AI Powered License Plate Recognition

Datasheet v4.5

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AllGoVision

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Contents

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INTRODUCTION

Automatic Number Plate Recognition –The Automatic Number Plate Recognition feature monitors the entry/exit of vehicles by automatically detecting the vehicle number plates in a virtual field of view. It supports automatic matching for one or more user-specified vehicle watchlists and generates instant, real-time alerts against the same. The ANPR feature can detect and recognize license plates on both moving and stationary vehicles and users can further configure it for accurately tracking vehicles across multiple locations and cameras. Since it also supports the recording and logging of number plates at a specific scene, this feature is especially useful for forensic investigations. Common applications include, checking the license/registration status of vehicles, cataloguing traffic movements in expressways or highways, preventing unauthorized vehicle movement in protected areas, supporting automated parking management with regulations for entry and exit in tollgates, and generating auto-E challans with 95% accuracy.

Deep Learning: A subset of Artificial Intelligence, Deep Learning technology exposes machines to high volumes of tagged data. The machine is then tasked to 'learn', 'analyse', and 'detect' the same information in new datasets which ensures more proficient detection and identification of objects. Since Deep Learning technology is also powered by robust hardware infrastructure, the analytic output is better and faster.

Use of Deep Learning in License Plate Recognition: The use of Deep Learning for ANPR brings it much closer to human perception. Advanced Deep Learning methods can assess large datasets of vehicle number plates and the layered filters can take the minutest details into account. This increases the number of parameters considered for matching the vehicle number, thereby increasing the degree of accuracy in Number Plate Recognition. Thanks to the technology's improved processing performance and superior object classification capabilities, it can efficiently detect and identify multiple vehicle types with low visual biasing and false alarms.

LPR APPLICATIONS

- Parking Management: For vehicles which has ingress into the parking area but even after timeout there is no egress, alarms are generated for detection of such vehicles.

- Traffic Monitoring: red light violation or any other traffic rule violation can be detected and associated rule-breaching vehicle's license number can be recognized.

- Law Enforcement: Stolen cars can be detected from IP cameras deployed in traffic surveillance system in the city / highway. Even the place of registration can be tracked for the detected and recognized license plates.

- Access Management: Using Multi Factor Authentication – MFA for authenticating Vehicle and Person for entry into a premises. The face & registered vehicle number matches are validated using a database.

- Task Automation*: Based on a matched entry of recognized license plate associated systems can be triggered such as access control / boom barriers etc. to open for a white listed vehicle at Entry and Exits of restricted zones, parking lots etc. Supports Face & Vehicle image capture.

- **Automatic Toll Management*:** Recognized vehicles being charged the toll fees by associated payment systems for car owners with the specific license number.

*Integration required with the associated systems.

SYSTEM REQUIREMENTS

AllGoVision analytics has the following system hardware & software requirements for LPR.

CATEGORY	REQUIREMENT
Operating System	Ubuntu server 18.4, Windows Server 2016, Windows Server 2019
Network	Ethernet, 1GB or higher recommended
Hardware Requirements	x86_64 Platform, AVX 2 Support 6th Gen and above + Nvidia GPU
Frame Rate	Frame Rate > 10 fps
Database	Maria DB (X64) 10.3.13.0
Stand Alone version camera support	Camera Models from Axis, Pelco, Bosch, Hikvision, Honeywell, IQinvision, Sony, Dahua, Panasonic, Brickcom, Indigovision, Cisco, Samsung, Acti, Digital Watchdog, and others (ONVIF Cameras).
VMS Support	Honeywell DVM, Honeywell Maxpro, Milestone, Genetec, IndigoVision, ExacqVision, Cognyte (Verint), Bosch, Network Optix Note: With VMS all cameras supported by VMS will be supported
Reporting & Analysis Software	AllGoVision Alarm Centre

LPR- HOW IT WORKS

The video feed coming from IP camera is processed frame by frame for detection and recognition of license plate which has 3 steps involved in the process. The solution is based on deep learning and provides best in class accuracy

- In the step 1, the clear image captured by the camera is processed for presence of any vehicle license plate. On successful detection of license plate the detected license plate is captured. This step is known as License Plate Detection (& Capture).

