The ACDSS

The Adaptive Control Decision Support System (ACDSS) has been under development for NYCDOT by KLD and GPI, and is scheduled for field test on both Route 9A in Manhattan and Victory Blvd in Staten Island, prior to other consideration for other sites.

The ACDSS has been built to make cost-effective use of the major investments NYC has been making in its ITS infrastructure — the new ASTC controllers, the wireless communication capabilities, and the network of RTMS and other detectors.

The ACDSS is to receive detector information on flow and occupancy from the NYC_TCS system via a web services interface, forecast upcoming conditions, and in its prototype run concurrent simulation “instances” of the results with the planned vs. an optimized signal timing plan. The operator is faced with the decision to implement the recommended plan or not, based upon a set of measures of effectiveness (MOE’s) and the time since the last change.

In its full implementation, the ACDSS can control some 12 arterials in a self-running mode, with the operator choosing one arterial to directly control in real time, obtaining MOE’s by high speed simulations that test planned and optimized signal timing.

The development of an advanced real time decision support system is currently being implemented in New York City for effective adaptive signal control.

This system integrates on-line simulation with actual field traffic controllers and detectors, thereby enabling real time signal optimization while providing immediate visualization of different control alternatives and time-dependent measures of effectiveness.

A computationally efficient adaptive signal control algorithm has been developed, tested and integrated with the decision support system. This algorithm handles both oversaturated and under-saturated traffic conditions and strives to optimize cycle length, offset, and split in real time.
THE SIMULATOR

The ACDSS uses the AIMSUN simulation model, because of its capability to run multiple concurrent instances (alternatives) at high speed, allow concurrent 2D and 3D views, and provide drop-down menus that allow virtual views from the exact locations at which NYCDOT has video cameras in the field.

THE SIGNAL OPTIMIZATION

The IMPOST control policy was developed by KLD under NYSERDA funding, and addresses both undersaturated and oversaturated flow, as well as allowing arterial prioritization. This implementation is referred to as IMPOST+, and is the core module within the ACDSS. Other policies can be used in this module.

THE MEASURES

The intent is to reduce the variability and the average value of travel time, avoid congestion and spillback, and provide for better pedestrian service.

The key to achieving this is adapting the signal timing to serve traffic demands that vary from the expected or are affected by blockages and/or capacity losses in the system.

THE DETECTORIZATION

The NYC ITS infrastructure features a new generation of detectors. The overall ACDSS design concept deals with the reality that detectors must be used cost-effectively, must be strategically placed, and are sometimes imprecise.

THE IMPLEMENTATION

As the ITS World Congress approaches, the NYC ITS infrastructure is being finalized --- controllers, communications, and detectors. The ACDSS computer is being installed in the TMC, and interfaced with its systems.

The ACDSS will be entering field trials and being calibrated to the live detector feeds via the web services interface. It will then be used on Victory Blvd and Route 9A.