

Data Collection and
Management System (*DCMS.2*) Specification

Table of Contents

Introduction	3
Functional Requirements.....	3
System Requirements.....	3
<i>System Architecture.....</i>	<i>3</i>
<i>System Components.....</i>	<i>3</i>
<i>System Software</i>	<i>4</i>
<i>Field Equipment.....</i>	<i>4</i>
<i>Central Communications</i>	<i>5</i>
<i>Remote Connections.....</i>	<i>5</i>
Graphical User Interface	5
<i>Browser Basics.....</i>	<i>5</i>
<i>Working with Tabs and Widgets</i>	<i>9</i>
<i>To Add a New Tab.....</i>	<i>9</i>
<i>To Add a New Widget.....</i>	<i>9</i>
Administrative and Support Requirements	10
<i>Warranty</i>	<i>10</i>
<i>Licensing.....</i>	<i>10</i>
<i>Documentation.....</i>	<i>10</i>
<i>Installation and Testing</i>	<i>10</i>
<i>Training.....</i>	<i>11</i>
<i>Hands-On Training.....</i>	<i>11</i>

Introduction

The purpose of this specification is to describe the minimum design and operating requirements for a secure Internet-based traffic data collection and distribution system. The system shall consist of a scalable package capable of automating the traffic data management process. The customer hosted system shall support operations in multiple jurisdictions dependant on how it is networked back to the main server.

Functional Requirements

The system shall facilitate a secure Internet-based traffic data collection and distribution system in order to automate the real-time and archived traffic data management process. The system shall convert intersection, mid-block, tunnel, or freeway detection systems into automated, virtual count stations that gather and display traffic data in real-time – without interruption.

The system network shall utilize open-architecture software, including Microsoft® Server technology that complements the *Autoscope*® Pro line and *Autoscope Terra* Technology video vehicle detection systems. The system, when combined with *Autoscope*, is designed for use on an extensive list of freeway, intersection, bridge, tunnel, railroad, traffic monitoring, incident prevention, and transportation system applications.

The system supplier shall provide site surveys to determine the best type of communications link, type of communications required, hardware requirements, and power requirements, and to evaluate the present detection configuration.

The system supplier shall implement the system website with vehicle data information and maps.

The system end user shall procure and initialize all necessary communications modems and acquire IP addresses.

The system end user shall install necessary communications devices as required (modems, connections, or protocol compliance), initiate, and maintain the communications service for each site.

The system end user shall provide all aerial images for “Location View” widget.

The system end user shall be responsible for the integrity and operation of communications infrastructure.

System Requirements

System Architecture

The overall system architecture shall consist of a client /server based on distributed open architecture, where the owner/agency hosts and manages the server and traffic data management process as an appliance.

System Components

The principal system components shall be as follows:

- Central Office (central servers and workstations)

- Field Device (data collectors)
- Central Communications
- Field Communications

The central office shall support the distributed client/server architecture via a Local Area Network (LAN).

The central office shall consist of Personal Computers (PC) as client workstations and servers with peripheral and communications equipment (as required by these specifications) as well as any necessary operating and field device (data collector) software.

Host servers shall access field devices that perform traffic data collection, database management (database server), and the Internet (Web server).

Multiple server functions may reside on a single server. An optional media server (Apple® recommended) to stream MPEG-4 video from *Solo Terra* and approved encoders can be deployed to provide simultaneous, multiple user access.

The system shall be implemented using standard, commercially available PC hardware.

The system supplier shall furnish all the necessary cables and any other hardware necessary to install the central office equipment in the Traffic Management Center (TMC) or other specified location. The host agency shall provide any network cabling internal (from the wall plate out to the network) or external to the TMC, additional furniture required, and additional power outlets. The central office or TMC computer shall consist of, at a minimum, the equipment described in the following sections.

System Software

The server-based software shall operate under the Microsoft® Server 2003 operating system. Remote client access shall require PC's to execute/run Microsoft® Internet Explorer® 7.X, Firefox® 2.X, Mozilla®, and Apple®, Safari® web browsers. The Apple® Quicktime® player may be required.

The software shall be designed to integrate with off-the-shelf PC software. The system shall provide the ability to exchange common files such as: Portable Document Format (PDF), Microsoft Word, MS Excel®, .rtf, .csv, SQL, and spreadsheet products.

The system shall utilize MS SQL Server 2005 commercial database product and the database shall be used to store, retrieve, and maintain system data and parameter files.

Field Equipment

The system shall support communications with field devices, as permitted by the field communications infrastructure.