- In the step 2, the captured license plate image is segmented into an optically recognized character string and alpha numeric values corresponding to the string are extracted.

- In the step 3, the license plate identity (the alpha-numeric code) is stored in the database. The user has options to manually examine the code and modify if required. There is option for the matching the extracted code with the existing entries in a list of registered license plates. Depending upon match or mismatch the license plate is recognized or unrecognized with respect to registered database.
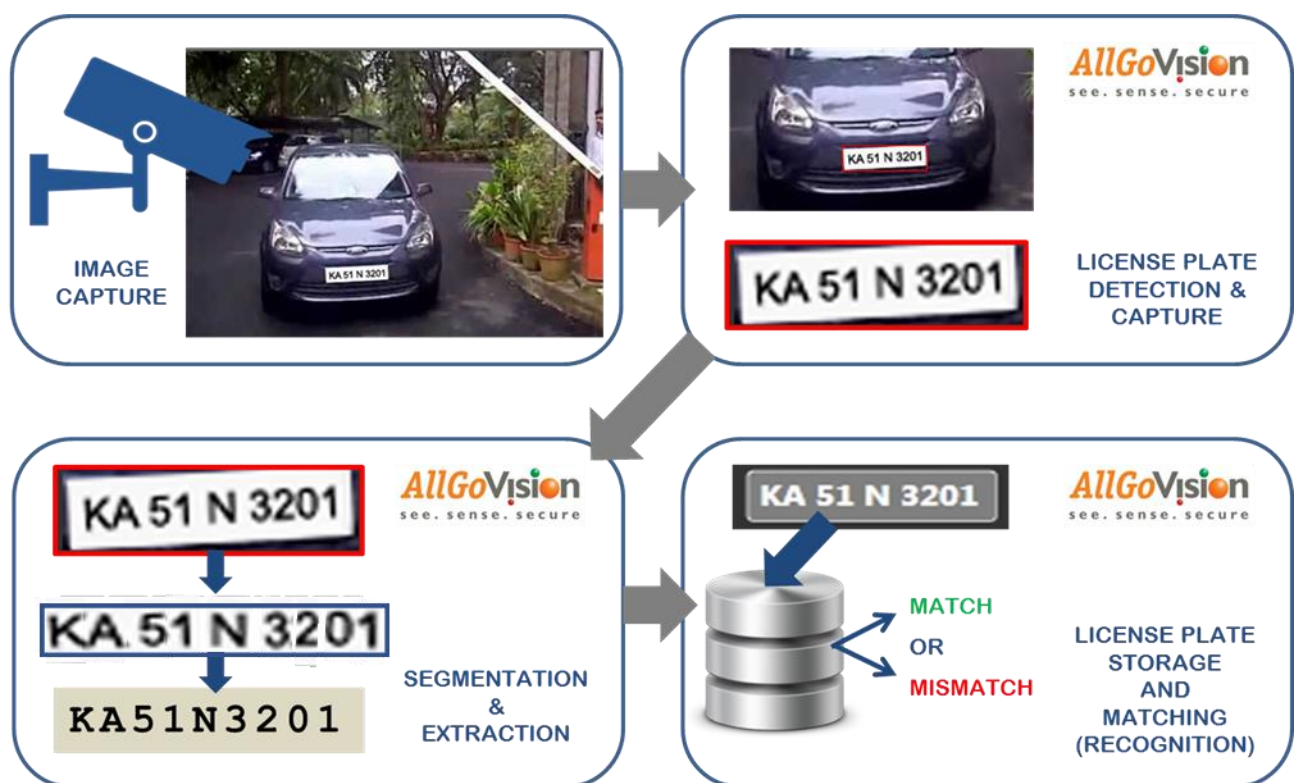
INSTALLATION

The software is easy to install and simple to use with intuitive GUI.

- Camera should be of good quality with high shutter speed. Full HD, 120 DB WDR, 30 fps Frame rate is required.

- Illumination should be Min 200 Lux. IR illuminator is required.

