



D4 Traffic Signal Controller Feature Summary (Version 1.6)

General Controller Features

- 16 phases
 - Three maximum times per phase with dynamic max operation
 - Minimum, maximum, soft recall modes
 - Early and delayed walk timing
 - Pedestrian clearance through yellow / red (configurable from end of red)
 - Conditional service during free and coordinated operation, with conditional service minimum and maximum green times
 - Manual control operation with selectable call, omit, sync, and protected pedestrian clearance phases
 - Per phase bike minimum green, red revert and advanced warning flasher
- 4 rings (single intersection or two independent intersections)
 - Each of the 4 rings can be assigned to one of the two ring-groups
- 16 timed overlaps
 - Vehicle and pedestrian movement for each overlap
 - Actuated pedestrian movements
 - Early and delayed walk timing
 - Pedestrian rest-in-walk across multiple phases
 - Per overlap preempt timing (vehicle and pedestrian)
- 8 flashing yellow arrow (FYA) / red arrow modules (separate from overlaps)
 - Start phase, opposing pedestrian movements, delay and skip red options
- 8 transit phases (for Bus or Light-Rail)
 - Two and three section signal head controls for light rail vehicles
 - Advanced warning signal control per transit phase (solid or flashing)
 - Recall or actuated operation
 - Normal or priority service
- 4 HAWK (High-intensity Activated crossWALK) modules
 - Various operational modes with flash delay and carryover
 - One or more can run independently via the second ring-group

Detector Features

- 64 vehicle detectors
 - Programmable call and extend phases
 - Delay and extend timing
 - Stop-bar disconnect mode with carryover (extend) timer
 - Detector cross-switching
 - No presence / max fail detector diagnostics (disabled by TOD)

- 16 queue detectors
 - Detects traffic backups
 - Capable of selecting alternate coordination patterns, maximum green timings or specified preempts
 - Advance green to clear vehicle movements prior to transit vehicle arrival
- 16 pedestrian detectors
 - Programmable calls for pedestrian and vehicle phases
 - Pedestrian cascade (sequential calling of two pedestrian movements)
- 8 transit detectors
 - Programmable calls for transit and vehicle phases
 - Delay and extend timing
 - Travel time delay
 - Alternate travel times by time-of-day (TOD)
 - Adaptive arrival time adjustment
- 32 remote transit detectors
 - Calls received by transit detectors at other intersections (via peer-to-peer Ethernet network)
 - Travel time delay
 - Alternate travel times by time-of-day (TOD)
 - Adaptive arrival time adjustment

Coordination Features

- 128 coordination patterns
 - Cycle time and three offsets per plan and ring group
 - Flexible global and/or per phase split expansion / shrinking for transition
 - Fixed / floating force-offs with a per phase float green parameter
 - Automatic permissive calculations
 - Single-band or multi-band modes with permissive limit timer
 - Three pedestrian permissive modes per pattern
 - Selectable reservice phases (fully actuated coordination)
 - Double service of phases (typically left-turns) without overlaps
 - Actuated coordinated phases can gap-out early and distribute unused time to movements with greater demand
 - Programmable recalls, omits and alternate base timing per pattern
 - Adaptive splits per timing pattern with global step and threshold values
- Multiple interconnect modes
 - Time based scheduler
 - Central system command (twisted pair or Ethernet connection)
 - 120 volt interconnect cable
- Master controller mode
 - Controller can operate as a twisted pair, Ethernet, or 120 volt cable master in the absence of a central management system

Preemption Features

- 10 prioritized preempts
 - Two track clearance states, dwell state, and exit state per preempt

- Per preempt gate-down confirmation input (variable track clearance)
- Permit or allow any phase / overlap for each preempt state
- Presence preempt input with optional fail-safe interlock input
- Per phase preempt timing (vehicle and pedestrian)
- Check-in / Check-out preempt detection option with override timer
- Exit to programmed phase, next phase (phase following the active phase when preempt commenced), same phase (if cut short) or in-sync
- Automatic yellow-trap protection for all preemption sequences
- 4 soft preempts
 - Step-by-step preempt (special preempt sequence)
 - 8 states per soft preempt sequence (timed or actuated)
 - Each state allows programmable calls, omits, holds and force-offs for each phase and overlap
- 8 emergency vehicle priority modules
 - Provides two-way communication between emergency / transit vehicles and the traffic signal to provide intelligent priority requests
 - Interface to GPS equipment that provides travel time away, Vehicle ID and left-turn requests with the goal of maintaining arterial two-way progression

Transit Priority Features

- Programmable transit priority options for each transit phase
- Operates based on arrival times using local intersection detection and remote “peer-to-peer” combined with estimated delay from upstream intersections
- Separate options for free or coordinated operation
 - Extend only (no phase abbreviation) or Early / Extend operation
 - Minimum phase green timing
 - Maximum extend limit
 - Optional vehicle / pedestrian phase omits
 - Ability to switch to an alternate sequence to better serve and early arriving transit vehicle (occurs only if needed and as a last resort)
- Adaptive arrival times to automatically compensate for varying station dwell times

Status / Diagnostic Features

- Detailed controller status displays through the 2070 LCD display
 - Phase, ring and overlap status
 - Transit phase / priority status
 - Coordination status
 - Preemption status
 - Vehicle and pedestrian detector status
 - Transit priority status
 - Cabinet / Field I/O status
 - System communication status
 - Web Interface / Telnet for remote status
- 6000 controller event log
 - Multiple classes of events can be individually enabled for logging
 - Logs can be retrieved / reset from a central connection (serial or Ethernet)

- 62.5 day detector volume / occupancy logs
 - Logging volume / occupancy for 16 system detectors (15-minute intervals)
- 600 MMU event log
 - Detailed MMU events, including reason for failure and status of all the field outputs at the time of failure

Cabinet Support

- NEMA TS-1, TS-2 Type 1 and Type 2, Caltrans 332/336, ITS and ATC cabinet
- All controller input and output functions can be mapped to any physical cabinet input and output for each of the supported cabinet types
- Peer-to-Peer interconnect over Ethernet (select outputs or inputs from the source intersection to activate a function at the local intersection)
- 64 cabinet logic channels to accomplish custom controller I/O operation

Protocol Support

- Communications over serial port, twisted pair or Ethernet (fiber-optics)
- NMEA 0183 support for any compliant GPS device (date and time set)
- Automated Traffic Signal Performance Measures (ATSPM)
- Caltrans AB3418E with messages for extended status and D4 functionality
- NTCIP with standard and proprietary objects implemented