videonetics
Look Deeper

Videonetics Traffic Management System

Version 2.0

Incident detection. Enforcement. Visualisation.

Rapid urbanisation comes with its own challenges

Regulating vehicular traffic movements on roads, highways, and large industrial complexes is required for the safe & smooth flow of vehicles while ensuring the safety of pedestrians. Traffic patterns differ from one location to another and enforcing a general guideline for traffic movement is always challenging. Adherence to these guidelines by the citizens needs monitoring while penalizing the offenders to discourage people from violating traffic rules.

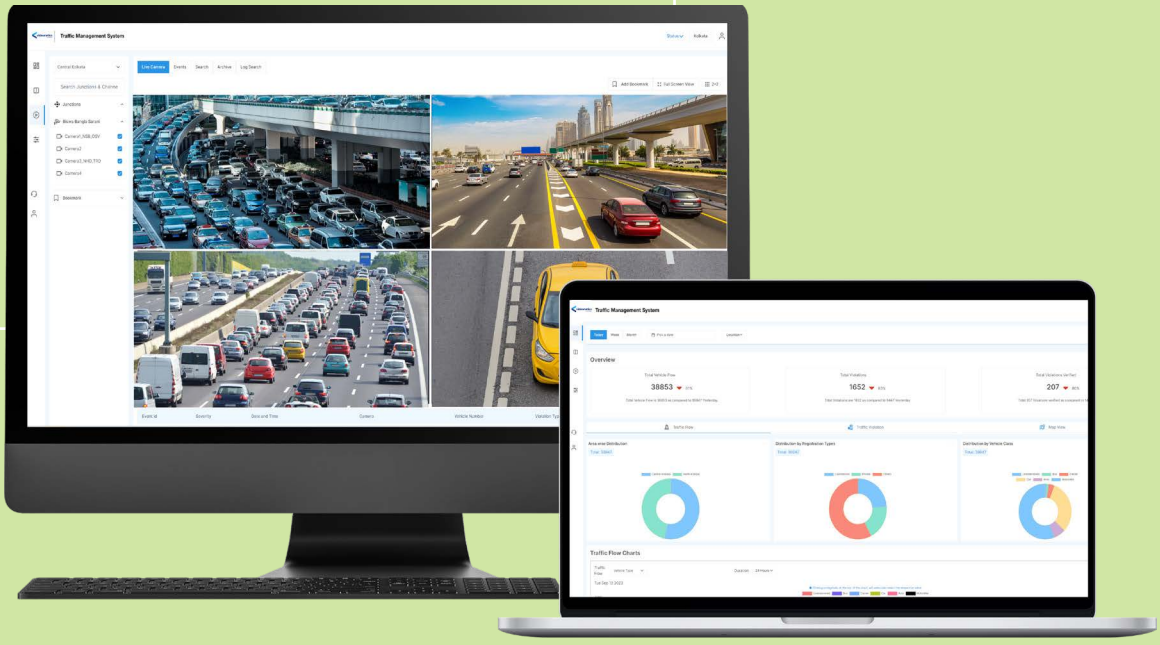
Along with other traffic control, management & enforcement systems, Video Management systems, and AI-powered Video Analytics applications backed by Automated Licence Plate Recognition (ALPR) have been deployed for a long time. But, though the system detects traffic violations and identifies violating vehicles, it often fails to provide an insight into overall traffic behaviour, patterns of traffic violations, or changes in traffic flow across locations. Therefore, traditional techniques have limited contribution towards strategic planning and traffic management.

Videonetics Traffic Management System addresses this with a distributed architecture. A Local Processing Unit (LPU) / Edge Processing Unit at each site runs video analytics and ANPR on-site and sends only actionable data to the central platform. This keeps bandwidth needs low, keeps processing running through network disruptions, and gives authorities consistent city-wide insight from every location.

We heard the needs of traffic management authorities.

What makes our traffic management solutions unique?

- End-to-end, true AI-powerded platform
- Smart dashboard & data visualisation platform
- Distributed computing for scalable deployment
- Traffic violations detection
- Multi-lingual license plate recognition
- Pre-Integrated E-Ticket Management system
- Vehicle count & classification
- Easy integration with vehicle & owners' database
- Our undisputed expertise & market leadership



One of a kind platform that empowers traffic authorities and city planners.