- **For Entry/ Exit:** For driver image along with captured license plate image, another angular camera should be installed at a height of 5-6 feet, focussing on the position where driver face would typically appear. Illumination should be Min. 200 lux for the face detection.
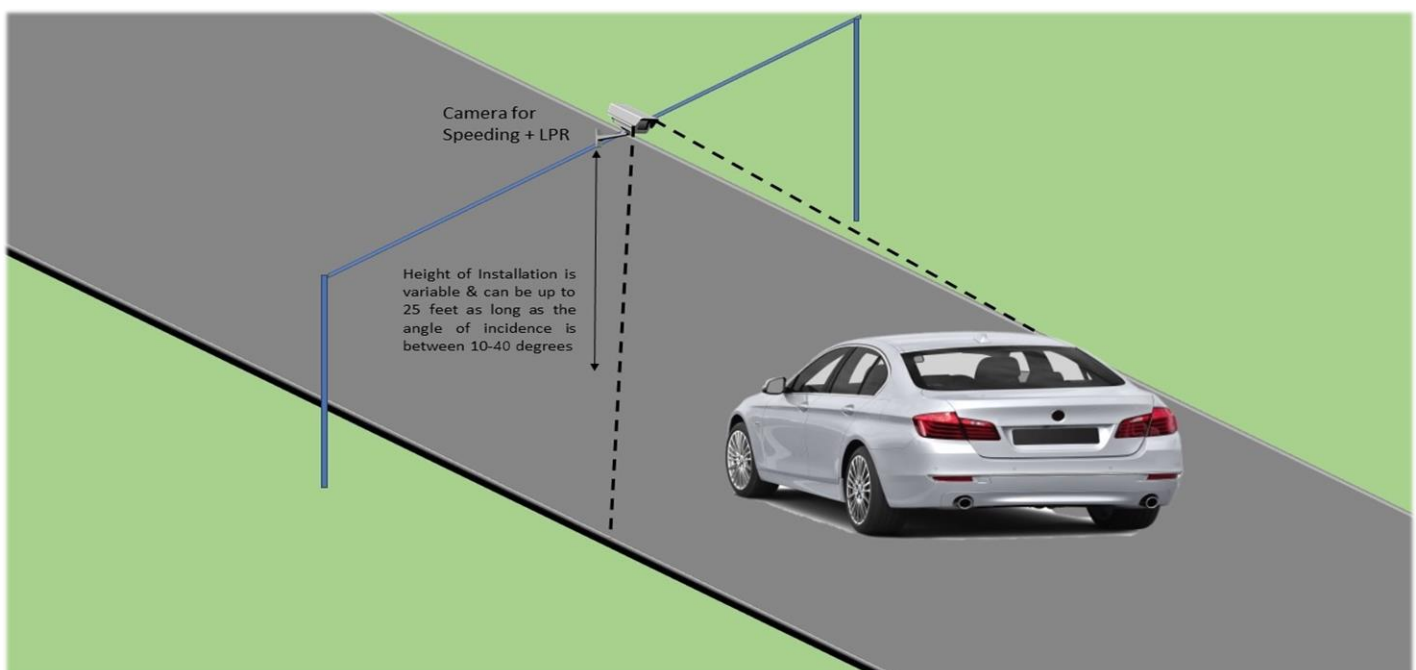
Cam (1)
For License Plate Detection & Recognition

Cam (2)
For Face Detection & Capture (Optional)

- **For Highway:** Height of Installation of the Camera is variable and can go up to 25 feet. The angle of Incidence should be between 10 to 40 degrees.

TECHNICAL HIGHLIGHTS

✓ High accuracy coupled with low complexity

✓ Works under difficult conditions like uneven lighting, partial shadows, dirt and glare as long as the numbers are readable by humans without ambiguity

✓ License plate can be located at any visible place on the vehicle

✓ Wide range of camera angles – up to 45 degrees vertical (elevation: θ), 45 degrees horizontal (azimuth: ϕ); can be extended even further for uniform traffic flow direction

✓ Detection works both day and night, even when vehicle is not clearly visible or occluded, but number plate is visible and readable

✓ Accuracy: 99+%, Recognition: 95+% (This accuracy is for unambiguously readable license plates. Some variations in accuracy is expected due to environmental conditions (lighting, blurring, noise), lack of sufficient computational resources, non-standard nature of plates or fonts, damaged/dirty plates, and country)

