ATTACHMENT B

SPECIFICATIONS FOR EIGHT PHASE TRAFFIC SIGNAL CONTROLLER

Specification for ATC eX Controller by McCain Incorporated

ATC eX NEMA TS2 Type1 Controller Specifications

This specification describes the Advance Traffic Controller (ATC) Standard published by AASHTO, ITE and NEMA.

1.1. Controller shall meet or exceed the following standard where applicable:

1.1.1. NEMA TS2-2003 v2.06

1.1.2. ATC (Advanced Transportation Controller) 5.2b standard

1.1.3. NTCIP (National Transportation Communications for ITS Protocol)1201/1202

1.2. The controllers shall have the following components and features:

1.2.1.1. Operating system

1.2.1.1.1. Linux

1.2.1.2. Microprocessors

1.2.1.2.1. Freescale PowerQUICC II Pro microprocessor

1.2.1.3. Memory

1.2.1.3.1. 16MB Flash memory

1.2.1.3.2. 128MB DDR RAM (expandable)

1.2.1.3.3. 2MB non-volatile SRAM

1.2.1.4. Backup real-time clock (RTC)

1.2.1.5. Controller Interfaces

1.2.1.5.1. Communication interfaces

1.2.1.5.1.1. SDLC ports (2) including SP-3 routed to NEMA TS2 Port 1

1.2.1.5.1.2. Serial (asynchronous) on front panel (3)

1.2.1.5.1.3. SP-1 and SP-2 Communications Modem Slot

1.2.1.5.1.4. ENET 1: 100 Base-T Ethernet switch, 1 uplink, and 3 additional ports

1.2.1.5.1.5. ENET 2: 100 Base-T Ethernet port dedicated for local communications (i.e. laptop or similar)

1.2.1.5.1.6. 4 High Speed USB v2.0 ports

1.2.1.6. Front panel interface

1.2.1.6.1. Display

1.2.1.6.1.1. 16 lines x 40 characters

1.2.1.6.2. Keyboard

1.2.1.6.2.1. 28 key keypad = ESC (escape), NEXT, ENT (enter), YES, NO, ARROW DOWN, ARROW UP, ARROW RIGHT, ARROW LEFT; numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, and o; and letters A, B, C, D, E, and F.

1.2.1.6.3. Cabinet interfaces

1.2.1.6.3.1. SDLC

1.2.1.7. General Specifications

1.2.1.7.1. Dimensions (rounded to the nearest inch)

1.2.1.7.1.1. 7" H x 10" W x 10.5" D

1.2.1.7.2. Form Factor

1.2.1.7.2.1. Shelf mounted

1.2.1.7.3. Power

1.2.1.7.3.1. 89 VAC to 135 VAC, 60 Hz (± 3 Hz)

1.2.1.7.4. Environment

1.2.1.7.4.1. Operating Temperature -37o C to +74o C

1.2.1.7.4.2. Humidity 0 to 95% (non-condensing)

1.2.1.7.5. Weight 7 lbs

Omni eX Local Intersection Control Software

This specification describes the fully NTCIP (1201/ 1202) compliant software that is compatible with ATC (v5.2b) standard traffic controller.