Application areas

Urban traffic

Typically deployed at road intersection, the system can detect multiple types of violations, e.g., Red light Jumping, Lane Violation, Driver on call, Driver w/o seatbelt, etc. Also, traffic signal controllers can receive vehicle flow data from the Traffic Management System for signal control. Cameras are installed at strategic locations for detection of speeding vehicles and for vehicle classification and counting.

Tunnels

Tunnels can be monitored with help of a series of cameras. Detection of poor visibility, over-speeding, Fire and smoke, presence of people, accident etc can be carried out effectively. Usage patterns of the tunnels across various time in a day and occurrence of congestion due to overcrowding of vehicles can also be detected and notified at the Central command center.

Highways and toll booths

Usually deployed in a multi-lane configuration, the system can be used for vehicle count and classification, detection of over-speeding, illegal lane change, vehicle congestion or slowing down, object fallen on road, polluting vehicles, vehicle stopped and accidents. Emergency call boxes can be integrated along with two-way audio communication for prompt help to people in distress.

Parking lots

Cameras can be installed at the entry and exit way of a parking lot and the duration of stay of a vehicle can be found for calculating fees. The system also notifies if there is no more free space beyond a given limit.

Available parking space across the city can be viewed in a GIS map and the information can be shared with citizens by integration of Videonetics Traffic Management System with Variable message display boards.

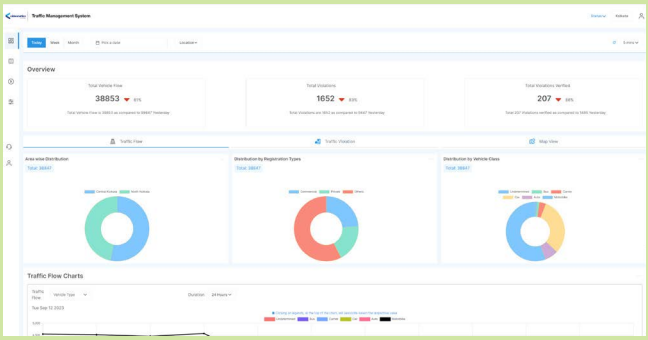
Smart dashboard and data visualisation platform

For data driven intelligent traffic management & planning

Videonetics' Traffic Management system receives video feeds from cameras and not only detects traffic violations and incidents but also generates data points related to changes in traffic density, headway, and traffic composition at various hours of the day. The analysis of such data could provide more insight into the overall traffic situation and changes thereof. A visualisation platform analyses the data using machine learning in multiple dimensions to represent it on meaningful graphical dashboards so that you can assess the traffic situation and take preventive measures before it is a catastrophe.

Data visualization

A Visualization dashboard keeps the officials updated on distribution of vehicles, distribution of violations and incidents across the city. You can apply various filters to visualize the trends and patterns related to traffic violations, incidents and vehicle flows, and compare the current trend with historical data.



Traffic flow statistics

In addition to detecting the various forms of violation and road behaviours, the Videonetics Traffic Management System also provides statistical analysis of traffic flow filtered by attributes of vehicles, e.g., Registration types (commercial, private, etc.), Classes (heavy, car, two-wheelers, etc.), Colours, Quality of number plates (clearly legible or not), etc. You can compare data across days, weeks, and months to understand the changes in traffic patterns in the city.

Videonetics traffic management system helps authorities to take informed decisions.

Distributed computing for scalable deployment

Receiving video feeds to a centrally hosted system from different cameras located in geo-separated areas across a city is a challenge due to the unpredictable nature and speed of the data network. Also, streaming all the cameras to a central location could cost dearly and sometimes a lot more than the cost of other infrastructure.

Videonetics Traffic Management System uses a distributed computing framework consisting of edge devices such as the Local Processing Unit (LPU) and centrally hosted servers to minimize the volume of data movement, improve efficiency, and remain economically sustainable. The system is developed on a scalable model to allow phase-wise implementation and expansion. It is of immense importance to cities and towns that expand due to the high rate of urbanisation.

Artificial intelligence at the core

Videonetics Traffic Management System is a product of insightful analysis of video metadata, trained with massive datasets of adverse demographic conditions, decade-long R&D efforts in computer vision, video computing, and advanced artificial intelligence and machine learning techniques.

The in-built AI-enabled video analytics (VA) engine analyses, extracts, and generates actionable information from a humongous amount of video or image repository.

Detect violations

Field-proven in diverse geographies and challenging conditions, our suite of video analytics is the reliable choice for Safe and Smart cities. Here's the list of common traffic violation use cases that Videonetics Traffic Management System is capable to detect.

