System Assessment and Validation for Emergency Responders (SAVER)

License Plate Recognition Database Software Market Survey Report

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U.S. Department of Homeland Security

System Assessment and Validation for Emergency Responders

Prepared by Space and Naval Warfare Systems Center Atlantic

FOREWORD

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL). The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency responder equipment; and

- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.

Information provided by the SAVER Program will be shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

As a SAVER Program Technical Agent, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic has been tasked to provide expertise and analysis on key subject areas, including communications, sensors, security, weapon detection, and surveillance, among others. In support of this tasking, SPAWARSYSCEN Atlantic conducted a market survey of commercially available license plate recognition (LPR) database software products. LPR database software products fall under AEL reference number 14SW-01-SIDV: Systems, Vehicle Identification.

Visit the SAVER section of the Responder Knowledge Base (RKB) website at https://www.rkb.us/saver for more information on the SAVER Program or to view additional reports on LPR database software or other technologies.

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1.   INTRODUCTION

License plate recognition (LPR) systems provide law enforcement and security personnel with an automated means to collect, track, and analyze vehicle data. To provide law enforcement personnel with information on LPR systems, the System Assessment and Validation for Emergency Responders (SAVER) Program conducted a market survey of LPR systems focusing on database software features.

This market survey report is based on information gathered from May 2012 to March 2013 from Internet searches, industry publications, an emergency responder focus group, and a government issued Request for Information (RFI) accessible from the Federal Business Opportunities website. For inclusion in this report, the LPR system had to be commercially available and include the capability to store and process LPR data. Due diligence was performed to develop a report that is representative of products in the marketplace.

2.   LPR SYSTEM OVERVIEW

LPR systems aid law enforcement personnel in tracking data related to license plate numbers (LPNs) such as stolen license plates and vehicles, expired license plates, and license plates associated with wanted persons. LPR systems can be used in a wide range of investigative activities, such as placing a suspect at the scene of a crime, tracking the movement of suspects, and using camera images to provide additional evidence.

A typical LPR system includes a number of components that must function together in order for the license plate information to be captured, processed, and accessed through the database software. As shown in Figure 2-1, fixed (e.g., pole-mounted) and mobile cameras (e.g., mounted to a police patrol car) are used to capture vehicle and license plate images. A unique identification (ID) number is often assigned to each fixed or mobile camera. Once a camera captures photos of a vehicle and its license plate, the license plate image is processed through the system's optical character recognition (OCR) software. OCR software uses an algorithm to convert the plate image into alphanumeric information, which can then be stored in the LPR database. Users can then perform a variety of tasks, such as searching for specific license plates, tracking vehicle history, and archiving records.
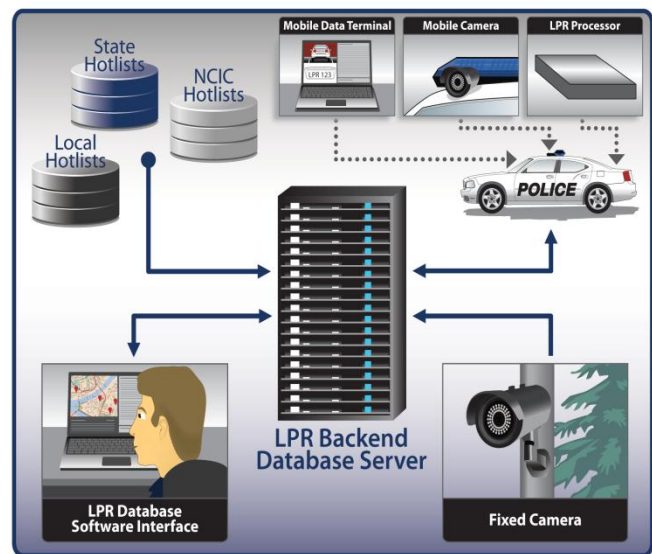
Figure 2-1 LPR System Overview

Image courtesy of Scientific Research Corporation

It is important to note that many LPR systems are proprietary and may require that all components of the system be purchased from the same vendor. This market survey report

focuses only on the LPR database software aspects and does not provide information on the capabilities of the other LPR system components.

2.1 LPR Database Software Features

The LPR database software features allow agencies a range of functionalities to enhance the effectiveness and usability of the system. The key features of currently available LPR database software products are described below.

2.1.1 LPR Images

Most LPR systems provide at least two digital images, one of the license plate and another of the vehicle. The license plate image may be used to confirm the OCR software is accurately reading LPNs. The vehicle image, often referred to as a contextual photo, may include other visuals within the camera's field of view. This additional information can be used to reveal evidence that was present at the time of capture and allow users to compare newly and previously captured images of the same vehicle, as shown in Figure 2-2.

Figure 2-2 Contextual Photos

Image courtesy of New Jersey Office of Homeland Security and Preparedness

Although high resolution images can benefit users by providing more detail, they present a challenge to database administrators concerned with the storage capacity of the database server. To resolve this issue, LPR systems may provide the ability to scale the database to accommodate more entries or compensate by either resizing or compressing the captured images to a lower resolution before storing them.

2.1.2 Graphical User Interface Features

Through a graphical user interface (GUI), LPR systems provide access to license plate and other vehicle-related data. The GUIs for most LPR systems have a search capability and display captured images of vehicles, license plate information, and any associated information that was previously logged. The GUI allows users to add new plate information and annotations to existing records, displays hotlist data, and alerts users by audio-visual cues to plate captures of interest. In presenting all of this information and providing various database search tools, the GUI should be simple and intuitive enough to enable users to utilize the database with ease and effectiveness.

