VGO DATA ACQUISITON SYSTEM FOR FREE FLOW TOLLING

A Sophisticated Technology with a User-Friendly Design

The Expert in Tolling System Development

As a leader in intelligent transportation and toll payment service for over 20 years, Autotoll is one of the largest service providers in Smart City Development, especially in Smart Mobility and Smart Living solutions.

SOLUTION

Detection I Processing I Central System

The ALL-IN-ONE Solution and Customization can overcome any site and environmental constraints, ensuring high-quality service.

PERFORMANCE

High Speed I Traffic (Contraflow) I Easy Maintenance

The Data Acquisition System (DAS) can deliver high performance to capture information from detectors and sensors in different scenarios and generate records for processing.

FLEXABILITY

Automatic Vehicle Identification (AVI) I
Automatic Vehicle Classification (AVC) I
Automatic Number Plate Recognition (ANPR) I Video

The software components are configurable, flexible and scalable to adopt wide-range of devices and detectors for the increase in demand, changes in the nature of demand, additional future services and geographic expansion.

FUNCTIONALITY

Vehicle Processing I Spatial Matching I
Data Integrity & Completeness I Enforcement

The system consists of a number of key modules. Each detector, sensor and interface is properly defined. This ensures the flexibility of future upgrades, and the smooth integration for future front-end implementation.

HIGH AVAILABILITY AND RELIABILITY

Active-Active / Standby Controllers I Parallel Architecture

The system Roadside Equipment (RSE) is designed that there is no single point of failure in particular that no failure of a single detection element, ensuring no vehicle passage and transaction are lost.

EXPERIENCE AND LEADERSHIP

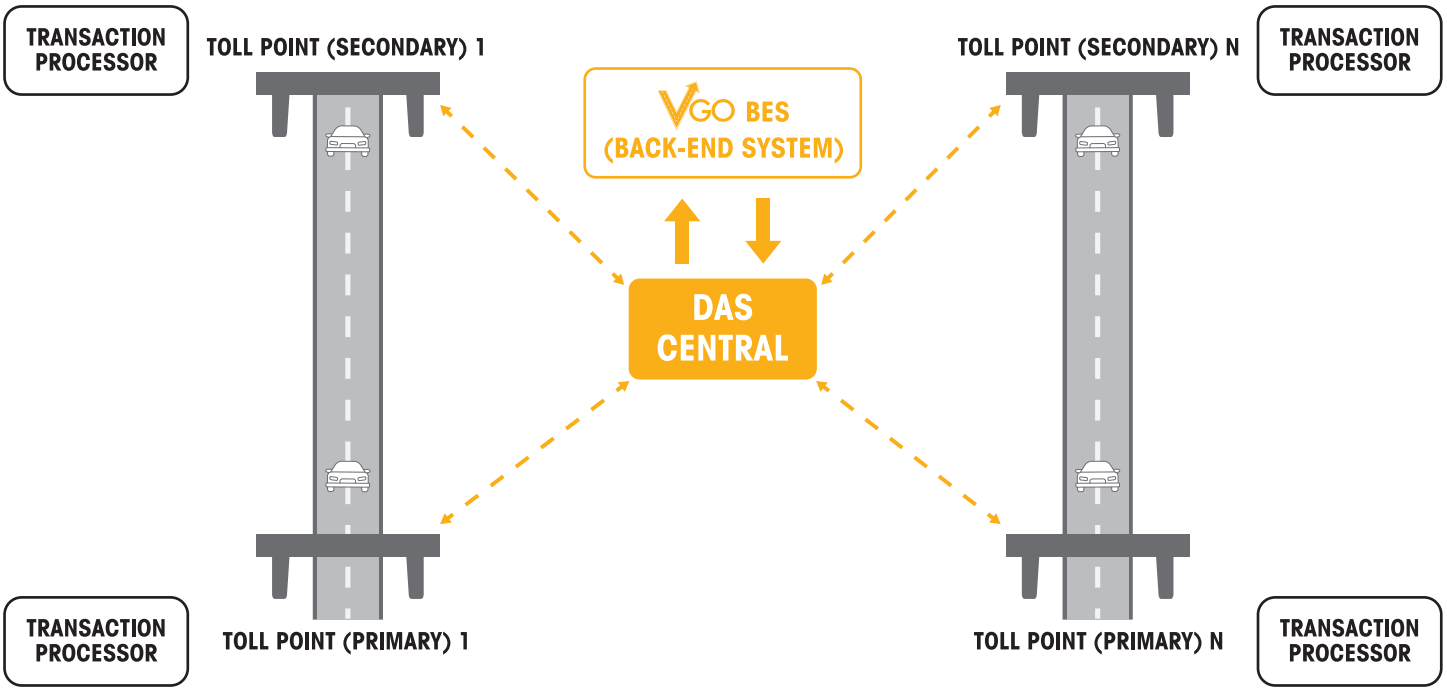
We have a sizeable team of Engineer, Developer and Device Integration Experts with 20 years' experience.

