# Transparity®

## SIGNAL PERFORMANCE MEASURES (SPM)

## Product Specifications

# VERSION HISTORY

| Rev | By | Date | Comments |
|-----|------|------------|-----------------------------|
| 1.0 | JLitvak | 07/12/2021 | Preliminary document release |
|     |      |            |                             |
|     |      |            |                             |

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# 1. SPM Specifications

## 1.1 General

1.1.1 The agency shall be able to maintain and operate the proposed ATSPM solution without recurring fees affiliated with the collection, storage, and visualization of Signal Performance Measures.

1.1.2 The system shall not require use of specific detection technologies.

1.1.3 The system shall support analysis in Business Intelligence Tools such as Microsoft Power BI.

*1.1.3.1 The system shall provide APIs for signal performance measures in order to prevent the need to expose or modify the database when sharing data with Business Intelligence Tools.*

## 1.2 System Architecture

1.2.1 The system shall provide an Automated Traffic Signal Performance Measures data storage and web-based reporting solution to be deployed on either:

- agency owned servers (on premise)
- cloud-hosted environment

1.2.2 If deploying on agency owned servers, the system shall be capable of operating without a connection to the internet.

1.2.3 The vendor's software shall be fully operational within a Microsoft Windows workstation based environment.

1.2.4 All web-based components of the system shall be fully compatible with modern web browsers (such as Google Chrome) without requiring dependency browser plugins.

1.2.5 The system shall fully satisfy all other requirements when operating in all NEMA, Caltrans and ATC environments.

1.2.6 The system shall fully satisfy all requirements when connected to a minimum of "X" of McCain Omni-eX ATC signal controllers with the latest firmware available from McCain.

1.2.7 The system shall collect log data stored by the traffic signal controller to prevent loss of data and decreased reliability affiliated with real-time collection of high-resolution event data over communication networks.

1.2.8 The system shall work with the existing ethernet communications network topology supporting IPv4. Fiber optic interconnect, microwave ethernet wireless, vDSL twisted pair interconnect and cellular communications.

1.2.9 The system shall utilize Secure Copy when collecting high-resolution event data logs as to prevent the security risks affiliated with FTP.

## 1.3 CONFIGURATION

1.3.1 The ATSPM reports shall utilize the proposed Traffic Management System configuration database as to prevent the need to configure and manage two separate intersection databases.

1.3.2 The system shall provide wizard-based configuration dialogs to improve ease of use and reduce the complexity of system configuration.

1.3.3 The system shall allow the operator to individually configure the properties necessary for each signal performance measure at each intersection.

## 1.4 ACCESS CONTROL

1.4.1  The system shall provide monitoring and control access from the following locations:

- Agency Local Area Network.
- Local Traffic Signal Controller Cabinets
- Remote Location via Internet

1.4.2 The system shall be fully operational when remotely accessed using a secure Virtual Private Network.

1.4.3 The system shall allow multiple operators to access the SPM system simultaneously.

## 1.5 AUTOMATED SIGNAL PERFORMANCE MEASURES

1.5.1 The agency shall be able to maintain and operate the proposed SPM solution without recurring fees affiliated with the collection, storage, and visualization of Signal Performance Measures.

**1.5.2** The system shall not require use of specific detection technologies for the production of signal performance measures.

**1.5.3** The SPM reports shall utilize the user authorization and authentication of the proposed Traffic Management System in order to reduce administration.

**1.5.4** The SPM reports shall utilize the proposed Traffic Management System configuration database to prevent the need to configure and manage two separate intersection databases.

**1.5.5 The system shall provide web-based reports charts with interactive features such as zoom, scroll, and add/remove data series in order to improve qualitative analysis of traffic conditions and signal performance.**

**1.5.6** The system shall provide a high-resolution events report which enables the time-ordered review of controller events.