The extent to which a user can configure the GUI of an LPR system varies from product to product. One possible option includes allowing the user to specify the colors and audible tones

associated with different types of alerts and assign priorities to each. This feature helps the user quickly identify both the type of alert and its importance.

LPR system GUIs may use tabs so that the user can group related features, while others include a dashboard with features for organizing information, performing common tasks, and simplifying the user's interaction with the interface. Several LPR systems can support a touch screen interface.

To aid in vehicle identification, a GUI can allow users to manipulate captured images. Additionally, most LPR systems will display license plate capture data on a map and integrate with a geographic information system (GIS).

2.1.3 Hotlists

A hotlist identifies license plates of interest and will cause the LPR system to issue an alert when listed license plates are captured. Along with the license plate capture data, a hotlist may include various types of metadata information, such as the following:

- Watched, stolen, bootable, or uninsured vehicles;
- Permit or parking violations;
- Suspended or revoked licenses;
- Scofflaws, wanted felons, or people with outstanding warrants;
- Missing persons;
- AMBER Alert™ suspects;
- Recent activity and latest vehicle contact information; and
- Any pre-configured hotlist parameters.

In addition to locally created hotlists, an agency may also have access to hotlists from Federal sources, such as the National Crime Information Center (NCIC), and state sources, such as the Department of Motor Vehicles. The ability of an LPR system to access hotlists from external sources depends on the data interoperability, which is discussed in Section 2.2.

2.1.4 Alerts

Alerts notify users that a license plate capture matches an entry on a hotlist. When a match occurs, the LPR system will generate an alert. An alert provides information on the nature of a crime or infraction associated with a license plate so responders have a better understanding of the potential risks involved and how to approach a suspect vehicle (e.g., request backup).

Alerts can be communicated as pop-ups or as audible or audio-visual notifications (e.g., e-mail, text messages, through a website). In addition, alerts can include images of the vehicle; license plate data; the time and date of the plate image capture; and metadata such as make, model, color, and vehicle identification number (VIN).

Many LPR systems allow users to configure alert parameters, which help ensure that they receive relevant alert information. Alerts may be configured to not notify a user on specific types of alerts (e.g., not to alert on parking violations for an officer tasked to find stolen vehicles). Different categories of alerts may be assigned color and sound parameters to simplify

the process of identifying the nature of the alert. In addition, alerts may be configured to display certain types of information and assigned a duration so that they are no longer active after a specified period of time.

2.1.5 Search

Search features provide the ability to look up captured plate information in the LPR system by matching it to user-defined criteria. The most common types of LPR system search features are described below.

Simple Plate Search

A simple plate search provides the ability to look up vehicle information using a full LPN (e.g., ABC 123).

Time Bracket Search

A time bracket search gives users the ability to look at all license plate capture data occurring between two times, either on a single day, multiple days, or a combination of days and times. For example, ranges for a time bracket search can be specified as:

- Monday, 10:00 p.m. to 11:00 p.m.;

- Monday, Wednesday, and Friday, 10:00 p.m. to 11:00 p.m.; or

- Monday, 10:00 p.m.to 11:00 p.m.; Wednesday, 8:00 a.m. to 7:00 p.m.; and Friday, 9:00 p.m. to 11:00 p.m.

Geo-Fence Search

A geo-fence search gives users the ability to look at all license plate capture data within a specific geographic area. The geographic area can be defined either as a distance from a given point or by rubber-banding (i.e., drawing an area on a map). Geo-fence search tools typically include the following features:

- The ability to select a point on a map and specify a radius;

- The ability to free draw a boundary on a map, including a buffer zone defined in feet, miles, meters, or kilometers;

- The ability to store geo-fence parameters for future use; and

- The ability to select new or existing geo-fences.

Wildcard Search

A wildcard search allows users to perform searches with partial alphanumeric license plate capture data and may provide the option to conduct searches using wildcards. A wildcard is a symbol such as an asterisk that replaces an unknown character or set of characters. Thus, if the first three characters of a license plate are known, such as ABC, a user can query the database with the search string ABC* to search for plates beginning with ABC.

Fuzzy Matching

Another way to compensate for incomplete license plate data is through the use of fuzzy matching. With this approach, an algorithm adjusts for LPR errors, such as misreads, to increase

the probability of positively matching the plate against a database. For example, a search for ABC 123 will also return results for ABC I23.

Batch Search

A batch search provides the ability to search for multiple license plates at the same time, usually by importing a list of plates from a text file.

Combined Search

A combined search provides the ability to search for relevant license plate capture data using multiple search parameters (e.g., wildcard and geo-fence searches could be combined to search for all plates beginning with ABC in a defined area).

Other Search Types

Depending on the system, users may be able to perform searches using a variety of other parameters (e.g., LPR system user, camera ID, suspect name, vehicle description, alert disposition).

2.1.6 Search Results

Once a search is performed, the results matching the user-specified criteria are displayed. The user can select among the results to view data pertaining to a specific result. The types of information displayed vary from system to system and can include the following:

- Information, such as plate number, time and date of plate image capture, direction, lane, and speed;

- Any previously captured data for that plate number;

- Alerts on license plates on a hotlist;

- Metadata derived from sources, such as NCIC or locally held data such as residential permits or previous warnings; and

- Global positioning system (GPS) location of the capturing camera for GIS mapping.

In addition to displaying search results, users may be allowed to add information to a search result and save the search results into standard file formats for printing or exporting to other databases.