✓ Countries supported: GCC countries (Abu Dhabi, Ajman, Bahrain, Dubai, Fujairah, Kuwait, Oman, Qatar, Ras Al Khaimah, Saudi Arabia, Sharjah, UAE, Umm-Al-Quwain); Algeria, Brazil, Dominican Republic, Egypt, Finland, Hong Kong, India, Indonesia, Jamaica, Malaysia, Mexico, Philippines, Singapore, South Africa

Operating parameters

Parameter	Value
Min Plate width	75 pixels (1 row) 45 pixels (2 rows)
Min Character height	10 pixels
Resolutions supported (entry/exit)	Upto 4K
Resolutions supported (Road/highway)	Upto 1080p
IR Illumination	30-60 W
Camera angle	maximum 45 degrees elevation (θ), 45 degrees Azimuth (ϕ).

INTEGRATION FLEXIBILITY

AllGoVision License Plate Recognition application is available in 2 flavours:
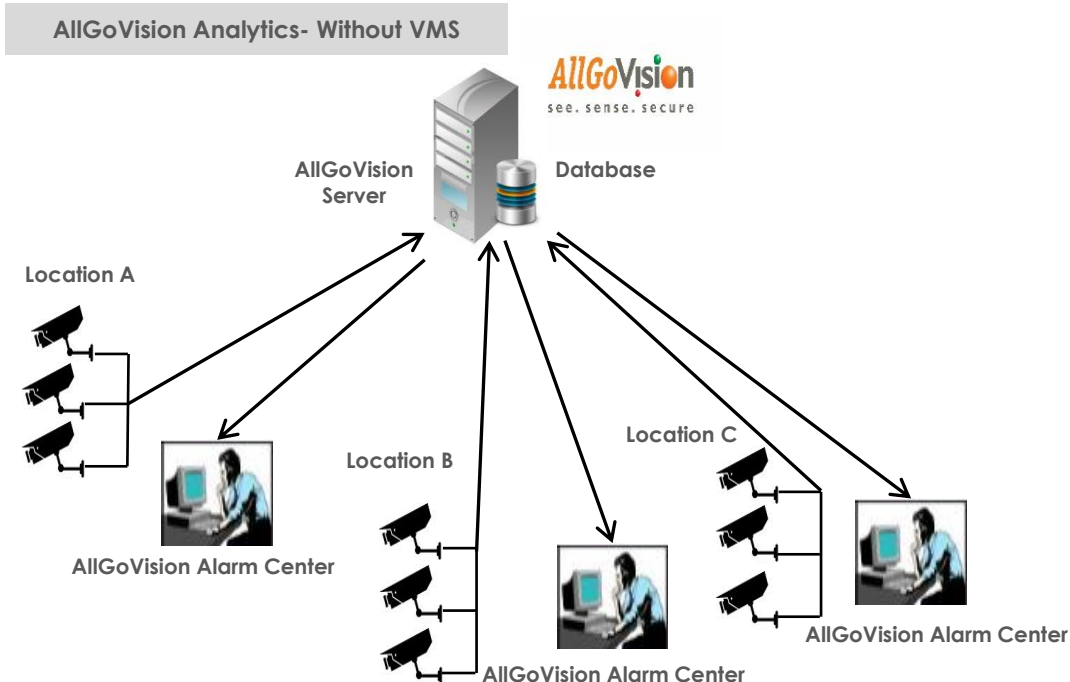
With VMS:

AllGoVision application is based on Open Platform Standards.

