## **Evaluation of**

## **Vendor Solutions for**

## **Traffic Signal Control Software**

\*\*09-09-24\*\*

## Purpose

This document is intended for Caltrans personnel to evaluate traffic signal control software solutions developed by industry vendors. State signal operations engineers need to be knowledgeable and experienced with vendor traffic signal solutions capabilities, as Caltrans expects vendor traffic signal control solutions to be a future option for Caltrans-controlled intersections in the State of California. Deployed vendor solutions need to be limited to at most the two best solutions for the State to minimize maintenance and support.

## Instructions

Below are numerous tables containing traffic signal controller-centric tasks separated in to four sections. Tasks should be executed by district engineers for a given signal control software and software version. Once each task is attempted and/or completed, a space has been provided for the engineer to rate task for ease to complete (Ease) and the user experience (UX) completing the task, ranging from 1 to 10 with:

* 1 - very difficult or unable to complete,
* 5 - some difficulty figuring, to
* 10 – Simple to complete.

A space has been provided for comments for each task in question, as to its execution, user experience, likes or dislikes, etc. Once you have completed the tasks below, please answer the Post-Evaluation Questions and provide your honest opinions on what you liked or disliked about the vendor solution. Use as much space as you need.

**One of these forms must be completed for each vendor evaluation**. For clarification on completing these tasks, seek guidance from HQ or other districts, as well as from the vendor. Multiple district evaluators can share the same for the same vendor evaluation. Each vendor evaluation form should be titled with the district and vendor being tested, such as “D3-McCain-Eval.docx.”

## Labeling of Functionality

Different vendors will have different naming conventions for many of the of functions you are being asked to identify and evaluate below. Please consult the help facilities for each vendor if you have trouble identifying each function. If the help facilities do not have an equivalency, please note this in the comments section of the task(s) in question.

CONTROLLER SOFTWARE EVALUATION WORKSHEET

**Controller Manufacturer:** TBD

**Traffic Signal Controller Software:** TBD

**Software Version:** TBD

**Evaluated by:** TBD

**Section One:** Software Help Facility and Controller Set-up

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Task: | Description: | Ease  (1-10): | UX  (1-10): | Comments: |
| Access Vendor-Supplied Online Help for traffic signal control software | Access Vendor-Supplied Online Help for traffic signal control software |  |  |  |
| Configure Network | Use the front panel of the controller to configure IP Address, Netmask, and Gateway for the controller to be used on the office network where the evaluation is taking place. |  |  |  |
| Access web-based GUI for traffic control software | Access traffic signal control software controller-hosted web page (GUI) |  |  |  |
| Configure for 332 Cabinet | Configure traffic signal software for 332 cabinet interfaces via Web-based GUI. Identify front panel menu location for same. |  |  |  |
| Connection of Simulation Briefcase or Cabinet | Connect simulation briefcase or cabinet to controller C1S and C11S connectors. Verify inputs and outputs work as expected. |  |  |  |
| Simulation of Battery Backup System – assisted power loss | Install the controller into a BBS-augmented test cabinet and configure the vendor software to communicate (via network or input/output files) with the BBS system. Simulate cabinet power loss with BBS system takeover. Note vendor software response. |  |  |  |

