Centracs® Adaptive

ECONOLITE

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1. Introduction

1.1 The ATMS software shall provide an optional arterial based adaptive control module that modifies coordination parameters for designated intersections in response to current traffic conditions as determined by intersection detectors. This adaptive control module (hereafter referred to as *Centracs Adaptive*) was based on the adaptive control system algorithms and software developed to address the needs identified by the Federal Highway Administration (FHWA). The ATMS supplier shall be able to show that they have been licensed to use the *Centracs Adaptive* software that is provided with the system.

1.2 The optional *Centracs Adaptive* module shall be able to simultaneously support multiple arteries or zones of intersections running under the control of the *Centracs Adaptive* algorithms. The *Centracs Adaptive* software shall run on the system's core server(s). Use of multiple field computers or masters to implement *Centracs Adaptive* control shall not be acceptable. The user interface to the *Centracs Adaptive* module shall be incorporated into the system's workstation client software and shall not require the use of a separate software package or web browser.

2. Functional Requirements

2.1 The *Centracs Adaptive* module, when enabled for a zone, shall be able to adjust splits and offsets in real time at each of the intersections assigned to the *Centracs Adaptive* zone. A maximum of 32 intersections shall be assignable to a *Centracs Adaptive* Zone. The initial split and offset values for each intersection in the zone shall be determined by the current coordination plan in effect, as determined by the ATMS, at the time that *Centracs Adaptive* becomes active for the zone. The cycle length shall remain constant at the value programmed for the coordination plan in effect; only the split and offset values shall be modified by *Centracs Adaptive*. It shall be possible to change to a new cycle length by selecting a new coordination plan through the ATMS time-of-day schedule, traffic responsive or manual plan selection. When a new coordination plan is selected by the ATMS the *Centracs Adaptive* module shall immediately implement the new cycle, offset and split values defined by the new coordination plan at each intersection and then begin optimizing the offset and splits using the *Centracs Adaptive* algorithms as developed in the *Centracs Adaptive* research noted above.

2.2 *Centracs Adaptive* shall adjust split values for an intersection based on phase utilization data gathered from lane-by-lane stop bar detector data. Phase utilization data shall be averaged over a number cycles to determine the degree of saturation of each phase in use at the intersection. The *Centracs Adaptive* split algorithm shall then attempt to balance the degree of saturation on all phases by adjusting splits; moving time from phases with a lower degree of saturation to those phases having a higher degree of saturation within the constraints of the controller configuration. The user shall be able to set both the maximum split increment allowed for each incremental change of the split and maximum overall change or deviation that will be allowed.

2.3 Offset values shall be adjusted by developing a cycle based flow profile using data from lane-by-lane advanced detectors on the coordinated phase(s) and correlating vehicle arrival to the coordinated phase interval (Green, Yellow, Red). The *Centracs Adaptive* offset algorithm shall determine the optimal offset to capture the greatest number of vehicles arriving on the green interval of the coordinated phase(s). The offset algorithm shall be able to determine optimum offset values using vehicle arrival data from advanced detectors located within 250-500 feet of the stop bar of the coordinated phase(s). The user shall be able to set both the maximum offset increment allowed for each incremental change of the offset and maximum overall change or deviation that will be allowed.

2.4 *Centracs Adaptive* adjustments to the splits and offset of the current coordination plan in effect shall occur in user adjustable steps and be downloaded to each intersection in the *Centracs Adaptive* Zone at intervals of 5, 7.5 or 10 minutes as determined by the *Centracs Adaptive* algorithm and user inputs. When *Centracs Adaptive* is disabled or releases control of the intersections the preprogrammed coordination plan values for the intersections in the affected zone(s) shall be restored.

2.5 Detectors used for computing offset and split changes shall be monitored for failure. The *Centracs Adaptive* module shall monitor these detectors by requesting detector diagnostic data from the local controllers during normal polling periods. If a detector is reported as failed (max presence, erratic counts or no activity) *Centracs Adaptive* shall stop making adjustments to the coordination values for the affected intersection until the detector fault condition is cleared.

2.6 It shall be possible for each controller to be individually enabled or disabled to respond to the offset and split changes being requested by *Centracs Adaptive*. In addition, at the system level it shall be possible to enable or disable *Centracs Adaptive* control on a time-of-day basis.

3. User Setup and Interface

3.1 *Centracs Adaptive* shall be easily configured through a user interface that is compatible in style and layout to that of the ATMS. The user interface shall be part of the ATMS client software. The use of separate third party programs or web browsers to interface to the *Centracs Adaptive* module shall not be acceptable.

3.2 Configuration data required by *Centracs Adaptive* shall be uploaded directly from the local controllers. Any supplemental configuration data entries requiring user input shall be kept to a minimum. After uploading configuration data, the user shall be able to configure links, detector assignments/configuration easily through the supplied user interface.

3.3 The *Centracs Adaptive* module shall include status screens that allow easy selection of the following status information for any intersection under *Centracs Adaptive* control:

- 3.3.1 Phase Timing
- 3.3.2 Phase Utilization
- 3.3.3 Flow Profile
- 3.3.4 Pattern History
- 3.3.5 Detector Data

4. Communications

4.1 The system shall be able to support *Centracs Adaptive* zones using Ethernet communications. All *Centracs Adaptive* related communications to the intersections shall be processed through the ATMS system's standard communications server(s). Use of dedicated *Centracs Adaptive* application or communications severs or separate *Centracs Adaptive* communication applications shall not be acceptable.

4.2 All communications shall utilize NTCIP. *Centracs Adaptive* required data shall be gathered using a combination of standard, *Centracs Adaptive* specific and manufacturer specific (as needed) NTCIP objects. Polling for *Centracs Adaptive* detector and phase status data shall occur at a minimum of once per minute.

4.3 If communications is lost during *Centracs Adaptive* control, the local controller shall continue to maintain coordination but shall revert to the pre-existing coordination plan data stored in the controller's database.