HARRIS COUNTY EMERGENCY VEHICLE PRIORITY SYSTEM REQUIREMENTS

Revised January 17, 2018

Includes updated requirements for support of:

- NTCIP 1211 protocol
- Traffic Signal Software Requirements
- GPS Vehicle Priority Request Generator
- Central System

OBJECTIVE

To provide emergency vehicles priority service with a minimum disruption to vehicular and pedestrian traffic

TRAFFIC SIGNAL FIRMWARE REQUIREMENTS

Priority operation

1. The natural controller sequence shall be preserved
2. No phase with demand shall be skipped
3. Left turn signals shall not be served unless specifically requested by the emergency vehicle (by utilization of the left turn signal input to the vehicle transponder)
4. No phase with demand shall be shortened to less than the programmed alternate minimum green
5. Clearance times (yellow clearance and all-red interval) shall not be shortened under any circumstance
6. Pedestrian intervals shall not be shortened less than the programmed alternate minimum times
7. If phase truncation is necessary, the controller shall not arrive at the priority service phase earlier than the specified arrival time (based on testing with demand on all phases)
8. The firmware shall support a minimum of four (4) priority control schemes
9. Each priority control scheme shall consist of the following programming items:
    a. Primary service phase
    b. Secondary service phase (for example a left turn movement)
    c. Alternate minimum green time for each phase in the sequence
    d. Alternate minimum pedestrian walk time
    e. Alternate minimum pedestrian clearance time
10. The emergency vehicle will be sending a classification of 1-10. The controller shall respond as follows:
    a. Class 1 or 2
        i. Skips/omits any vehicle phase as well as pedestrian service
        ii. May dwell in EVP phases beyond max split extension
        iii. May cause coordination transition
        iv. Not subject to recovery cycle inhibit as defined in section 2.5.1.1
        v. If pedestrian service is not skipped/omitted, pedestrian walk time may be truncated to guaranteed walk time
    b. Class 3
        i. Skips/omits any vehicle phase as well as pedestrian service
        ii. May dwell in EVP phases beyond max split extension
        iii. May cause coordination transition

c. Class 4
    i. May not skip/omit vehicle phases
    ii. Is bounded by configured min and max splits reductions
    iii. May skip/omit pedestrian service
    iv. May cause coordination transition
d. Class 5
    i. May not skip/omit vehicle phases
    ii. Is bounded by configured min and max split reductions
    iii. May skip/omit pedestrian service on requested phase
    iv. May skip/omit pedestrian service on non-requested phase to accommodate min/max split reductions
e. Class 6
    i. May not skip/omit vehicle phases
    ii. Is bounded by configured min and max split reductions.
    iii. May skip/omit pedestrian service on non-requested phases to accommodate min/max reductions
f. Class 7-10
    i. May not skip/omit vehicle phases
    ii. May not skip/omit pedestrian service
    iii. Is bounded by configured min and max split reductions
    iv. Will not cause coordination transition
    v. Will not allow adjustments that causes coordination transition

11. Emergency vehicle priority requests shall be able to reduce any phase to the alternate minimum green time, including coordinated phases
12. The controller firmware shall prevent a previously accepted priority control scheme from extending its time of arrival beyond the maximum programmed time of arrival (due to reduced speeds caused by excessive traffic)
13. During SCP activation, the controller shall display the following:
    a. Phase requested
    b. Vehicle classification
    c. ETA
    d. Status of SCP
    e. Vehicle ID
14. The controller shall log the time of request, vehicle ID, phase (SCP) requested, and time of end of request
15. The controller firmware shall log a minimum of 500 events in a circular log, utilizing FIFO