**Section Two:** Controller Intersection Phases and Ring Configuration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Task: | Description: | Ease  (1-10): | UX  (1-10): | Comments: |
| Use Web Interface to Verify phases, peds, etc. using Web Interface | With controller connected to input device (cabinet or briefcase), use the Web interface to identify and confirm functionality of all normal phases (1-8), peds (1-4), overlaps (1-6). Repeat step using controller front panel interface |  |  |  |
| Use front panel interface to Verify phases, peds, etc. using front panel Interface | Repeat step using controller front panel interface |  |  |  |
| Use Web interface to Configure and verify 8 phase intersection with 4 ped phases and basic timings for each. Test to verify actuation. | Test to verify actuation via both simulation briefcase and making “soft calls” via Web-Based GUI. Vary timings to match typical intersection layouts in district. Vary the phase lead/lag designations to ensure they behave as expected. |  |  |  |
| Use front panel interface to Configure and verify 8 phase intersection with 4 ped phases and basic timings for each. Test to verify actuation. | Repeat the above step for using the front panel interface. |  |  |  |
| Use the Web interface to Identify and implement Leading Pedestrian Interval | Identify Leading Pedestrian Interval (LPI) implementation on ped phases using controller software. Test to verify functionality. |  |  |  |
| Use the front panel interface to Identify and implement Leading Pedestrian Interval | Repeat the above step for using the front panel interface. |  |  |  |
| Use the Web interface to Re-configure for “T”-shaped intersection | Reconfigure for “T”-Shaped intersection with 2-3 pedestrian phases. Test and verify functionality. |  |  |  |
| Use the front panel interface to Re-configure for “T”-shaped intersection | Repeat the above step for using the front panel interface. |  |  |  |
| Use the Web interface to Configure and Test Pedestrian Hybrid Beacon | Re-configure controller phases and timing to allow Pedestrian Hybrid Beacon functionality for the simulated intersection. Ensure that the beacon actuates and times correctly by placing ped calls via GUI. |  |  |  |
| Use the front panel interface to Configure and Test Pedestrian Hybrid Beacon | Repeat the above step for using the front panel interface. |  |  |  |
| Use the Web Interface to Configure and Test “Ped Scramble” | Configure controller phases and timing to allow simultaneous actuation of all 4 ped phases at once, aka “Ped Scramble”. Test by actuating via GUI. |  |  |  |
| Use the front panel interface to Configure and Test “Ped Scramble” | Repeat the above step for using the front panel interface. |  |  |  |
| Use the Web interface to configure a 4-ring operation of two intersections | Configure the controller software to operate a 4-ring configuration for two intersections |  |  |  |
| Use the front panel interface to configure 4-ring operation of two intersections | Repeat the above step for using the front panel interface. |  |  |  |
| Use the Web Interface to Configure and test Protected Permissive/ Flashing Yellow for Left Turn | Enable protected permissive with flashing-yellow on a thru phase to be operated on an opposing left turn with appropriate timing. |  |  |  |
| Use the front panel interface to Configure and test Protected Permissive/ Flashing Yellow for Left Turn | Repeat the above step for using the front panel interface. |  |  |  |
| Use the Web Interface to Configure Transit Signal Priority (TSP) Implementation | Identify the Transit Signal Priority implementation for the signal software. Implement and test on phases 2/6, and in a separate attempt, phases 3/7. |  |  |  |
| Use the front panel interface to Configure Transit Signal Priority (TSP) Implementation | Repeat the above step for using the front panel interface. |  |  |  |
| Coordination participation | Configure vendor software to active as coordination “slave” (subordinate) and, if possible, “master”. Note configuration operations as well as limitations. |  |  |  |
| TSMSS-led Coordination | Configure TSMSS to allow controller vendor software to send/receive intersection coordination information and settings. Investigate if TSMSS can act as a coordination “master” for this controller. |  |  |  |
| Use the web interface to configure the controller's flash and startup parameters | Configure all relevant parameters for a controller to enter a flash pattern including but not limited to entry, exit phases, and the startup sequence of the controller after exiting a hardware or software flash. |  |  |  |
| Use the front panel interface to configure the controller's flash and startup parameters | Repeat the above step while using the front panel interface. |  |  |  |