1.1. Software shall be compatible with the following ATC (5.2b) controller hardware platforms:

1.1.1. ATC 2070

1.1.2. ATC NEMA TS 2 Type 1

1.1.3. ATC NEMA TS 2 Type 2

1.2. Software shall be compatible with the following cabinet styles:

1.2.1. Caltrans 2070

1.2.2. NEMA TS 2 Type 1

1.2.3. NEMA TS 2 Type 2

1.2.4. ITS (Intelligent Transportation System) Standard Specification for Roadside Cabinets v01.02.17b

1.3. Software shall have the following features:

1.3.1.1. Phases

1.3.1.1.1. 16 volume/density vehicle phases

1.3.1.1.2. 16 pedestrian phases

1.3.1.1.3. 4 rings

1.3.1.1.4. Automatic barrier calculation based on compatible phases

1.3.1.1.5. Variable phase sequence

1.3.1.1.6. Exclusive pedestrian-phase operation

1.3.1.1.7. Alternate timing for special vehicles or pedestrians

1.3.1.1.8. Advance and delayed WALK operation

1.3.1.1.9. 4 phase banks

1.3.1.2. Coordination

1.3.1.2.1. 253 patterns

1.3.1.2.2. Phase sequence selection by pattern

1.3.1.2.3. Recall selection by pattern

1.3.1.2.4. Fixed, floating, manual force off selection

1.3.1.2.5. Reference cycle to beginning or end of green

1.3.1.2.6. Change phase, overlap, or detector options by pattern

1.3.1.3. Inputs

1.3.1.3.1. 16 alarm inputs

1.3.1.3.2. 16 Special function inputs

1.3.1.4. Outputs

1.3.1.4.1. 16 special function outputs

1.3.1.4.2. 8 auxiliary outputs

1.3.1.5. Field I/O

1.3.1.5.1. All input and output functions are individually assignable (I/O map)

1.3.1.5.2. 64 Internal logic gates

1.3.1.6. Detection

1.3.1.6.1. 128 local detectors

1.3.1.6.2. 32 system detectors

1.3.1.6.3. Phase assignments configurable per detector

1.3.1.6.4. Each detector supports all NTCIP detector options including count, call, and extension

1.3.1.6.5. Delay and extend

1.3.1.6.6. Volume/occupancy configurable per detector

1.3.1.6.6.1. Detector failure monitoring (stuck on, stuck off, and erratic calls) configurable by time-of-day (TOD)

1.3.1.7. Communications

1.3.1.7.1. NTCIP (1201/ 1202) & AB3418E

1.3.1.7.2. Data validation during download process

1.3.1.7.3. USB for quick database upload/download, firmware upgrades, log retrieval

1.3.1.7.4. All industry standard communication infrastructures supported

1.3.1.7.5. Support NTP client or server configuration

1.3.1.8. Preemption

1.3.1.8.1. 8 preemption sequences

1.3.1.8.2. Each sequence can be configured for railroad or emergency vehicle

1.3.1.8.3. Definable priority and "linking"

1.3.1.8.4. Flash, limited service

1.3.1.9. Overlaps

1.3.1.9.1. 16 vehicle overlaps

1.3.1.9.2. 16 pedestrian overlaps

1.3.1.9.3. Negative vehicle and pedestrian phases

1.3.1.9.4. Flashing yellow arrow (PPLT)

1.3.1.10. Time of Day Scheduler

1.3.1.10.1. 64 schedules

1.3.1.10.2. 64 day plans

1.3.1.10.3. 48 events

1.3.1.11. Time of Day/Day of Week Functions

1.3.1.11.1. Minimum, maximum, and soft recall

1.3.1.11.2. Red rest by phase

1.3.1.11.3. Vehicle recall by phase

1.3.1.11.4. Detector plan

1.3.1.11.5. Pedestrian recall by phase

1.3.1.11.6. Rest in walk

1.3.1.11.7. Alternate phase timings and options

1.3.1.11.8. Alternate detector configuration and diagnostics

1.3.1.11.9. Alternate overlap configuration

1.3.1.11.10. Phase omit

1.3.1.11.11. Pedestrian omit

1.3.1.11.12. Phase sequence

1.3.1.11.13. Conditional service

1.3.1.11.14. Second phase maximum

1.3.1.12. Logs

1.3.1.12.1. NTCIP Global Reporting conformance group for user defined event logging

1.3.1.12.2. Cycle-based measures of effectiveness (MOE)

1.3.1.12.3. Detector volume, occupancy and speed

1.3.1.13. Transit Signal Priority (TSP)

1.3.1.13.1. Priority can be granted in either free or coordinated mode

1.3.1.13.2. Detection Modes

1.3.1.13.2.1. Presence

1.3.1.13.2.2. Check-in/check-out on leading or trailing edge of detection

1.3.1.13.2.3. Trigger (check-in only)
Automatic checkout after fixed time or on first green of priority phase after expected arrival

1.3.1.13.2.4. Remote request from central system

1.3.1.13.3. Input types

1.3.1.13.3.1. Normal (not pulsing) Priority inputs

1.3.1.13.3.2. Pulsing Multiplexed Preempt Inputs(6.5 or 13Hz, i.e. Opticom low priority inputs)

1.3.1.13.4. Input processing

1.3.1.13.4.1. Minimum on time (leading edge filter)

1.3.1.13.4.2. Minimum off time (trailing edge filter)

1.3.1.13.4.3. Maximum on time (stuck on filter)

1.3.1.13.4.4. Delay (delay leading edge)

1.3.1.13.4.5. Extend (extend trailing edge)

1.3.1.13.5. Priority status output

1.3.1.13.5.1. Unique output for each priority strategy, assignable in I/O mapping

1.3.1.13.6. Multiple concurrent requests

1.3.1.13.6.1. By default, all strategies have equal precedence - first expected arrival served first

1.3.1.13.6.2. Option to allow selected lower-numbered strategies to override higher-numbered strategies. (e.g. main street requests take precedence over side street requests)

1.3.1.13.7. Priority service features

1.3.1.13.7.1. Early green

1.3.1.13.7.2. Extended green

1.3.1.13.7.3. Phase insertion (call phases)

1.3.1.13.7.4. Omit phases

1.3.1.13.7.5. Omit peds

1.3.1.13.7.6. Queue jump

1.3.1.13.8. Configuration options

1.3.1.13.8.1. 16 unique priority strategies

1.3.1.13.8.1.1. Strategy can be associated with an intersection approach, vehicle type, etc.

1.3.1.13.8.2. 4 priority strategy sets

1.3.1.13.8.2.1. Each set contains settings for 16 priority strategies

1.3.1.13.8.2.2. Active set is selected by pattern, so priority configuration is changeable by time of day, system command, etc.

1.3.1.13.8.3. Priority service phase(s)

1.3.1.13.8.4. Estimated Time of Arrival (ETA)

1.3.1.13.8.5. Limits for phase reduction and extension time

1.3.1.13.8.6. Enable/disable selected priority strategies

1.3.1.13.8.6.1. Per strategy

1.3.1.13.8.6.2. Global value for all strategies

1.3.1.13.8.7. Headway time

1.3.1.13.8.7.1. Per strategy

1.3.1.13.8.7.2. Global value for all strategies

1.3.1.13.8.8. Preempt lockout time

1.3.1.13.8.8.1. Per strategy

1.3.1.13.8.8.2. Global value for all strategies

1.3.1.13.9. Logging of TSP events

1.3.1.13.9.1. Viewable on controller front panel

1.3.1.13.9.2. Uploadable to central system

1.3.1.13.10. Reporting of real-time TSP service status

1.3.1.13.10.1. Controller front panel

1.3.1.13.10.2. Reporting to central system