2.1.7 Analysis

LPR systems collect vast amounts of information, and many products offer data analysis tools to promote public safety and aid in the identification of vehicles of interest. These tools leverage LPR data to allow users to analyze traffic flow and patterns within a defined time range and assist in tracking plates associated with a variety of unlawful activities, such as gang-related crimes, illegal immigration, terrorist threats, and human trafficking. These types of data can help law enforcement to develop hotlists, improve intelligence information on persons of interest, and increase arrest rates through better situational awareness.

Moreover, through the use of user logs, administrators can analyze user performance on factors such as number of alert confirmations, number of missed alerts, and alert response time. With this data, agencies can determine ways to create efficiencies and improve system

implementation. Depending on the LPR system, users may be able to create custom reports to further aid in the analysis process.

2.1.8 Access Control

Controlling access to an LPR system is an important consideration for many agencies. By limiting the range of functionality available to certain users or groups of users, an LPR system administrator can help ensure the security of the system and the integrity of its records. While this capability may be advantageous to LPR systems of any size, it is particularly beneficial for large-scale operations in which data is shared across numerous participating agencies.

LPR systems offering access controls may be configured in a variety of ways. System administrators may be able to assign system access and privileges according to a pre-defined set of roles (Table 2-1). In addition, system administrators may be able to assign user privileges from a list of available privileges, which allows for a great deal of customization for each user, but requires more effort to administer.

Table 2-1 Sample System Roles, Access, and Privileges

Role	Access and Privileges
Administrator	• Oversees the technical management of the system including server maintenance, client system connections, and component configurations; • Manages the database and hotlists; • Defines system access permissions for accounts based on user responsibilities; • Creates and deletes accounts and assigns user names; • Modifies user permissions for security purposes; • Views user data logs; and • Updates system software for all users.
Agency Manager	• Manages the LPR user group for an agency account; • Serves as a liaison between the administrator and users within an agency; and • Establishes and/or implements agency data sharing capabilities.
User	• Receives system alerts for disposition; • Operates LPR field equipment; • Manually enters vehicle and license plate information; • Searches for plate capture information; • Views information associated with license plate captures such as times, dates, and locations; and • Edits the database and hotlists, if permitted.

A system administrator may be required to assign new users a generic password, which the users must then personalize before accessing the system. This feature is often found on LPR systems with a web interface, which require user authentication before logging into the system.

2.1.9 Data Encryption

Many LPR systems provide data encryption capabilities to ensure the secure transmission of information between LPR cameras and the central data repository. Data encryption transforms plain text into a coded format that is unreadable by unauthorized individuals. This process helps protect the integrity of database records by reducing the possibility of tampering.

Given the variety of encryption algorithms, the approach to securing data varies among LPR systems. Products that transfer data through a wireless connection may rely on the encryption

technology offered by an Internet service provider, while others may use a proprietary form of data encryption. Some LPR systems offer data encryption capabilities that adhere to the Advanced Encryption Standard (AES), a Federal Information Processing Standard (FIPS)-approved encryption format.

2.1.10 Maintaining and Modifying the System

Maintaining an LPR system through regular software updates and data backups ensures that the information in the system remains up-to-date, accessible, and secure. In most cases, system maintenance is the responsibility of the agency's LPR system administrator. In this case, LPR systems allow administrators to automate a variety of recurring maintenance tasks, such as importing and exporting hotlists, archiving older entries, and backing up the entire server.

Some LPR systems allow both administrators and users to enter, modify, and delete license plate and vehicle information, although access to these features may be limited by the permissions associated with assigned roles. Moreover, due to legal considerations, agencies using LPR systems may be restricted from using these types of features due to state or local requirements for maintaining the chain of evidence.

Most LPR systems offer scalable databases for agencies that need to maintain large quantities of information. This refers to the ability of the LPR system to automatically recognize and use new storage media, such as an additional hard drive. Scalability gives administrators the ability to expand their data storage capacity in order to meet the growth in the number of LPR records residing in the database.

2.1.11 Software Client and Web-Based Solutions

Most LPR system products operate through either a software client running on a local network or a web-based interface that runs over the Internet. Although software client solutions sometimes have higher initial costs due to more extensive hardware requirements, this approach gives agencies greater control over the system and data because the software is running on a local network.

Alternatively, the primary advantage of web-based solutions is that they allow users to log in from any location with Internet access. When using web-based solutions, administrators must ensure that the two-way transmission of data between remote workstations and the central database remains secure.

2.1.12 Cloud Computing

Although cloud computing has been available for several years, its application to LPR systems is still emerging. Cloud-based services are typically hosted by third-party vendors and can provide agencies with a means for sharing LPR resources such as servers, software, and data. This approach not only allows agencies to reduce costs related to the purchase and use of equipment, but can promote collaboration between agencies. However, cloud computing solutions may present security issues associated with data transmission. Cloud computing may present difficulties in maintaining clear data ownership and the chain of custody of evidence as well as risks arising from the hosting facility having access to the information contained in LPR records.

2.2   Data Interoperability

The ability to access and utilize data from diverse and often dissimilar sources will enhance the effectiveness of an LPR system. LPR systems may use standardized data formats to facilitate data sharing between agencies; however, others may use proprietary data formats, which cause interoperability issues. In addition, some LPR systems are designed to integrate with third-party GIS suites to enhance the system's mapping capabilities. Section 2.3 discusses standards and resources that promote interoperability.

2.3   Standards and Resources

A number of LPR systems are designed in accordance with industry-recognized standards and best practices. A representative sample of these standards and resources is described below.