It is integrated with many open platform VMS.
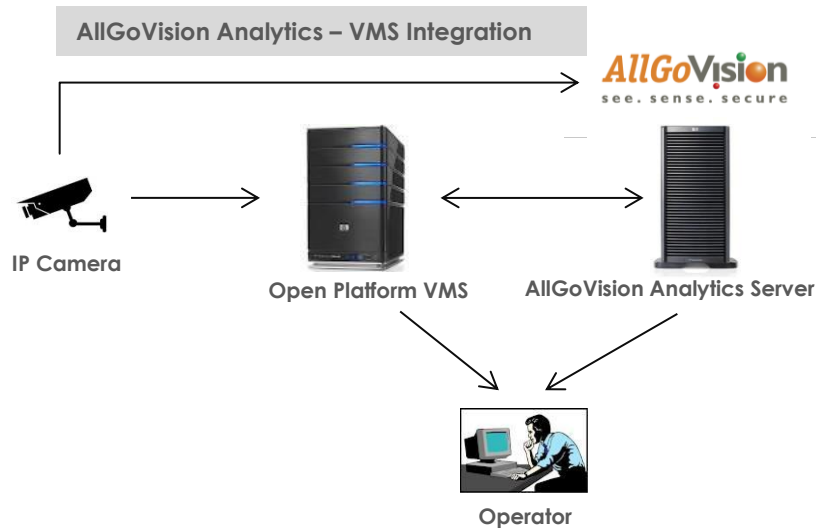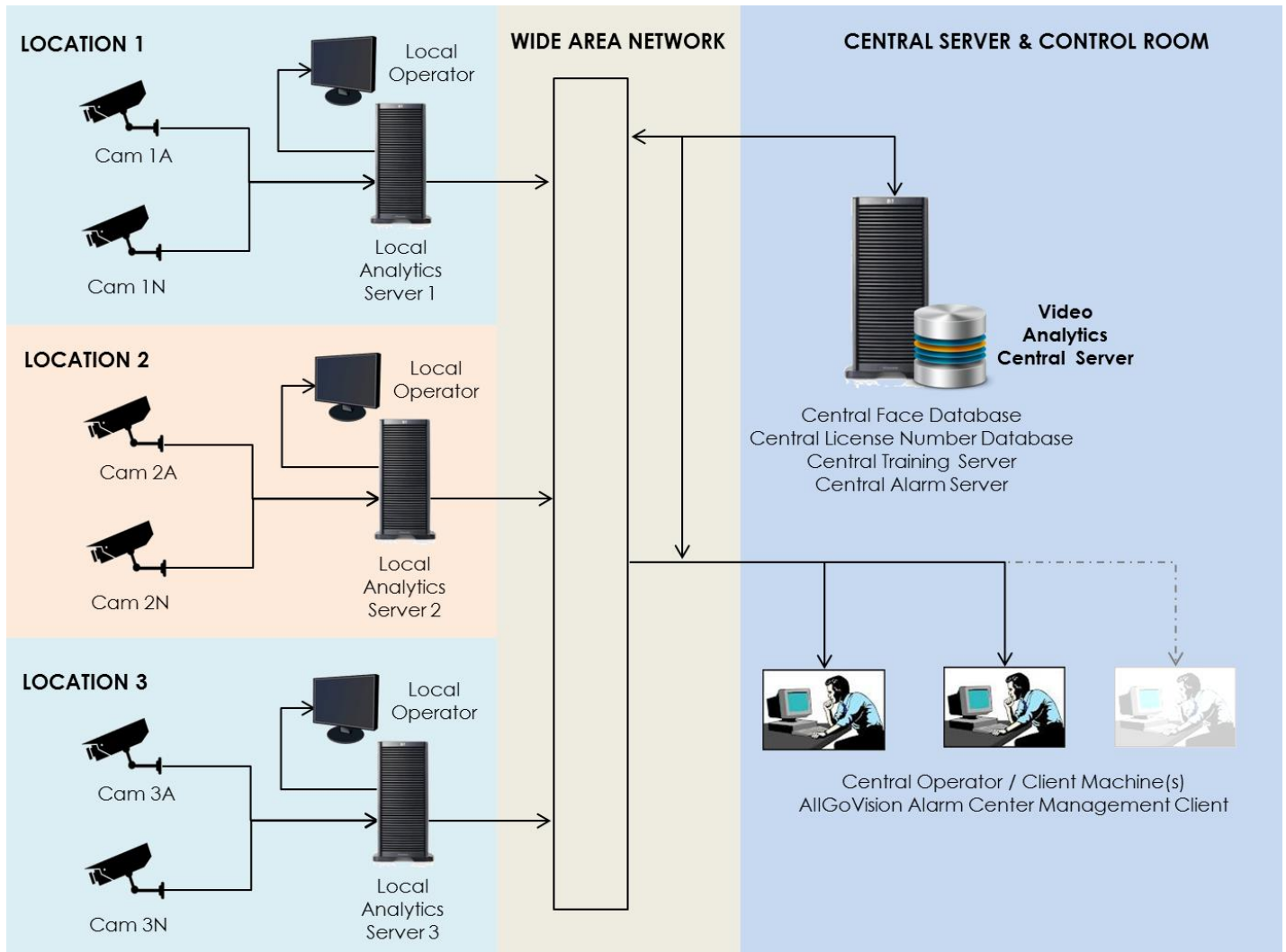