The system shall provide real-time monitoring, control and complete editing capabilities as well as upload and download support for the following field data collection devices, at a minimum:

- Econolite *Autoscope*® 2020 video detection system with RS232 communications
- Econolite *Autoscope RackVision*™ video detection system with RS232 communications

- Econolite *Autoscope Solo*[®] *Pro II* video detection system with RS232 communications
- Econolite *Autoscope Solo*[®] *Pro II* video detection system with Ethernet communications
- Econolite *Autoscope RackVision*[™] *Terra*[™] video detection system with Ethernet communications
- Econolite *Autoscope Solo*[®] *Terra*[™] video detection system with Ethernet communications

The system shall support the following communication devices:

- Digi Connect WAN 3G
- Blue Tree Wireless 4600
- AirLink Raven CDMA

Central Communications

Communication at the central office shall be an Ethernet 100baseT LAN and shall support the distributed client/server architecture.

The LAN shall provide the capability of having multiple users and multiple workstations working simultaneously on a common database.

The owner/agency shall provide all necessary LAN software for a fully functional system.

Remote Connections

Remote password protected connections shall be made available via the Internet.

Only the number of modems accepting incoming connections and network bandwidth constraints shall limit the number of remote workstations.

Graphical User Interface

Browser Basics

The system shall be comprised of World Wide Web (WWW) browser windows, called Widgets. Widgets are accessed through a dedicated web browser. Logging onto the system web site will open a system browser desktop, which is used to organize a series of Widgets, dedicated to viewing and managing traffic data. These Widgets are linked to dedicated computer servers and a Microsoft SQL database, which houses the collected traffic data. The system shall log data collected from a network of vehicle detectors.

Access to vehicle detector information is through a large suite of system Widgets. Widgets are used to check traffic volumes, monitor intersection use, view detector images and associated traffic data, retrieve traffic data reports, charts, data history, and set account preferences.

The system shall provide the user with a suite of Administrator Widgets and a suite of User Widgets. Users and Administrators can set up their own custom Widget configurations to view the data specific to their needs. By creating

a series of organized Tabs, which can hold groups of Widget windows, specific traffic data can be monitored continuously. Tabs allow the organization of "groups" of detection devices. Monitoring a large number of vehicle detection devices can be organized in groups, which will help the user remotely manage their vehicle detection network.

User Widgets types to include the following:

- *Device Video* - The Device Video Widget shall permit the user to view Streaming Video from a specific video device, which is used at the intersection or on the roadway for vehicle detection. The traffic data management system shall be compatible with Apple® QuickTime™ player "plug-in" and the Real Time Streaming Protocol (RTSP), to allow the Device Video Widget to view a remote streaming media server and its streaming media content.
- *Map* - The Map Widget is a geographic information tool, which shall permit the user the ability to view the location of system detection Devices on a map. The Map Widget also lets the user find specific Devices and display Detectors associated with individual Devices or Groups of Detectors. The Map Widget's boundaries or extents are determined by the user's geographic jurisdiction. The Map Widget can also be used to create new Groups of Detectors. Detector Groups can be accessed through other Widgets, like the Chart Widget, the Worksheet Widget, or the Report Widget to view and manage specific traffic data.
- *Location View* - The Location View Widget shall permit the user the ability to view an image, which depicts a true representation of the area associated with a traffic data collection location. The Location View Widget can be used as a form of a "birds-eye" view of where the detection Devices are located in a geographic region.
- *Device View* - The Device View Widget shall permit the user the ability to view an image, which is captured from the *Autoscope* Video Vehicle Detection System. This image represents the field-of-view of the *Autoscope* camera. The *Autoscope* system is set-up to continuously update the image (snapshots), while the system also continuously displays the updated image using the Device View Widget.
- *Event Watchdog* - The Event Watchdog Widget monitors the status of system communications. If the system experiences a disruption in communications with the data collection application, a warning will display in the Event Watchdog Widget "New Messages" list. The Site Administrator sets the Alert Message preferences, which includes activating the Alert Service, establishing the support contact information, and applying the Alert Message.
- *Worksheet* - The Worksheet Widget shall permit the user the ability to view traffic data collected by the system. The Worksheet Widget includes data summarized in a table. The data is collected from vehicle detection devices, like the *Autoscope* Video Vehicle Detection System, and their associated system detectors.

The user selects the period of time to view from the pull-down list or by entering a date. The pull-down options include:

- *Last Record* - Data will continuously update in the Worksheet Widget as the traffic data management system accumulates new data.
- *Last Hour* - a summary of the data for the last full hour, starting at the top of the hour.
- *Current Day* - a summary of the data for the current day, starting at 12 o'clock midnight.
- *Last 24 Hours* - a summary of the data for the last full 24-hour period, 12 o'clock midnight to 12 o'clock midnight.

- *Chart* - The Chart Widget shall permit the user the ability to view traffic data collected by the *DCMS.2* system. The Chart Widget includes data summarized in a Chart, either in a Bar Graph or a Line Graph format. The data is collected from vehicle detection devices, like the *Autoscope* Video Vehicle Detection System, and their associated system detectors.