2.3.1 Federal Information Processing Standard

FIPS 140-2 is a Federal government security standard for accrediting computer systems using encryption to protect hardware and software assets. FIPS 140-2 defines a four-level security hierarchy, with Level 1 providing basic security and Level 4 providing advanced security. The requirements are described in the National Institute of Standards and Technology publication series FIPS PUB 140-2.

2.3.2 License Plate Recognition Database

The License Plate Recognition Database (LPRD) is a software product used to standardize LPR data so that it can be shared among agencies through a web portal. Funded by the National Institute of Justice, LPRD uses a National Information Exchange Model (NIEM) data standard that was created in collaboration with 13 LPR vendors. The software is provided free of charge to law enforcement agencies.

2.3.3 National Information Exchange Model

NIEM is a Federally funded program that provides a forum for agencies to share information on repeatable standards and processes and promotes automated data exchange among jurisdictions. NIEM uses a common programming language to define the structure and meaning of data through simple, yet well-defined, rules.

2.3.4 National Law Enforcement Telecommunications System

The International Justice and Public Safety Network, also known as the National Law Enforcement Telecommunications System (Nlets) was created to provide a secure network infrastructure for sharing electronic information among Federal, state, and local agencies. Nlets is a non-profit organization run by participating states and funded by service fees.

2.3.5 Open Geospatial Consortium

The Open Geospatial Consortium (OGC) is an international association of more than 400 organizations from both the private and public sectors. Through a collaborative consensus-building process, OGC promotes the creation and implementation of accessible, interoperable standards for geospatial information and services used in a variety of applications.

2.3.6 Open Network Video Interface Forum

The Open Network Video Interface Forum (ONVIF) was created to facilitate the development and use of a global open standard designed to foster interoperability between physical Internet Protocol based security products regardless of vendor. Participation in ONVIF is open to all companies and organizations.

3. PRODUCT DATA–VENDOR PROVIDED

Six LPR system vendors responded to an RFI and are identified in this market survey report. The vendors offer a range of solutions and pricing options to meet the needs of their customers. The database software products are available as software client, web-based, or cloud solutions, and most offer enterprise licensing agreements. These products provide records search, analytics, auditing, and security as well as the ability to access hotlist data from external sources.

LPR systems are highly configurable and the price for an LPR system will depend greatly on the needed features of the purchasing agency. Since pricing information is not provided for these products, agencies should contact the vendors for price information.

All of the LPR systems require the purchasing agency to provide compatible computer hardware and additional software to support the LPR database software. These minimum requirements vary by product, and are continuously changing. Purchasing agencies should confirm with the vendor what these minimum requirements are prior to purchase.

Product data presented in this report was obtained directly from vendors and their websites. The information has not been independently verified by the SAVER Program.

3.1 PIPS Technology Inc. Back Office System Server

The Back Office System Server (BOSS) is a central repository and data management system designed for use specifically with PIPS Technology's LPR hardware. The BOSS database software includes proprietary mapping capabilities.

Software updates are not included in the base price but are available for an annual maintenance fee. Major software updates and maintenance releases are available on an as-needed basis. Updates are provided either on a CD or electronically by download, file transfer protocol (FTP), or remote installation. The vendor also offers on-site installation and configuration of software updates.

Image courtesy of PIPS Technology Inc.

PIPS Technology provides telephone technical support, web-based support, maintenance, and sales support from 8:00 a.m. to 6:00 p.m. Eastern Time, Monday through Friday.

Included with purchase is a 2- to 4-hour training session. Additional on-site, remote, and web-based training are available along with user manuals.

The features of BOSS database software include:

Database Features:

- **Database Size:** 1 gigabyte (GB) to 1 terabyte (TB);

- **Database Scalability:** The database is scalable through the addition of more disk storage space;

- **Recorded Data:** Time and date, plate photo, plate photo (infrared), contextual photo (color), contextual photo (black-and-white), event location, GPS coordinates, street address, camera ID, and associated metadata;

- **Metadata:** User-defined alert dispositions and manual entry data can be added to database records;

- **Default Image Size:** The database resizes or compresses the image received from the camera. The default image size was not provided;

- **Format:** The data format is proprietary; however, the database supports Nlets, LPRD, NIEM, Microsoft Excel®, and portable document format (PDF); and

- **GIS:** The database can integrate with Microsoft Bing®, Google™, and Microsoft MapPoint® GIS products.

Analytics Features:

- **Hotlists:** The system supports creating and importing hotlists;

- **Alerts:** Alerts are provided through pops-ups and e-mail;

- **Data Presented in a Record:** Contextual photo, plate photo, GPS coordinates, time and date, source database text data, and manually entered data. Users cannot configure the presentation of the record;

- **Information Displayed for Plate Captures:** Color overview (scene), infrared plate image, GPS coordinates, time and date, and associated metadata;

- **Number of Cameras Monitored Simultaneously:** Tested up to 600 cameras; and

- **Types of Reports:** Many including read/alert counts by site or user ID, hotlist by date, and audit reporting by usage. Search reports are available in Excel or PDF formats.

Security Features:

- **Types of System Access Protection:** Password, encryption, and rule-based security;

- **User Roles and Access Levels:** System administrator, hotlist administrator, group administrator, device administrator, and user;

- **Records Management:** Administrators cannot modify or delete records. Changes and access requests are added to audit logs; and

- **FIPS 140-2 Compliant:** Yes.

