



## Technical Memorandum

### Mobile License Plate Recognition (MLPR) For Enforcement of Parking Spaces

Municipalities struggle with how to efficiently enforce On-Street parking spaces, both for payment processing as well as time-based enforcement. Since vehicles are required to display unique license plates many municipalities are implementing a Mobile LPR vehicle to capture the vehicle's license plate and determine how long that vehicle has parked within the parking space. If the vehicle has parked longer than the posted time limit, that vehicle is then subject for the issuance of a citation. If electronic parking meters are installed, many MLPR systems communicate with those parking meters and can determine if the parked vehicle has paid for parking in that particular spot and if they have parked longer than the period that was paid.

Text LPN data is used by parking management software to check parking authorizations and various hotlists. These lists may include parking scofflaws, stolen vehicles, suspect vehicles, and AMBER alerts. Visual or audible alerts from the system may alert parking enforcement officers of violations or notifications related to a specific license plate. This process occurs in a matter of seconds, effectively automating a previously manual/subject process.

Mobile LPR systems consist of the following components:

- One overview camera
- One digital camera to capture the License Plate data
- A Trunk mounted GPS
- One lap top (or tablet) mounted inside the vehicle
- Some may also include a citation printer
- Processing software
- Data Storage
- Management Software





The type of vehicle may vary depending upon other types of services anticipated for use. For example, some cities may further equip the vehicle with boots, battery chargers, battery charging cables, and other tools. Other cities reserve these vehicles specifically for enforcement. The best type of vehicle to be used is typically a small SUV. These vehicles allow the cameras to be installed at a higher level that provides a better angle for capturing license plates.

A common misconception about LPR is the ability to read 100% of license plates 100% of the time. The statement that best describes the accuracy of LPR is: "If you can see it, we can read it." There are certain reasons why a plate cannot be read, including:

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- License plate missing from the vehicle
- License plate outside of the camera's field of view
- Damaged license plates:
  - o Portions of the plate are missing
  - o Plate is bent or otherwise distorted in a manner that alters the shape of characters that constitute the registration number or identify the plate origin.
- Plates mounted in a manner inconsistent with the law of the state entered: i.e. plate is displayed in the rear window of a passenger vehicle
- Obstructed plates: A of
  - o An object, such as a trailer hitch, prevents a clear view of the origin or the registration number
  - o Any object that obscures the outline of the origin or the registration number, such as a license plate frame.

Measuring the accuracy of capturing the license plates can be a difficult process. Not all LPR manufacturer measures accuracy the same way, so it is imperative to have a clear definition of what accuracy is required within the system. The following is a simple equation to help define accuracy:

$$\frac{\text{No. of vehicles detected}}{\text{No. of vehicles}} \times 100 = \% \text{ of Vehicle Detection Rate Actual}$$

$$\frac{\text{No. of plates read}}{\text{No. readable plates}} \times 100 = \% \text{ of Plate Read Accuracy}$$

This equation also requires the definition of "plate read." A license plate includes a series of alphanumeric characters and an origin (State). The LPR system should correctly identify each alphanumeric character. For example, many systems have difficulty in differentiating between a "B" and an "8" or a "D" and a "0". Some vendors may include statements such as: "Our system can read the letter Q correctly 99% of the time." Cities should focus on the overall accuracy of all reads and not solely on one or two letters or numbers.

"The OCR Software is the 'brains' of the LPR System"



Additional factors that can have an impact on the overall accuracy:

- The type of camera – Cities should focus on ensuring a minimum pixel count at the point the plate is read.
- OCR: Optical Character Recognition software. The OCR engine is the brains of the system and interprets the plate image into individual characters.

Typically, most MLPR systems can accurately capture 95 – 96% of the plates that can be seen. Many systems continually monitor and track the accuracies of the LPR Capture to provide data for ongoing improvements to their system.

When preparing specifications for the procurement of a Mobile LPR system, the requirements must be succinct and all encompassing. A detailed analysis of the specific city's requirements must be developed to be incorporated into the specifications. Of primary concern are any integration requirements between existing city functions, such as the citation issuance, adjudication, and payment processing. LPR capture rates and accuracy analysis must be succinctly stated within the specifications so that all vendors understand what is required and any penalty that may be imposed for failure to meet the specifications requirements.

Other considerations for MLPR Systems:

- Track LPR Capture Rates
- Track manual corrections
- Electronic “chalk” each vehicle to capture when a vehicle moves out of parking space
- Capture GPS coordinates
- Run analytics in real-time:
  - o Turnover rate
  - o No. of boots
  - o Behavior analytics:
    - Employees
    - Students
    - Car parked multiple times within same parking space
- Track payments, appeals, error rates, who received permits, etc.
- Integration with parking meters
- Integration with mobile payment providers such as Pay-by-Phone, ParkMobile, etc.
- Integration with other city departments to share data as well as improve payment of citations, develop an online appeal process and possibly issue electronic citations.
- Hold potential citations for up to one hour to provide patron time to correct any deficient activity, such as paying the parking meter for any extended parking fee due over the initial timeframe.
- Issuance of electronic citations
- Feeding information from the database to citation handheld computers so Parking Enforcement Officers will have real-time information.
- Issuance of alerts for violations



- Calculation of occupancy data coincident with enforcement process.
- Track who writes citations and why the citation was written.
- The system must track payments, appeals, error rates, who received permits, etc.