- Red light / Stop line violation
- Speed limit violation
- Non-standard licence plate
- Driver not wearing seatbelt
- Driver using mobile phone
- Vehicle changing lanes
- Two-wheeler rider & pillion not wearing helmets
- More than allowed no. of pillion riders on a two-wheeler.
- Vehicle moving in wrong direction.
- Vehicle making a prohibited turn
- Stationary vehicle

Connect with us to explore more Traffic Management System use cases.

Highway traffic monitoring

Not only do highways empower individuals with personal mobility, but they are also a must to maintain a competitive edge in the contemporary fast-paced business economy, where the expediency of travel is a necessity. In addition to the common form of violations listed above, certain use cases have been developed keeping in mind the modern-day highways and expressways.

- Video-based spot & average speed detection
- Speed limit management (based on vehicle class)
- Lane monitoring & violation
- Detect obstructions
- Detection of unauthorised vehicle category
- Average corridor speed management (by vehicle category)
- Vehicle stopped/ Needing assistance

Automatic licence plate recognition

Our Traffic Management System comes embedded with our own Automatic Licence Number Plate Recognition (ANPR/ALPR) application that automatically captures the licence plates of any vehicle irrespective of the type of vehicle – private car, taxi, bus, truck, auto rickshaw/ tuk-tuk, two-wheeler, etc

ANPR/ALPR application works on optical character recognition (OCR). Every country or its member state defines a specific template of licence plates for the vehicles registered in their jurisdiction. OCR algorithm processes captured images or video footage to recognize the licence plate characters.

Multi-lingual ALPR / ANPR

Our ALPR/ANPR technology can read the licence plates of many countries, and we continue to add more with each passing day. The ALPR/ANPR engines are re-trainable with country-specific OCR data for increased accuracy in reading the number plate.

Multi-lane ALPR / ANPR

A single camera can be used to cover multiple lanes, thus reducing the cost of ownership. Among other installation factors, the number of traffic lanes possible to cover using a single camera depends on the size of the license plates, resolution, and fidelity of the video.

Monitor, detect and report

Monitor. Record. Replay.

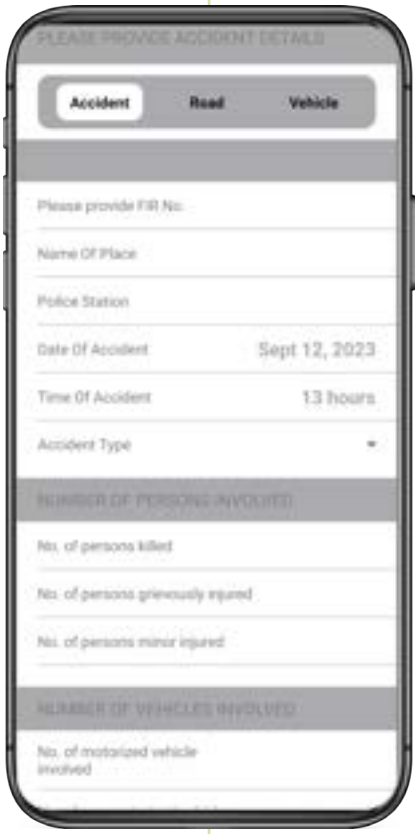
View Live video streams of cameras in a matrix layout. Store & replay the video streams from associated storage, and from any given timestamp. Download selected video segments from recorded video streams for sharing with appropriate authorities. Control PTZ cameras from the user interface or move to specified PRESET.

Realtime incident detection

Detect various incidents like stationary vehicles, congestion, accidents, pedestrians on the road, etc. The system also analyses the video feeds to detect visibility on the road, as low visibility may lead to accidents. Integrate IP speakers and variable message boards to alert people about any incident up-ahead or if the visibility falls below a threshold.

Incident reporting

Videonetics Traffic Management System mobile application has an in-built incident reporting interface that field officers can use to report accidents to the command-and-control center. Capture images using phone cameras and describe the incident textually with details. The data is sent to the central command center for instant action and stored for future investigation.



Take informed decisions as events unfold.

3rd party integrations

Traffic controller

Videonetics Traffic Management System counts and classifies vehicles, and this data may be passed to external systems over API in situ. For example, this provides data to Traffic signal controllers for better control of traffic signals based on the presence and movement of different vehicle types.

Radars

Besides being self-sufficient for video-based vehicle speed detection, Videonetics Traffic Management may integrate with 3D and 4D RADARs. Information related to number plates and other attributes of vehicles is combined with RADAR-generated speed data to compose a single unit of information and stored in the database.