3.2   ELSAG North America LLC ELSAG Operations Center™

The ELSAG Operations Center (EOC™) is a web-based back office data management system. Data from third-party cameras can be imported for use in the EOC database software. In addition, agencies can purchase ELSAG's Tactical Operations Center™ software, which simultaneously broadcasts real-time alerts from mobile units to an agency's dispatch center in order to aid in the allocation of backup units.

Photo courtesy of ELSAG North America LLC

Purchase includes 12 months of 24 hours a day telephone technical support, web-based support, maintenance, and software support. Software support, including updates, can be purchased separately after the first year. Depending on the extent of the update, the software is delivered via download, e-mail, or CD.

Training is included in the base price and is tailored to an agency's needs. Additional on-site and remote training led by an instructor is available as well as web-based training. User manuals are provided.

ELSAG uses its Capacity Planning Tool™ to help agencies determine the database size and configuration requirements based on the number of deployed cameras, the number of anticipated plate captures, and the duration of record retention.

The features of EOC database software include:

Database Features:

- **Database Size:** Depends on server capacity and camera type;

- **Database Scalability:** The database is scalable through the addition of more disk storage space;

- **Maximum Number of Simultaneous Reads:** Depends on server size and processing power;

- **Maximum Number of Simultaneous Writes:** Depends on server size and processing power;

- **Recorded Data:** Time and date, plate photo, plate photo (infrared), contextual photo (color), contextual photo (black-and-white), event location, GPS coordinates, street address, and camera ID;

- **Metadata:** Metadata can be added to records;

- **Default Image Size:** The database resizes or compresses the image received from the capturing camera. The default image size varies and is based on the hardware solution;

- **Format:** ELSAG uses Extensible Messaging and Presence Protocol, an open industry standard protocol for data, and publishes its Extensible Markup Language (XML) payload format to customers; and

- **GIS:** The system uses licensed mapping software and integrates with Bing and Google GIS products, which can be accessed through hyperlinks in the GUI. The system also has an Application Programming Interface that allows data to be accessed by another database and queries to be performed.

Analytics Features:

- **Hotlists:** Users can create, import, and maintain hotlists;

- **Alerts:** The system provides alerts through pop-ups and e-mail. Alerts and categories of alerts are configurable by users and can be assigned a specific audible tone;

- **Data Presented in a Record:** Plate photo, contextual photo, plate capture, time and date, location address, map of plate capture location, GPS coordinates, plotted map showing nearest cross streets, camera system designation, and camera system domain. The display presentation cannot be configured; however, data can be filtered and grouped so that only preferred fields are displayed. The data view is adjusted through the system's interface;

- **Information Displayed for Plate Captures:** Plate photo, LPN, state, time, camera ID, alert classification, hotlist, and notes;

- **Number of Cameras Monitored Simultaneously:** Not specified; and

- **Types of Reports:** Users can create reports that contain time, map, and plate-specific data including partial plate numbers. Users can also create convoy analysis and location cross-reference reports. Convoy analysis reports are used to identify two or more vehicles that have traveled in the same location within a specified time interval. Location cross-reference reports can identify a vehicle that has traveled in different parts of a geographic region on a regular basis.

Security Features:

- **Types of System Access Protection:** User ID and password. The server and camera systems communicate through the MD5 message-digest algorithm over Secure Sockets Layer 3 (SSL3). EOC web-GUI users have access by clear text over SSL3;

- **User Roles and Access Levels:** Agencies can establish user roles and access levels to meet their needs;

- **Records Management:** Records cannot be modified or deleted. Every interaction is tagged for auditing so that administrators can identify who accessed the database, what information was accessed, and when it was accessed; and

- **FIPS 140-2 Compliant:** Yes.

3.3   Genetec Inc. AutoVu

AutoVu is the LPR component of Genetec's Security Center system, which includes video surveillance and access control modules.

Software updates are not included with purchase, but agencies have the option to purchase a Software Maintenance Agreement (SMA), which includes all major and minor software update releases. Agencies that do not purchase an SMA can purchase software updates separately. Annual software updates include, on average, two major releases and two or three service releases; these releases are available to download through Genetec's support website.

Image courtesy of Genetec Inc.

Purchase includes support 24 hours a day through Genetec's web portal as well as e-mail support. Purchase of an SMA includes 12 months of telephone technical support, maintenance, and sales support Monday through Friday from 8:00 a.m. to 8:00 p.m. Eastern Time. These services are available 24 hours a day for an additional cost.

Also included with purchase is a 1-day training session for up to 12 trainees. Additional on-site and remote training led by an instructor is available for purchase, and web-based training is also available for purchase.

The features of Genetec AutoVu database software include:

Database Features:

- **Database Size:** Approximately 200,000 records per 10GB;

- **Database Scalability:** The database is scalable through the addition of disk storage space;

- **Maximum Number of Simultaneous Reads:** No practical limit; restricted only by server hardware and network bandwidth limitations;

- **Maximum Number of Simultaneous Writes:** No practical limit; restricted only by server hardware and network bandwidth limitations;

- **Recorded Data:** Time and date, plate photo, plate photo (infrared), contextual photo (color), event location, GPS coordinates, street address, camera ID, user ID, action taken, and type of event;

- **Metadata:** Metadata can be added to entries and includes any information (make, model, color, VIN, etc.) found on a hotlist. In the event of an alert, a user can choose from a list of actions taken regarding the alert and enter a text note that will be associated with the plate capture;

- **Default Image Size:** The database resizes or compresses the image received from the capturing camera. The default image size is 55 kilobytes (KB);

- **Format:** Data can be imported and exported based on the XML data standard. Nlets and LPRD support will be available in a future software release. NIEM and ONVIF are not supported; and

- **GIS:** Data can be posted to a third-party GIS system through XML.