**1.5.7** The system shall enable users to compare signal performance measures of different:

- Intersections
- Approaches / Phases
- Date/time ranges

**1.5.8** In order to improve the evaluation of phase performance, the system shall provide a single performance report that combines the following signal performance measures:

- Phase Split Duration
- Phase Reason for Termination
- Phase Split Failure
- Pedestrian Activity
- Pedestrian Delay

**1.5.9** In order to improve the evaluation of approach performance, the system shall provide a single performance report that combines:

- Approach Volume
- Arrivals on Red
- Arrivals on Yellow
- Arrivals on Green

**1.5.10** The system shall provide Turning Count Movement Reporting.

**1.5.11 The system shall provide Peak Hour Reporting.**

1.5.12 The Purdue Coordination Diagram shall enable users to clearly distinguish events between cycles.

## 1.6 TRAFFIC PERFORMANCE MEASUREMENT CHARACTERISTICS

1.6.1 The SPM system shall configure how the high-resolution data is handled from local traffic signal controllers.

1.6.2 The system shall provide Split Monitor Reporting that consolidates the following Signal Performance Measures: including:

- Phase by Phase Split Length per cycle
- Split Termination (Max-Out, Gap, Force-Off, etc.)
- Pedestrian Activity
- Pedestrian Duration
- Split Failure

1.6.3 The system shall provide Vehicle Volumes Reporting

*1.6.3.1 The Vehicles Volumes report shall display the approach volume, arrivals on red, and arrivals on green*

1.6.4 The system shall provide Purdue Coordination Diagram Reporting.

1.6.5 The system shall provide Arrivals on Green Reporting.

1.6.6 The system shall provide Preemption Details.

## 1.7 SECURITY

1.7.1 The system shall provide user privileges definable on the following functional levels:

- Traffic Signal System (TSS) Manager
- TSS Operator
- External System
- TSS Maintainer

1.7.2 The system shall comply with the agency's security policy as follows:

*1.7.2.1 The system shall be capable of operating in a network environment with no connection to the Internet.*

## 1.8 COLLECTION AND STORAGE

1.8.1 The system shall store the logs, alarms, and reports for a user defined amount of time (at least "x" months) where they are easily accessible.

1.8.2 The system shall automatically transfer all logs, alarms, and reports to an archive system.

1.8.3 The archive system shall store each log, alarm, and report for a minimum of "x" months.

1.8.4 The system shall create the reports for a user-specified period.

1.8.5 The system shall collect detector data consistent with the Indiana Traffic Signal High Resolution Data Logger Enumerations.

1.8.6 The system shall produce performance reports consistent with:

1.8.7 Purdue Pooled Fund Study

1.8.8 The Performance Measurement Server shall retrieve and store high-resolution data from local traffic signal controllers.

1.8.9 The Performance Measurement Server shall retrieve and store high-resolution data from external devices.

*1.8.9.1 The Performance Measurement System server shall store uploaded high-resolution data for 36 months.*

*1.8.9.2 The Traffic Signal System shall not prevent the local controller from accessing local devices as needed to store high-resolution data.*

## 1.9 TRAFFIC PERFORMANCE PROCESSING

1.9.1 The Performance Measurement Server shall process the collected and stored high resolution data to produce the following reports or equivalents:

- Approach Volume
- Arrivals on Green
- Preemption Details
- Purdue Coordination Diagram
- Purdue Phase Termination
- Purdue Split Failures
- Split Monitor
- Turning Movements
- Peak Hour Report

*1.9.1.1 Performance measurement reports shall be consistent with descriptions in SPM version 4.0 (or later) documentation.*

## 1.10 Signal Performance Measurement Training

1.10.1 The vendor shall provide training on the operations of the automated traffic signal performance measurements and monitoring.

## 1.11 Maintenance, Support, and Warranty

1.11.1 The vendor shall provide maintenance according to a separate maintenance contract. That contract should identify the following:

- Repairs necessary to preserve requirements fulfillment.
- Responsiveness in effecting those repairs.
- All requirements on the maintenance provider while performing the repairs.
- Provision of routine updates to the software and software environment necessary to preserve the fulfillment of requirements.

1.11.2 The vendor shall warrant the system to be free of defects in materials and workmanship for a period of 12 months. Warranty is defined as correcting defects in materials and workmanship. Defect is defined as any circumstance in which the material does not perform according to its specification.