Without VMS:

- It is a standalone application.
- Directly takes the video feed from camera.
- The alarms and reports are seen in AllGoVision Alarm Centre.


Federated Architecture

- With Federated Architecture, analytics can be done at local servers and viewed by local operators.

- A central server with a central operator can view all the alarms in the system generated by all the local servers.

- Alarms from different clients can be seen at the central Alarm Centre and alarms are differentiated through Client IDs.


LOCATION 1

Cam 1A

Cam 1N

Local Operator

Local Analytics Server 1

LOCATION 2

Cam 2A

Cam 2N

Local Operator

Local Analytics Server 2

LOCATION 3

Cam 3A

Cam 3N

Local Operator

Local Analytics Server 3

WIDE AREA NETWORK

CENTRAL SERVER & CONTROL ROOM

Video Analytics Central Server

Central Face Database
Central License Number Database
Central Training Server
Central Alarm Server

Central Operator / Client Machine(s)
AllGoVision Alarm Center Management Client

Redundancy / Failover

- Config Server can be setup for active/passive redundancy. NLB is used to manage the Active/Passive redundancy. When the active Config Server is up, all requests will be serviced by it. Only when it is down, requests are serviced by the passive Config Server.

- For video analytics, redundancy is achieved by having redundant server capacity for N:1 or 1:1 redundancy. When one or more VA Servers fail, the analytics pertaining to the cameras running in that server are re-assigned to a pre-designated set of servers.
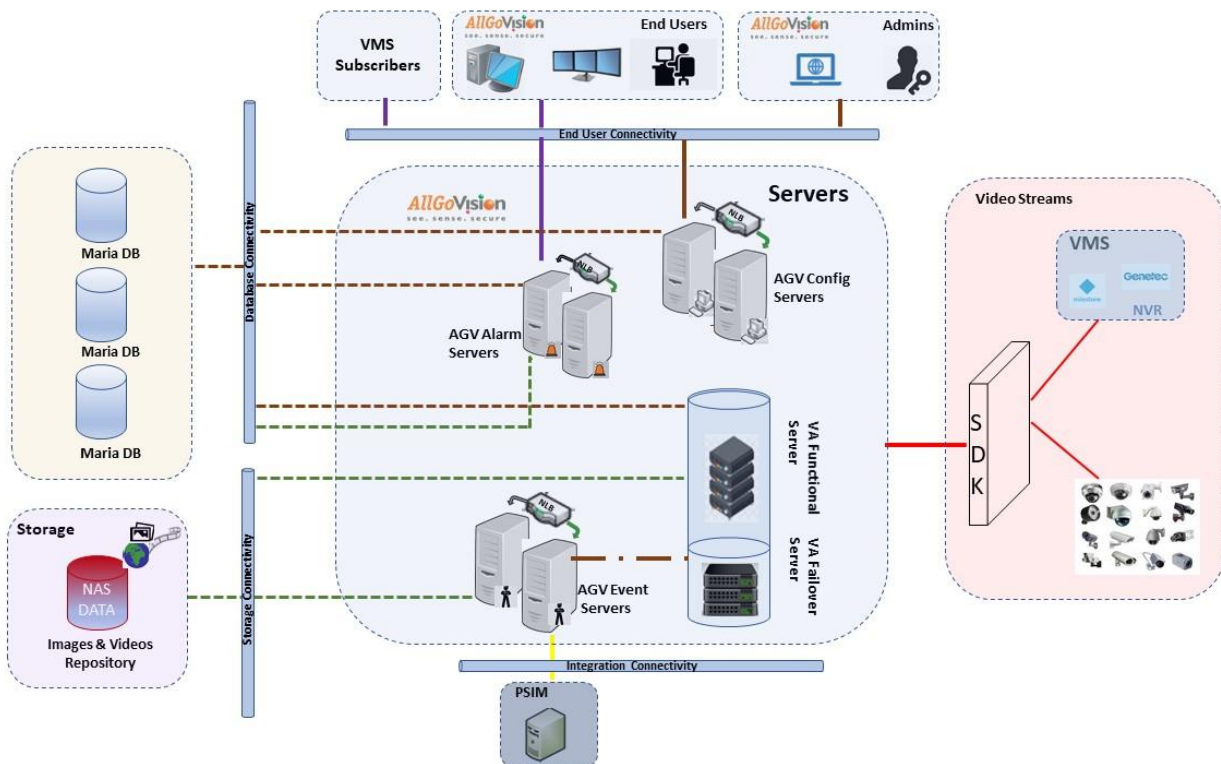
ALLGOVISION GUI