Analytics Features:

- **Hotlists:** Users can create, import, and maintain hotlists;

- **Alerts:** Alerts pop up in the GUI. Users can configure types of hotlist alerts with specific colors and sounds. E-mail notifications can be sent to recipients assigned either to a particular hotlist or specific entries on the hotlist;

- **Data Presented in a Record:** Plate photo, contextual photo, plate interpretation, time and date, location address, map of plate capture location, LPR unit name and number, type of event (e.g., plate capture, alert), alert category (e.g., stolen vehicle, AMBER Alert, wanted felon), a watermark indicating the plate capture has not been altered in the database, any metadata associated with a capture, reason for a "rejected" alert, and action taken for an "accepted" alert. Users can configure the display presentation;

- **Information Displayed for Plate Captures:** Plate photo, contextual photo, LPN, time and date, location address, map of plate capture location, LPR unit name and number, type of event (e.g., plate capture, alert), alert category, (e.g., stolen vehicle, AMBER Alert, wanted felon), a watermark indicating the plate capture has not been altered in the database, and any metadata associated with an alert;

- **Number of Cameras Monitored Simultaneously:** Dependent on bandwidth and processing power of server hardware; and

- **Types of Reports:** Plate capture reports showing all plate captures matching search criteria, hit reports showing all alerts matching search criteria, reports showing statistical data on plate captures and alerts over a period of time, route playback reports showing a map of all areas through which a mobile LPR vehicle traveled, and reports showing log ins per mobile unit.

Security Features:

- **Types of Database Access Protection:** User ID and password, Microsoft Active Directory, AES encryption;

- **User Roles and Access Levels:** Privilege levels can be configured for each user, or in groups of users, to very specific levels of access and capabilities within the database;

- **Records Management:** Administrators cannot modify or delete records; however, all activities relating to a record (e.g., access requests) are logged and reported in the administrative tools of the software through the audit reports feature; and

- **FIPS 140-2 Compliant:** No.

3.4 Image Sensing Systems Inc. CitySync Jet-BOF™

CitySync Jet-BOF is Image Sensing Systems' LPR database software product.

Software updates are included with purchase for the first year. A standard service agreement (SSA), which includes software updates, can be purchased after the first year. In general, two major software releases are issued per calendar year with additional releases provided on an as-needed basis. Depending on contract requirements, updates are delivered electronically through either secure FTP or e-mail.
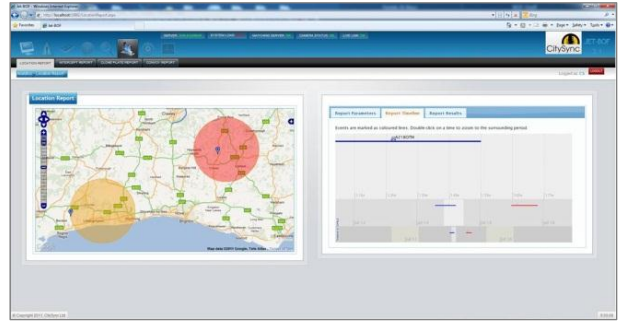

Image courtesy of Image Sensing Systems Inc.

The SSA includes 12 months of telephone technical support, web-based support, maintenance, and sales support Monday through Friday from 9:00 a.m. to 6:00 p.m. Eastern Time.

Purchase includes 80 hours of on-site training conducted over a 10-day period for an unlimited number of trainees. Additional on-site or remote training led by an instructor is available for purchase.

The features of CitySync Jet-BOF database software include:

Database Features:

- **Database Size:** Limited only by hardware;

- **Database Scalability:** The database is scalable and limited only by hardware;

- **Recorded Data:** Time and date, plate photo (color, black-and-white, or infrared), contextual photo (color or black-and-white), event location, GPS coordinates, street address, and camera ID;

- **Metadata:** Metafiles can be added as an optional feature;

- **Default Image Size:** The default image size is 79KB;

- **Format:** Database options for enterprise are MS SQL® 2008 R2, Oracle® (Linux and Microsoft Windows®), and MySQL (Linux and Windows). The database supports Nlets, LPRD, NIEM, comma separated value (CSV), and PDF export. ONVIF is not supported; and

- **GIS:** The database provides a full GIS mapping interface. The mapping is interoperable with OGC Web Map Service or with Web Feature Service.

Analytics Features:

- **Hotlists:** Users can create, import, and maintain hotlists;

- **Alerts:** Alerts are displayed on-screen with a sound clip. Alerts can also be e-mailed and work in the background with a pop-up feature. The database supports an unlimited number of hotlists;

- **Data Presented in a Record:** Plate photo, contextual photo, time and date, location, associated hotlists, and vehicle make, model, and color. Display presentation cannot be configured;

- **Information Displayed for Plate Captures:** The interface can be configured to display only alerts or any desired information, including contextual photo, LPN, OCR read, time and date, camera ID, location, map data, vehicle speed, and direction;

- **Number of Cameras Monitored Simultaneously:** The system will show 20 camera views at a time in a grid, and the data is updated every 30 seconds. Users can view the location of the cameras on a map; and

- **Types of Reports:** The database contains a reports function, which provides reporting for web-based display or export to Microsoft Excel and PDF. Types of reports include automatic, inbuilt, and custom reports. Automatic reports show daily operational statistics such as plate captures, alerts, and system status and can be e-mailed to a system administrator. Inbuilt reports show system usage, camera usage, etc.

