actuated intersections.

ACS Lite was developed to meet the needs identified by research conducted by the FHWA Research, Development and Technology Traffic Operations program. ACS Lite was originally designed to operate as a closed-loop system using local ACS Lite master controllers. Econolite has improved on the original design and now offers ACS Lite as an optional integrated software module for the *Centracs*® Advanced Transportation Management System (ATMS). *Centracs* can manage multiple ACS Lite arterials using standard ACS Lite algorithms. Econolite's approach eliminates expenses associated with on-street ACS Lite masters by operating ACS Lite on the *Centracs* application server. Further savings are achieved because existing *Centracs* communications channels are used to manage, monitor and make adaptive adjustments on the arterial controllers.

ACS Lite adapts splits and offsets of signal control patterns and plans with optimization steps occurring every 5 to 10 minutes. Using the currently running traffic plan, ACS Lite creates and analyzes a statistical profile of intersection efficiencies along an arterial. In the event communication interruptions occur

between the ACS Lite application and the local controllers, the local controller still maintains full coordinated operation of the intersection using the preexisting plans stored in the controller.

The ACS Lite application performs its optimizations by polling each local controller once each minute for custom ACS Lite National Transportation Communications for ITS Protocol (NTCIP) detector and phase status data. *Centracs* ACS Lite can poll up to 32 controllers on a single arterial using Ethernet communications. After measuring phase and split utilization, ACS Lite runs optimization algorithms to reallocate split time from phases that are not using their entire split to other phases that need more time. The optimization algorithms also determine whether an earlier or later offset would be more effective for improving traffic progression. ACS Lite downloads the new values to each controller in the managed arterial. Since the changes to the split and offset values are small (typically 2-5 seconds), transition from the current setting to the new setting is usually completed within one cycle. The traffic engineer controls the frequency of optimizations and the maximum amount of split and offset times are added or subtracted from the programmed values.

Initial field demonstration testing of ACS Lite has shown 5-25% improvement in arterial travel times, significant reduction in stops, and between 5% and 50% improvement in delays at side streets and left turns, over standard coordinated arterials.

## Benefits

- Eases traffic congestion
- Easily deployed
- Needs little maintenance
- Makes use of existing detection
- Operates in real time
- Requires no calibration

## User Interface

*Centracs ACS Lite* is easy to configure through the *Centracs* Graphical User Interface (GUI). There is minimal data entry because much of the configuration data is uploaded directly from the local controllers. After uploading the configuration data, the user configures links, detector configurations, and tuning parameters through the GUI. After the configuration is completed *ACS Lite* control is managed through the *Centracs* scheduler, providing maximum control over when *ACS Lite* is operational. As the system runs, the *Centracs* database is continually updated to provide status reports, allowing users to track the changes that *ACS Lite* makes to the splits and offsets. In addition, *Centracs* archives *ACS Lite* performance measures and decisions to a database for future analysis and retrieval.

*ACS Lite* and its user interfaces are natively implemented in *Centracs*. This allows any user with the *Centracs* client software to securely access *ACS Lite* tools and reports locally and remotely via the Internet over a VPN connection.

## Detector Requirements

*ACS Lite* is flexible with respect to the size, location, and requirements for local detection used to provide the data needed to adjust offsets and splits. Any detection technology can be used (*Autoscope*®, loop detectors, etc.).

Advance detection, used for offset optimization should be far enough upstream to avoid spillback. Whether with stop-bar or advance detection it is recommended that each lane

have its own detection. Even when detection configurations are not ideal, *ACS Lite* is still capable of providing measurable improvements in traffic.

## ACS Lite in the Cabinet

*Centracs ACS Lite* is capable of centrally managing and operating multiple *ACS Lite* arterials without the expense of deploying multiple field-hardened PCs or *ACS Lite* Masters. *Centracs ACS Lite* works exclusively with Econolite's *ASC/3* controller software running on *ASC/3*, *ASC/3 2070* or *ASC/3 Rack Mount* controllers running version 2.49 or later of the *ASC/3* software. *ACS Lite* is enabled on these controllers using a special data key available from Econolite.

Each local controller can be individually enabled or disabled to respond to the changes being requested by *ACS Lite*. This allows the user to easily override *ACS Lite* at any time or to establish when (by the system scheduler) adaptive control will be allowed. When *ACS Lite* releases control of the local intersection it automatically restores the original offset and split values so that the controller database remains unaffected.

To learn more about how your agency can benefit from *ACS Lite*, please contact your local Econolite sales representative or Econolite distributor.

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