The user selects the period of time to view from the pull-down list or by entering a date. The pull-down options include:

- *Last Record* - Data will continuously update in the Worksheet Widget as the traffic data management system accumulates new data.
- *Last Hour* - a summary of the data for the last full hour, starting at the top of the hour.
- *Current Day* - a summary of the data for the current day, starting at 12 o'clock midnight.
- *Last 24 Hours* - a summary of the data for the last full 24-hour period, 12 o'clock midnight to 12 o'clock midnight.
- *Reports* - The Report Widget shall permit the user the ability to create data summary reports using traffic data collected by the *DCMS.2* system. The Report Widget displays data summarized on a web page and formatted in a spreadsheet-like format. These web-based spreadsheets can be saved in a variety of digital file formats, which can be distributed for use outside of the *DCMS* web site. *DCMS.2* supports PDF, RTF, CSV, HTML, and Microsoft Excel file formats.

The system shall use a Microsoft SQL database and a web-based report formatting application to organize and format data, the system can be configured to deliver information at the convenience of the user.

Selecting a report from the Display Name column of the Reports Widget shall permit the user to immediately start the process of formatting a report. Clicking on the Home button from any reports window will take the user to the "top" Reports Widget folder window.

The system shall provide "Schedule Report" or "Run in Background" icons in the reports list that shall permit the user to determine when the reports will be generated and at what time interval.

The system shall provide a "No Recurrence" radial button, the report can be scheduled to run immediately or on a specific day. By selecting the "Simple Recurrence" radial button, the report can be scheduled to run immediately, or continuously every "x" number of Minutes, Hours, Days, or Weeks.

The system shall provide a "Calendar Recurrence" radial button, the report can be scheduled to run on a variety of scheduled times, on specific dates, days of the week, or on specific months of the year.

The parameters of the report establishes the data preferences for the report.

The system shall support PDF, RTF, CSV, HTML, and Microsoft Excel file formats. Once the report is created, the system can send the report, in the file format chosen, to an email address(es). It shall be possible to save the report and display the new report to a Jobs Scheduled list in the Reports Widget directory.

Reports that are part of the data management system include the following:

- Arithmetic Mean Speed
- Average Time Occupancy
- Average Volume
- Comparison
- Peak Hour
- Station
- TMG03
- Total Volume
- Vehicle Classification

Admin Widgets types to include the following:

- *Site Switchboard* - The Site Switchboard Widget is used to update system Site Preferences. Personalize your system site with a custom web page Masthead or Banner. The Site Switchboard shall also permit the Admin User the ability to manage and personalize alert message notifications.
- *Device Manager* - The Device Manager Widget shall permit the Site Administrator the ability to edit the Device's Preferences. The Device preferences include information about the detection device, its specific geographic location, and its associated Detectors. The Site Administrator can also add or change information about the Device. The Device Preferences are used as a helpful reference while the user is utilizing other Widgets.
- *Detector Manager* - The Detector Manager Widget shall permit the Site Administrator the ability to edit the Device's "Detector" descriptions or characteristics. The Detector descriptions include information from the detection device, which is collected by the data management system. The Site Administrator can also add or change information about the Detector. The Detector descriptions are used as a helpful reference while the user is utilizing other Widgets.
- *Location Manager* - The Location Manager Widget shall permit the user to associate the Devices used in the system with a Reference Image. This Reference Image can be used to provide the user with an ariel photo or custom graphic of a device's location.
- *User Manager* - The User Manager Widget shall permit the Site Administrator to manage the data management system web site's authorized users. The User Manager Widget shows a list of Site Users and their Access Roles and profiles. Users can be assigned an Admin Access Role or a standard User Access Role. The Admin Role includes access to the tools available in the Admin Widget Gallery, as well as the User Widget Gallery. The User Role includes access to the tools available in the User Widget Gallery.
- *Web Services Manager* - The Web Service Manager Widget shall permit the Site Administrator to distribute traffic data collected and aggregated by the system. The Web Service Manager Widget uses a subset of the Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MSETMCC) standards, The TMDD and MSETMCC were jointly developed by American Association of State Highway and Transportation Officials (AASHTO) and the Institute of Transportation

Engineers' (ITE). *DCMS.2* follows these standards to provide content compliant with the center-to-center concept of operations. The Web Service functionality in the system can be used to compliment existing field deployments of, the National Transportation Communications for ITS Protocols (NTCIP) Center-to-Center standards, the IEEE Incident Management standards, and/or the Society of Automotive Engineers Advanced Traveler Information Service standards.

The data management system assembles Volume, Occupancy, and Speed (VOS) data and creates an XML data file, as specified in the TMDD standard.