Security Features:

- **Types of Database Access Protection:** User ID, password, and Public Key Infrastructure. All user access levels are configurable;

- **User Roles and Access Levels:** The system provides a variety of pre-configured user roles and access levels. Customized user roles and access levels can be created for specific tasks by modifying the user definable fields;

- **Records Management:** Administrators can modify and delete records. All database modifications, deletions, and access requests are logged and can be configured to require second tier approval; and

- **FIPS 140-2 Compliant:** Yes.

3.5 NDI Recognition Systems Vehicle Intelligence Server and Communications Engine

The Vehicle Intelligence Server and Communications Engine (VISCE®) is a web-based product. VISCE works natively with other products in NDI's LPR software suite but can be configured to interface with other, non-NDI systems.

Software updates are included with purchase, and are typically structured in 6-month increments or per the customer agreement. As a web-based product, VISCE software updates are transparent to the user.
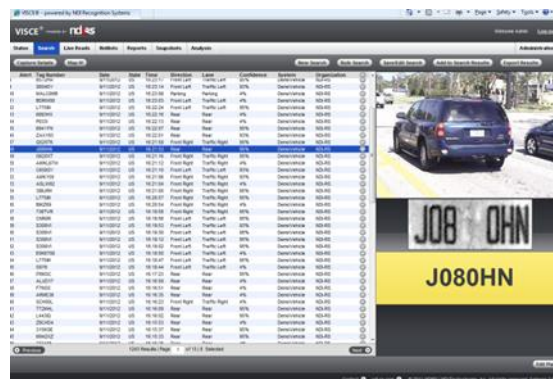
NDI provides telephone technical support, web-

Image courtesy of NDI Recognition Systems

based support, maintenance, and sales support from 8:00 a.m. to 6:00 p.m. Eastern Time, Monday through Friday. On-site engineering support is available.

Included with purchase is a 1-day training session for 1 to 10 trainees. Additional on-site, remote, and web-based training are available.

The features of VISCE database software include:

Database Features:

- **Database Size:** 30KB per plate capture (or database record);

- **Database Scalability:** The database is fully scalable. SQL can be scaled to the enterprise level by clustering and through other methods, as required;

- **Maximum Number of Simultaneous Reads:** Four per user, but limited by server capacity and processing power;

- **Maximum Number of Simultaneous Writes:** Four per licensed unit, but limited by server capacity and processing power;

- **Recorded Data:** Time and date, plate photo (color or black-and-white), plate photo (infrared), contextual photo (color), contextual photo (black-and-white), event location, GPS coordinates, street address, camera ID, etc.;

- **Metadata:** Notes, keywords, etc.;

- **Default Image Size:** The database compresses the image received from the capturing camera. The default image size is 10KB;

- **Format:** Supports LPRD and NIEM as required; and

- **GIS:** Database can integrate with GIS.

Analytics Features:

- **Hotlists:** Users can create, import, and maintain hotlists;

- **Alerts:** Alerts are provided through pop-up, e-mail, and text message;

- **Data Presented in a Record:** Plate photo, contextual photo, time and date, location, geographic information in latitude and longitude, map display of plate capture, vehicle's direction of travel, camera ID, user ID, plate capture confidence, metadata, etc. Users can configure the display presentation;

- **Information Displayed for Plate Captures:** The interface can be configured to display only alerts or any desired information, including plate photo, contextual photo, time and date, location, geographic information in latitude and longitude, map display of plate capture, vehicle's direction of travel, camera ID, user ID, plate capture confidence, metadata, etc.;

- **Number of Cameras Monitored Simultaneously:** Configurable; and

- **Types of Reports:** A variety of reports are available, including plate capture reports, alert reports, exhibit reports (i.e., reports formatted in presentation-ready document

types such as PDF, Word, and Excel), and audit reports (e.g., camera asset usage, mobile unit usage, database usage, user activity).

Security Features:

- **Types of Database Access Protection:** User name and password;

- **User Roles and Access Levels:** Administrator, super user, standard user, and restricted user;

- **Records Management:** Administrators can modify and delete records. All record modifications and deletions, access requests, log ins, searches performed, and reports generated are recorded by the database. For each activity, user, time, and date information is recorded; and

- **FIPS 140-2 Compliant:** Not specified.

3.6   Vigilant Solutions Law Enforcement Archival Reporting Network

The Law Enforcement Archival Reporting Network (LEARN™) is a web-based, back office data management system designed to work with Vigilant Solutions' fixed and mobile CarDetector cameras and processors. Data from third-party cameras can be imported for use in LEARN. Agencies have the option to use LEARN either as an agency-hosted database or in a cloud environment where data and software are hosted in a secure third-party facility.

Image courtesy of Vigilant Solutions

Software updates typically occur on a quarterly basis and are provided as part of the licensing agreement. For the cloud-based database, the software is updated at the hosting facility and is transparent to the user. For the agency-hosted database, the software is updated via download.

Purchase includes 24 months of telephone technical support from 11:00 a.m. to 8:00 p.m. Eastern Time. E-mail, maintenance, sales, and web-based support is also available 24 hours a day. Vigilant also maintains a network of local dealers and distributors to provide database setup, configuration assistance, and additional customer support.

On-site and remote group training is available but is not included with purchase. The cost is based on the number of days and the scope of training. User manuals are provided.