AllGoVision product offers a graphical user interface with the choice of native windows-oriented, tab based, point and pick interface along with the Web UI. The options are provided to add cameras directly or from VMS, provide configuration and view alarms whenever event happens.
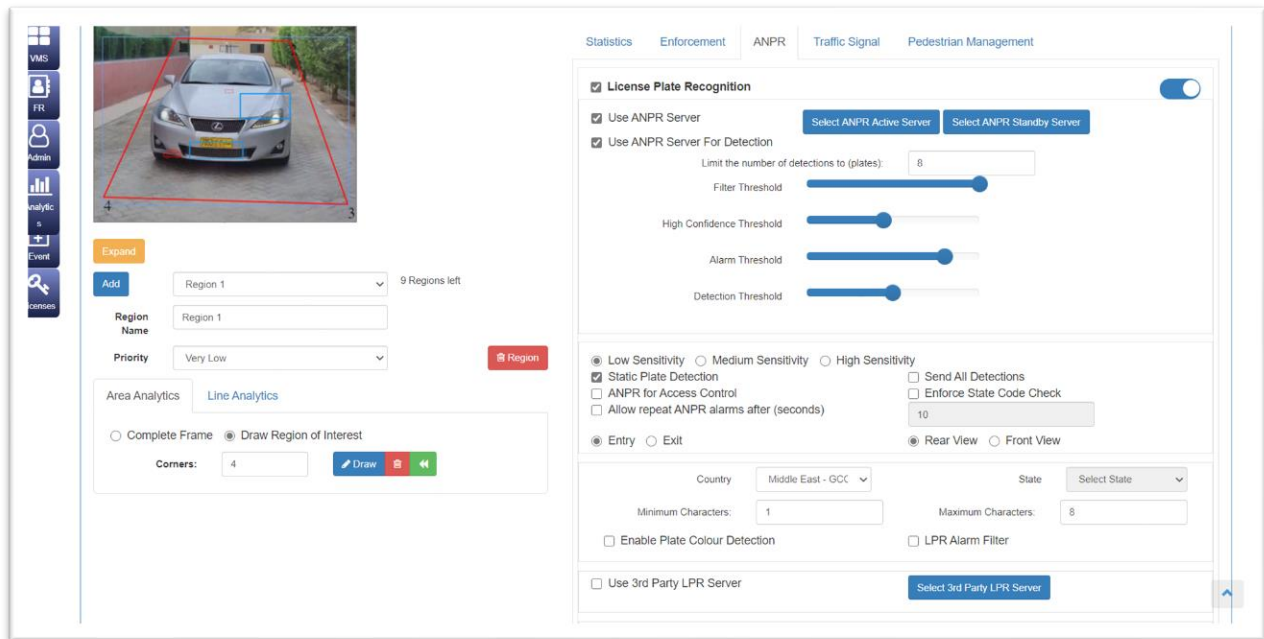
AllGoVision License Plate Recognition Configuration

ALLGOVISION ALARM CENTER

AllGoVision Alarm Centre is a Client to view all the alarms generated by AllGoVision analytics running on different systems across a LAN. It also supports report generation.

ANPR Alarm in Alarm Centre