VEHICLE GPS PRIORITY REQUEST GENERATOR SYSTEM

1. The communications protocol between the GPS equipment and the controller shall be NTCIP 1211v0224
2. Travel time shall be passed directly to the controller via NTCIP
    a. Travel time away from the intersection shall be displayed in seconds, up to the maximum of 255 seconds
    b. Minimum 80 seconds advance notice is required – calculated using a constant vehicle speed of 40 MPH (approximately 4700 feet from the intersection)
3. Vehicle ID shall be passed directly to the controller via NTCIP
4. The GPS equipment shall send the classification of the vehicle (1-10)
5. A minimum of 3 messages per direction via NTCIP are required

        i. 1 advance through movement message
        ii. 1 advance left-turn movement message (latched once activated)
        iii. 1 check-out message (sent when vehicle exits the approach)
    b. Advance messages shall not activate until the programmed ETA from the intersection is reached
6. GPS unit shall send a left turn request if the left turn signal is activated (default is no left turn)
    a. Left turn request is provided via NTCIP and must be logged
        i. This message shall be passed on an intersection by intersection basis by default
            1. Closely spaced intersections may necessitate that the left turn message be sent to clear queues and is allowable
        ii. The left turn request is only valid for the next intersection after passing the previous intersection (unless spacing of intersection prevents it)
    b. Left turn inputs shall be a "latched" call wired to the vehicle left turn signal
        i. Left turn signal shall only need to be on for 1 second to latch
        ii. Left turn must not latch to more than one intersection
        iii. Left turn request shall be remembered after passing the previous intersection but have the ability not to pass the call to the controller until the emergency vehicle is the specified travel time away from the intersection
7. In no instance shall raw (wired) inputs in the detector racks be used
8. GPS unit shall have a mechanism in place to prevent increasing ETA (due to slowing or stopping of vehicle) from changing the original ETA more than 10 seconds later.
    a. Hysteresis shall be provided such that if a vehicle is stopped or slowed, the update of the ETA will be delayed to determine if the vehicle can return to the original ETA window (no greater than +10 seconds)
9. GPS unit shall send a check-out request to all downstream intersections (provided there are no other active emergency vehicles on that approach) if the vehicle is in park or there is a communication loss between the vehicle and the PRG
    a. A vehicle in park shall immediately send the check-out request to the controller pending no other active priority request on that approach
    b. GPS shall have a separate time-out value (in seconds) for communication loss configurable on a per approach basis

GPS CENTRAL MANAGEMENT SYSTEM REQUIREMENTS

MANDATORY ITEMS

1. Central system shall be connected to all intersections via communications
    a. Communications shall not be over existing Harris County communications infrastructure
2. Central system shall provide monitoring of all devices currently active in the system
    a. This includes any vehicle in the system that is sending GPS location
3. Central system interface shall provide a GUI that displays all devices currently in the system
    a. GUI shall include a map showing the relative or actual location of all devices in the system
    b. Minimum statuses to be displayed
        i. Online
        ii. Offline
        iii. Responding to code priority/preemption
4. Central system shall monitor all devices and recognize if their configuration has changed
5. Central system shall provide a mechanism to remotely update the field device configuration
6. Central system shall provide a mechanism to remotely upgrade/update field device firmware
7. Central system remote update/upgrade of firmware shall be able to send to multiple devices at a time
8. Central system shall provide user security levels for multiple users
    a. Minimum user levels required – Administrator and User
        i. Administrator level shall be able to make any change to the system and users
        ii. User level shall have view rights and be able to run reports
9. Central system shall provide reporting tools
    a. Minimum reports required
        i. Devices in system
        ii. Devices online
        iii. Devices offline
        iv. Device logs
        v. Device firmware version
        vi. User log on/activity report
10. Central system shall provide automated notification to selected users of failed devices via email

OPTIONAL ITEMS

1. Central system shall provide change control management of all intersections and vehicle equipment regardless of whether the devices are currently online or offline
    a. If a device is offline, the user shall be able to view, edit, save, and export the configuration settings
2. Central system shall notify selected users when a change has been detected
    a. Users that are logged into the system shall be notified of configuration differences if detected by the system
    b. Users shall be able to select if they are to be notified via email
3. Central system shall have the ability to roll back configuration changes to devices and firmware updates
    a. System shall save at least one known good configuration to allow for roll back