The features of LEARN database software include:

Database Features:

- **Database Size:** Approximately 70 million records per 1TB hard disk drive;

- **Database Scalability:** Unlimited database scalability;

- **Maximum Number of Simultaneous Reads:** Unlimited;

- **Maximum Number of Simultaneous Writes:** Unlimited;

- **Recorded Data:** Time and date, plate photo (color or black-and-white), plate photo (infrared), contextual photo (color), contextual photo (black-and-white), event location, GPS coordinates, street address, camera ID, user ID, system ID, and plate capture confidence;

- **Metadata:** Users may add comments in the field at the time of capture; users with appropriate privileges may add comments within LEARN;

- **Default Image Size:** The database resizes or compresses the image received from the capturing camera. The default image size is 13KB;

- **Format:** LEARN uses a SQL database. The database supports Nlets, LPRD, NIEM, XML, and CSV. ONVIF is not supported. LEARN integrates with the National Vehicle Location Service, a data-sharing initiative that aggregates LPR data from participating agencies via their LEARN accounts; and

- **GIS:** The database integrates the Google Maps GIS.

Analytics Features:

- **Hotlists:** Users can create, import, and maintain hotlists;

- **Alerts:** Alerts are provided through a real-time web service and e-mail. Alerts can be assigned a specific color, audible tone, or heading (e.g., hotlist name);

- **Data Presented in a Record:** Plate photo, contextual photo, LPN, time and date, location address (in latitude and longitude with nearest address), map display, system ID, camera ID, camera type, user ID, and agency name. Users can configure the display presentation;

- **Information Displayed for Plate Captures:** Plate photo, contextual photo, LPN, time and date, location address (in latitude and longitude with nearest address), map display, system ID, camera ID, camera type, user ID, and agency name;

- **Number of Cameras Monitored Simultaneously:** No practical limit. For the standalone database, this number depends on bandwidth and processing power of the server hardware; and

- **Types of Reports:** Query results with mapping, captures by user ID, captures by agency, hot lists, hot list alerts, alert ratio (i.e., the percentage of captures that trigger an alert), alerts by user ID, and plate capture confidence.

Security Features:

- **Types of Database Access Protection:** Password and data encryption;

- **User Roles and Access Levels:** The database provides varying levels of database access through standard user roles: administrator, agency manager, and user;

- **Records Management:** Administrators can modify and delete records. An audit file is maintained on all changes, deletions, and queries. The database can be configured so that each database query generates a pop-up requiring user acknowledgement. This allows administrators to monitor how the database is being used; and

- **FIPS 140-2 Compliant:** Yes.

4.   VENDOR CONTACT INFORMATION

Additional information on the six LPR database software products included in this market survey report can be obtained from the vendors listed in Table 4-1.

Table 4-1 Vendor Contact Information

Vendor	Address/Phone Number	Website
PIPS Technology Inc.	804 Innovation Drive Knoxville, TN 37932 865-392-5540	http://www.pipstechnology.com
ELSAG North America	7 Sutton Place Brewster, NY 10509 877-773-5724	http://www.elsag.com
Genetec Inc.	2280 Alfred-Nobel Boulevard Suite 400 Montreal, QC H4S 2A4 Canada 334-676-9220	http://www.genetec.com
Image Sensing Systems Inc.	1600 University Avenue West Suite 500 St. Paul, MN 55104 651-206-6982	http://www.imagesensing.com
NDI Recognition Systems	385 Commerce Way Longwood, FL 32750 321-441-1800	http://www.ndi-rs.com
Vigilant Solutions	2021 Las Positas Court Suite #101 Livermore, CA 94551 925-398-2079	http://vigilantsolutions.com

Eight additional vendors that may provide LPR database software products were identified through Internet searches and industry publication research. Insufficient information was available to include these vendors, who did not respond to the RFI, in this market survey report. Their contact information is listed in Table 4-2.

Table 4-2 Additional Vendor Contact Information

Vendor	Address/Phone Number	Website
Avigilon	4th Floor 858 Beatty Street Vancouver, BC V6B 1C1 Canada 888-281-5182	http://avigilon.com
COBAN Technologies Inc.	11375 W. Sam Houston Parkway S. # 800 Houston, TX 77031 866-812-6226	http://www.cobantech.com
Database Consultants Australia	8 Faneuil Hall Marketplace 3rd Floor Boston, MA 02109 866-454-3224	http://www.pinforce.com.au
INEX/ZAMIR	10870 Murdock Drive Knoxville, TN 37932 865-671-1400	http://www.inexzamir.com
Intelligent Security Systems	Aspen Corporate Park 1480 U.S. Highway 9 North Suite 202 Woodbridge, NJ 07095 732-855-1111	http://www.isscctv.com/products/intelligent/auto
ipConfigure Inc.	4111 Monarch Way Suite 510 Norfolk, VA 23508 877-207-1112	http://www.ipconfigure.com/products/LPR/index.html
Perceptics Inc.	9737 Cogdill Road Knoxville, TN 37932 800-448-8544	http://www.perceptics.com
Transport Data Systems	1159 Cushman Avenue San Diego, CA 92110 619-295-5050	http://transportdatasystems.com

5. SUMMARY

This market survey report includes six LPR database software products that provide law enforcement and security personnel with an automated means to collect, track, and analyze vehicle data. This capability enhances the ability of law enforcement and security personnel to locate vehicles of interest. The primary differences between the products are related to data interoperability, data formats, additional training, software updates, enterprise licensing, FIPS 140-2 compliance, and how data is displayed.

Emergency responder agencies that consider purchasing LPR products should carefully consider each product's overall capabilities and limitations in relation to their agency's operational needs.