## Development and Implementation of Privacy Policies for Parking

The acquisition of large numbers of license plates, location and time data has raised several privacy concerns among the public, government agencies and privacy advocates. More specifically, the storage, distribution, and use of the data is cause for concern. Municipalities should proactively develop privacy policies for the capture, storage, and use of License Plate information and the data associated with each LPN.

The widespread capture and storage of large quantities of LPR data has raised privacy concerns among several organizations, such as the American Civil Liberties Union (ACLU). LPR systems capture every license plate they see. Most these records are for individuals not suspected of breaking any law. Nationally, approximately 8% of plate reads result in some form of enforcement action.

Privacy implications and risks are real and a detailed Privacy Policy should be developed and implemented.

Although the primary use of an organization's LPR data may be well-intentioned, the risk of abuse is very real, and can include:

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- Tracking individual Vehicles – Observations of a vehicle's whereabouts over time allows an individual's movements to be easily tracked with detail.
- Tracking Groups of Vehicles – LPR data could lead to the tracking of individual vehicles that were observed at a location, such as political protests.
- Data Aggregation – Entities can share their respective data thereby resulting in the aggregation data into a large
- Secondary Uses – LPR data could be used in ways that were not originally intended.

Numerous agencies have issued guidelines for the development and implementation of a Privacy Policy regarding the potential uses of LPR data. The agency and a reference to their specific policy suggestions follow:

### ACLU

*You Are Being Tracked: How License Plate Readers Are Being Used to Record Americans' Movements* (<http://www.aclu.org/files/assets/071613-aclu-alprreport-optv05.pdf>)

### NCJA





*Justice Information Privacy Guideline: Developing, Drafting and Assessing Privacy Policy for Criminal Justice Information Systems*

(<http://www.ncja.org/sites/default/files/documents/Justice-Information-Privacy-Guideline.pdf>)

### IACP

*Privacy Impact Assessment Report for the Utilization of License Plate Readers*

([http://www.theiacp.org/Portals/0/pdfs/LPR\\_Privacy\\_Impact\\_Assessment.pdf](http://www.theiacp.org/Portals/0/pdfs/LPR_Privacy_Impact_Assessment.pdf)) *Automated License Plate Recognition Systems: Policy and Operational Guidance for Law Enforcement*  
([http://www.theiacp.org/Portals/0/pdfs/IACP\\_ALPR\\_Policy\\_Operational\\_Guidance.pdf](http://www.theiacp.org/Portals/0/pdfs/IACP_ALPR_Policy_Operational_Guidance.pdf))

The potential gains of using LPR data for customer service and the improvement in operational efficiency are numerous. However, municipalities must take care to ensure the vast amounts of data collected are used for legitimate purposes and the privacy interests of the public are addressed.

### Potential Costs

There are many factors that come into play when reviewing the proposed cost of a Mobile LPR system. The costs included in this section highlight costs that may be included in the ultimate system, but it should be noted that there are additional functionalities that a municipality may wish to acquire within or as a part of the Mobile LPR system that will result in additional costs. The primary costs are as follows:

Vehicle	\$40,000 - \$ 50,000
LPR equipment	\$30,000 - \$ 50,000
Server (if required)	<u>\$ 2,000 - \$ 4,000</u>
<b>Total</b>	<b><u>\$72,000 - \$104,000</u></b>
Annual Software Maintenance costs	\$10,000 - \$ 20,000

### Acquisition and Implementation

Many factors affect the timing of the acquisition of Mobile LPR systems as well as the implementation of such systems. A summary is included below. These timelines are general and can be modified based upon the policies and practices currently used by the specific municipality. It should also be noted that several tasks may be implemented at the same time and may be mutually exclusive.

Task	Timeframe
Development of Privacy Policy	3 – 6 months
Development of Specifications	2 months
Procurement process	2 – 3 months



Award and contract negotiation	1 month
Implementation of MLPR	2 – 6 months

## Sharing of Data

The City may wish to reach out to other entities who might benefit from the use of a Mobile LPR system or who might implement their own Mobile LPR system. A memorandum of understanding could be negotiated that would allow the respective entities to share the data collected, pursuant to any Privacy Policy, that would enhance the ability to track users while offering special parking benefits to users of both systems. For example, if the City shared data with the local university, a special parking program could be offered to students, faculty, etc. while using the license plate data as the credential for entering these programs. Sharing of data could also enhance the enforcement of parking within the city. It would be beneficial to open discussions with these respective potential users to determine how the entities could work together and further define the uses of the shared data.