**Section Three:** Vehicle Counts, Soft Logic Use, Time-of-Day Actions, EV and Railroad Preemption

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| --- | --- | --- | --- | --- |
| Task: | Description: | Ease  (1-10): | UX  (1-10): | Comments: |
| Use Web Interface to Identify Vehicle counts and count reporting | Identify software facility for storing and reporting per-movement vehicle counts. Use available inputs to actuate during green and yellow indications. |  |  |  |
| Use front panel interface to Identify Vehicle counts and count reporting | Repeat the above step for using the front panel interface. |  |  |  |
| Use Web Interface to evaluate “Soft Logic” abilities | Identify ability of controller software to evaluate and execute logic statements (aka ‘Soft Logic’) involving vehicle phases and calls. |  |  |  |
| Use Front Panel Interface to evaluate “Soft Logic” abilities | Repeat the above step for using the front panel interface. |  |  |  |
| Time-of-Day (TOD) Action Code | Identify controller software ability to implement Time-of-Day actions for the variation of signal function. Investigate equivalent of Permitted/Restricted Phases, Free Operation, Flashing Operations, and Protected Permissive. |  |  |  |
| Use Web Interface to Configure Emergency Vehicle Preemption Configuration | Identify and configure emergency vehicle preemption for phases 2/5. Time and actuate using available inputs. |  |  |  |
| Use Web Interface to Configure Advance Railroad Preemption Configuration | Identify and configure vehicle preemption for phases 2/5. Time and actuate using available inputs. |  |  |  |
| Use Front Panel Interface to Configure Emergency Vehicle Preemption Configuration | Identify and configure emergency vehicle preemption for phases 2/5. Time and actuate using available inputs. |  |  |  |
| Use Front Panel Interface to Configure Advance Railroad Preemption Configuration | Identify and configure vehicle preemption for phases 2/5. Time and actuate using available inputs. |  |  |  |
| Use Front Panel Interface to Configure Advance Railroad Preemption Configuration | Repeat the above step for using the front panel interface. |  |  |  |

**Section Four:** Configuration Load/Save and Remote Management

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| --- | --- | --- | --- | --- |
| Task: | Description: | Ease  (1-10): | UX  (1-10): | Comments: |
| Use Controller Web-Based GUI to save configuration database | Use GUI to save the traffic signal control program to save the intersection “database” to your PC. |  |  |  |
| Use Controller Web-Based GUI to load configuration database | Use GUI to load the traffic signal control program “database” from your PC. |  |  |  |
| Use Controller front panel interface to save configuration to USB stick inserted into controller | Insert a supported USB stick into the controller USB port. Use the front panel interface to cause the controller to save it current configuration to the USB stick |  |  |  |
| Use Controller Front panel interface to load configuration from USB stick | Insert USB stick into controller USB port. Use the front panel interface to cause controller to load configuration from USB stick. |  |  |  |
| Load USB-resident configuration from USB stick and Transfer to controller via Web Interface | Insert USB stick into PC. Use controller web interface to upload configuration from USB to controller. |  |  |  |
| Configure controller to be Managed by TSMSS | Set up controller to be managed by TSMSS/KITS. Enter controller data in central system and verify that central system can see the controller and is able to communicate, synchronize, and apply configuration changes. |  |  |  |
| Enable/Disable Web-Based GUI | Disable Web-Based GUI via either front panel interface or with the GUI itself. Re-enable GUI via front panel interface. |  |  |  |
| Enable NCTIP Management | Use GUI to enable controller NTCIP management. Identify location of NTCIP password management |  |  |  |
| CPU works in other controller chassis | Power-down the evaluation controller that was provided by the vendor. Remove the 2070-1C CPU card and insert it into the CPU card slot on a chassis previously used with an OS-9 –based CPU card. Connect this controller to available inputs and power up the controller. Verify that the 2070-1C CPU can operate all phases, peds, and overlaps successfully. Verify configuration was maintained between chassis. |  |  |  |

**Section Five:** Tasks for Caltrans Headquarters Personnel

**District personnel can ignore this section**

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| --- | --- | --- | --- | --- |
| Task: | Description: | Ease  (1-10): | UX  (1-10): | Comments: |
| User access control security | Evaluate controller software security features that allow restriction on a per-user or roll basis. |  |  |  |
| Enable/disable Secure shell access | If available, enable and test login to controller via Secure Shell (SSH). Disable shell login when done. |  |  |  |
| Locate/Change NTCIP password | If available, locate and change the password for NTCIP communications. Test using SNMP client if possible. |  |  |  |
| Verify HTTPS used for web-based GUI. Identify certificate storage and update facilities | Ensure secure HTTP (HTTPS) is being used for the web-based GUI. Locate facility within GUI to download/manage/update certificates. |  |  |  |

**Post-Evaluation Questions:**

Please respond with a separate document for the following questions:

1. Are there any major issues with the software evaluated?
2. Is there anything special about the solution that you prefer?
3. What was your experience with the UI? Was there an intuitive layout for front panel and Web-Interface? Did you prefer this interface over other vendors?
4. Please test something we didn’t ask for and tell us about your experience:
5. What is your overall opinion of this traffic signal software?