Emergency call box

Videonetics Traffic Management System can associate cameras, both Live and PTZ, with ECBs or Panic buttons so that the application can instantly stream video of the location to the Command center upon receiving a signal from ECBs or Panic buttons.

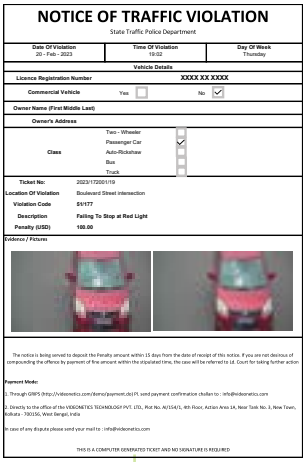
Pre-integrated e-ticket management

Traffic enforcement authorities today require an efficient traffic management system that not only detects traffic violations & identifies the offenders but also facilitates the enforcement. Videonetics Traffic Management System comes pre-embedded with an e-ticket management system designed to enhance the administration of generating E-tickets for penalising traffic violators and habitual offenders.

From issuance to ticket tracking and payment status, the application streamlines the entire process of generating & managing tickets. The system can be linked to a payment gateway portal for the offenders to pay their penalties. The application can also be installed on a handheld terminal or PDAs for the on-duty cops to issue violation tickets to offenders on the spot.

Key highlights

- Easy integration with vehicle and owner database
- Automated, semi-automated and spot mode of operation
- Secure web access
- Mobile user authentication and mobile device authorisation for HHT/ PDA
- Ticket traceability
- Multiple ticket printing options
- Integrate with payment collection system and third-party web portals
- Customizable e-ticket template


NOTICE OF TRAFFIC VIOLATION

State Traffic Police Department

Date Of Violation	Time Of Violation	Day Of Week
20 - Feb - 2023	19:02	Thursday

Vehicle Details

Licence Registration Number	XXXX XX XXXX
Commercial Vehicle	Yes ☐ No ☑
Owner Name (First Middle Last)	
Owner's Address	
Class	Two - Wheeler, Passenger Car, Auto-Rickshaw, Bus, Truck
Ticket No:	2023/17200119
Location Of Violation	Boulevard Street intersection
Violation Code	51/177
Description	Failing To Stop at Red Light
Penalty (USD)	100.00

Evidence / Fixtures

The notice is being served to deposit the Penalty amount within 15 days from the date of receipt of this notice. If you are not desirous of compounding the offence by payment of fine amount within the stipulated time, the case will be referred to Ld. Court for taking further action

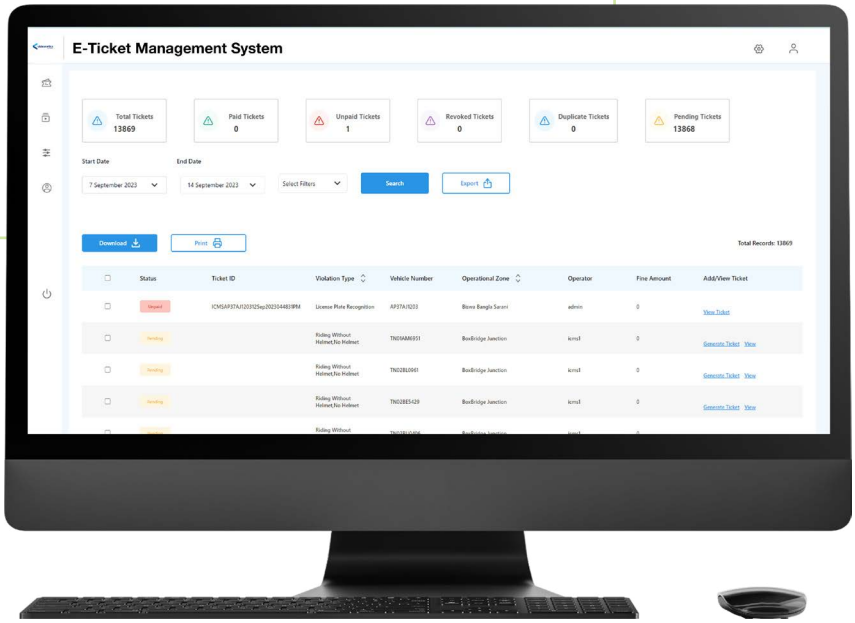
Payment Mode:

1. Through GWS (http://videonetics.com/demo/payment.do?), send payment confirmation challan to : info@videonetics.com

2. Directly to the office of the VIDEONETICS TECHNOLOGY PVT. LTD., Plot No. A/154/1, 4th Floor, Action Area 1A, Near Tank No. 3, New Town, Kolkata - 700156, West Bengal, India

In case of any dispute please send your mail to : info@videonetics.com

THIS IS A COMPUTER GENERATED TICKET AND NO SIGNATURE IS REQUIRED



Cyber secured

Rugged & tolerant

AI algorithms of Videonetics Traffic Management System analyze the attributes of deployed servers, storage, network communication bandwidth, and other integrated devices to intelligently assess the capability of those devices and services to offer a fault-tolerant, fail-safe, responsive, and rugged system for intelligent video management.

Data safety, security, privacy

Data encryption and its transmission over secured channels ensure data security at rest and on the move. Our trained AI engines are also encrypted to protect them from tampering. Videonetics Traffic Management System handles cybersecurity threats with multi-pronged security measures to ensure user data privacy, security, and integrity when data is at rest, in motion or in use.

Tested for vulnerabilities

Videonetics software applications are certified for OWASP compliance, and its client applications are continuously tested for any venerability. All communications amongst different servers, and between servers and clients take place over encrypted channels and are authenticated by exchange of certificates.

Our philosophy

- Secure development
- Secure deployment
- Operational endurance
- Rapid response

Key specifications

OS & hardware supported	• Windows, Linux • Containerization and virtual machine supported, both in Windows and Linux OS • MS-SQL, MySQL, PostgreSQL, Oracle databases • Supports Commercially Off-The-Shelf (COTS) hardware and storage • Local Processing Unit (LPU) / Edge Processing Unit for on-site video analytics and ANPR • Firefox, Chrome, Safari, Internet Explorer, Microsoft Edge, Opera • ONVIF-conformant for profiles S, G, T and M NVIDIA, Intel HD Graphics and QuickSync hardware decoders. • Android and iOS Mobile Apps
Architecture and platform	• Standalone and federated architecture • Simultaneous multi-site monitoring • Back-up multi-sites data to central location • Failover, fail-safe, and High Availability (HA) features • Flexible and scalable Disaster Recovery (DR) system • Direct interface to S3 object storage of cloud • Unique master-master configuration of two systems with data synchronization • Time synchronisation with NTP
Deployment capabilities	• Single site on-premise, on-cloud, hybrid • Multi-site with central command centre at cloud/data center/hybrid
Security and encryption	• Multi-factor authentication • Integration with multiple directory access protocols, for single sign-on • Secured TLS 1.3 protocol for server-client communication • Video watermarking and encryption support for video recording • Secured HTTPS protocol for integration with external systems through API • Encryption of video files, critical system information and AI models to prevent tampering • VAPT certified to confirm resilience against cyber-attacks

Monitoring	• Unlimited cameras • Unlimited Users • Supports WebRTC and HLS (for mobile and web app) • Sequence view, matrix switching with configurable dwell time • Video-wall support • Supports multiple monitors, each one with different camera matrix • Simultaneous view of live and recorded video on the same view panel • Multi-camera time synchronized replay for better situational awareness • Supports multiple streams from a single IP camera or encoder • Bandwidth adaptive streaming with or without transcoding • Multicast support • Matrix switching among bookmarks, with pre-determined time • Variable playback speed • Multi-channel video weaving and record as a single video file • Digital zoom function • Instant snapshot from the live camera view • Access right hierarchy based PTZ control • Integrated archive player within the client • Export video in multiple formats (MP4, MJPG, AVF, AVI), frame rate (full/half) and encryption • Export single frame of the video in BMP, GIF, TIF, JPG and PNG formats. • Video Compression - MJPEG, H.264, H.265, H.265+, ZipStream • Video cart to download multiple archive video clips • Report on the downloaded video • Region selection with intelligent grid for smart motion search by time, sensitivity and interval • Colour and activity search in archive video • Timeline to indicate the availability of recording, motion or event • Video watermarking • Export recording details in a spreadsheet, with details of each of the video segments • Automatic/manual selection of hardware/software accelerator decoder • Print surveillance report with a snap and camera specific information and user notes • Supports transcoding for bandwidth adaptive streaming • Thumbnail search for fast investigation of incidents
Maps	• Integration with multi-layer sitemaps, GIS, Google map, static maps • Camera navigation using the pencil tool • Camera live view and recorded video replay on maps • Camera event notifications on the maps • Display map on a separate monitor