- *Collection Manager* - The Collector Manager Widget shall permit the Site Administrator to manage the system web site's traffic data collection profiles. The Collector profiles are used as a means to manage the system "Data Loggers". The Data Logger(s) collects data directly from the detection devices on the roadway and converts the raw data to an Extensible Markup Language (XML) file, which is continuously placed in a "Hot Folder". Traffic data is "logged" every 5-minutes, which the system turns into a new XML data file. The Collector Manager Widget creates a mechanism to read the XML data file(s) (from the "Hot Folder"), and then appropriately places the data in the system SQL database. The data management system accesses the SQL database for traffic data, which is displayed in the system suite of Widgets.

Working with Tabs and Widgets

The system shall be available via a secure web site, which can only be accessed by those users whose account was set up by the site administrator. The site administrator will provide the user with a User ID and Password. The user must log on to the system site to open the browser. Each user creates their own custom Widget profiles, using common traffic data. Upon log out of a session, all Tabs and their content shall be maintained, ready to view in the same configuration when the user logs on again at a later time.

An Internet connection is required to view and manage the data management system. The system shall use the latest Microsoft Internet Explorer version 7.x, Mozilla Firefox 2.x, and Apple Safari for viewing the site.

To Add a New Tab

The system desktop shall use Tabs to organize multiple Widget profiles. Each Tab shall hold multiple Widget windows. The system browser opens with an initial Home Tab and New Widgets can be added to this Home Tab. To add a new Tab click the New Tab area of the system desktop Tab Toolbar; a new Tab labeled New Tab is added to the Tab Toolbar. There shall be no limit to the number of Tabs you can add to the Tab Toolbar. Left and right Tab Toolbar arrows can be clicked to move through the Tab Toolbar, to scroll through available Tabs.

To Add a New Widget

The user will select the Gallery Widget from the Tab drop-down menu. The User Gallery Widget opens in the Browser Desktop. Click on a Widget Link to open the desired Widget window. Widgets can be moved and placed anywhere on the Browser Desktop. Click, hold, and move the cursor on the Widget Title Bar to drag the Widget to desired placement on the desktop. The Widget can be sized by placing the cursor on any side or corner of the Widget. When the double-arrow cursor appears, select and drag the cursor to the desired Widget size.

Administrative and Support Requirements

Warranty

The central office software shall be warranted for 1 (one) year from system acceptance. Software corrections or required modifications for proper system operation per these specifications shall be furnished to the agency at no additional cost during the warranty period.

The system supplier shall provide an optional yearly software maintenance agreement to extend support of the system software after the warranty period, as follows:

- Maintenance and support agreement shall be available with an optional yearly maintenance and support package. *DCMS.2*, database and mapping upgrades are part of maintenance agreement, if changes are available and customized; Widgets and reports are available at an additional cost. Support in the form of telephone and email during the warranty and maintenance and support period is available from 7:30AM to 4:00PM PST, PDT.
- Field communication equipment and communication infrastructure operation shall be the responsibility of the end user.
- Third party hardware and software warranties shall be passed to the end user.

Licensing

The furnishing supplier of the central office software and other associated software shall provide a software license to the purchasing agency for its use. The licensing shall permit for up to 500 devices (*Autoscope* and/or other devices that will be accessed by the database) without any additional licensing needed. The owner/agency can create any number of unique log-on clients.

The supplier shall carry out no work that will infringe on the licensing of third party hardware or software.

Documentation

Manuals shall be supplied for all equipment and components of the system. In some cases, manuals will be in the form of on-line help menus.

Documentation shall be supplied explaining the operation of all system features. In addition, hard copies of all handouts supplied during user training shall be supplied.

Installation and Testing

Upon contract award, the system supplier shall assign a Project Manager to oversee the development of the system and to serve as the main point of contact between the purchasing agency and the supplier.

The system supplier shall assign a Project Engineer to oversee the assembly and test of the system hardware and software. The Project Engineer shall complete a standard factory acceptance test on the assembled system hardware and software.

After completion of the factory acceptance test the system shall be disassembled, packed and shipped to the system end user. A member of the supplier's systems engineering team shall arrive on site to un-pack, assemble and perform initial tests on the new system.

Upon completion of the initial testing the system supplier shall perform a formal acceptance test of the system using a standard acceptance test supplied by the system supplier. This acceptance test shall include an operational demonstration of all major software components of the system.

Training

Formal classroom training and "hands-on" operations training shall be provided for 5-10 personnel by the system supplier.

System training shall be provided by experienced instructors and shall include all training material for formal classroom and hands-on work.

The training shall cover both operation and maintenance of the system software.

Hands-On Training

Hands-on training shall be provided to the agency personnel assigned to the project and the training shall consist of, at a minimum:

1. Operation of all devices
2. Generation and editing of field devices
3. Complete coverage on the creation and editing of Tabs, Widgets, charts, and reports
4. Basic troubleshooting procedures to isolate malfunctions