Storage, recording, data protection, disaster recovery	• Supports local storage/DAS/SAN/NAS • Hierarchical storage deployment, with independent data retention at different layers • DC-DR architecture for data replication and flexible business continuity options. • Supports multiple recording schedule configurations • Start/stop parallel recording for any specific camera • Supports configurable video retention policy for every camera • Profile G compliant for fetching recordings from camera SD cards. • Supports data purging on FIFO or retention basis • Supports motion activated and Event activated recording • Alert when storage space reaches a pre-defined threshold
User management	• Role-based access control, with multiple user categories • Flexibility to modify access rights for specific system roles • Restricted access to cameras for selected users • Locking user access from designated devices only- specific mobile phone or workstation • Co-operators or system users can communicate via in-built operator messaging tool • Operator screen can be recorded and imported for supervision by supervisor • Standard Operational Procedure (SOP) workflow for the ease of the operator • User activity audit trail • LDAP and AD integration • Forced logout for any operator by his superior • Escalation messages if operator is nonresponsive
Types of traffic violation detections	• Red Light / Stop Line Violation • Speed Limit Violation • Dilapidated/ Missing / Non-standard Licence Plate • Driver not wearing seatbelt • Driver using mobile phone • Vehicle changing lanes • Two-wheeler rider & pillion not wearing helmets • More that allowed no. of pillion riders on a two-wheeler. • Vehicle moving in wrong direction. • Vehicle making a prohibited turn • Stationary vehicle • Video-based Spot & Average Speed Detection • Speed Limit Management (based on Vehicle Class) • Average Corridor Speed Management (by Vehicle Category) • Detection of unauthorised vehicle category • Lane driving • Detect obstructions

Notifications & alarm management	• Send alerts via SMS, & Email • Create recipient group email IDs and phone numbers • Transfer or escalate event alerts to administrator • Trigger and create incidents on recorded or live video • Alert notification with sound and pre-recorded voice messages, along with audio and video annunciator integration
E-ticket management	• Central web-based interface for administration • Can be easily installed in any web server • Android-based mobile app for compatible smartphones, handheld device/ PDA • Vehicle database integration • Web API based framework • Web service-based architecture to support receipt of data from different system • User management - Pre-defined user roles • Role-based device user authentication • Unique identifier assigned to each ticket • Identify and search history of offences – by device, location, offender, device user, generation type • Ticket traceability - by unique identifier • Ticket tagging to issuing officer's details, time stamp • Digital signature signed by the responsible authority • Detailed MIS reports based on type of offence, location, officer, offender etc. • Pictorial evidence embedded with each Ticket • Manual ticket generation - Upload images and text to generate challans/ tickets • Web-based data entry for manual ticket generation
Data visualisation/ dashboard	**Analyse** • Total Vehicle Flow • Traffic flow by Vehicle Class (Cars, Buses, Trucks, Motorbikes etc.) • Traffic flow by Vehicle Registration type (Private, Commercial, Public, etc.) • Total and Verified Violations • Area-wise Traffic Situation & Traffic Rule Violations recorded. • Traffic Rule Violations by vehicle class and registration type. **Compare** • Visually comprehensible trend comparison, across date range. • Trend comparison can be performed on variety of data buckets like • Traffic Flow by Registration Type & Vehicle Class • Traffic Violations by Registration Type, Vehicle Class & Violations Type • Location & camera specific Traffic flow & violations.

	Map view • Get a bird's eye view in the form of a Map to see key data points. • Select cameras on the to view Traffic flow distribution according to the vehicle class and Traffic violations - distribution according to violations type
System health monitoring	• Health status monitoring & display for all components. • Reports camera uptime availability, camera recording percentage and status, critical events, incident video, camera performance data with resolution, frame rate and network usage • Allows operator to raise a support ticket from the interface console, attaching screenshot and details of the issue • Dynamic visual indication on the camera icon to display camera status.
External device integration	• Universal device integration framework- both PUSH and PULL modes • Open to any IP camera, encoder integration • IP speaker, two-way audio integration with cameras • Integration support with command-and-control centre application to share live video, recorded video clips, alarms and alerts with timestamp and source information • Integration support with RADAR, access control, perimeter intrusion detection, physical access control barriers, SCADA, BMS, TAS, POS devices, DI/Dos etc. • DVR, NVR and multi-lens camera integration support • Supports Open API standards (REST and WEBSOCKET) • Supports USB, joystick, surveillance keyboard

videonetics
Look Deeper

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