Powered by

Autotoll

VGO DAS Package

VGO DAS PACKAGE COMPOSES OF THREE (3) SOFTWARE MODULES:

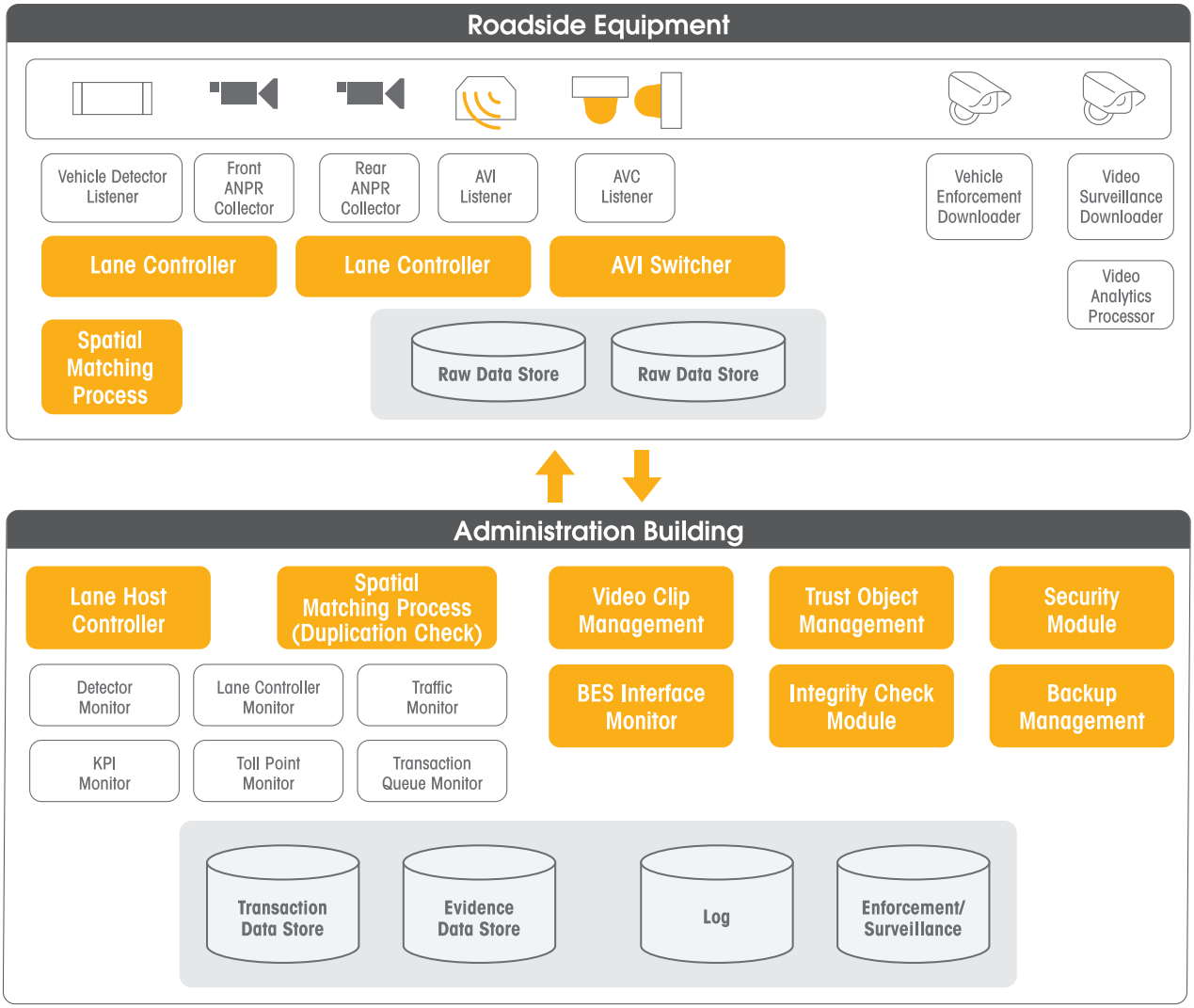


1. DAS Central

- Data hub for DAS to the back office (backend system) API Interface
- SOAP communication protocols with data format that complies with standard XML requirements
- Supports data exchange for transactions, video enforcement and toll point surveillance
- Supports accurate GPS/NTP time synchronization
- Supports Toll Points Interchange based on system availability from "Management Tools"
- Supports Data Recovery and Back-log Clearance after faulty Toll Points resume-to-normal
- Supports both Server-based and Cloud Computing implementation
- Supports local database and cloud-based storage
- Supports various encryption processes with regular updated keys, security certificates or trust objects from the backend or back office
- Allows backend "Off-line" operation
- Specially designed, encrypted and dedicated link for authorized remote access (separated links for maintenance, operations and data auditing)

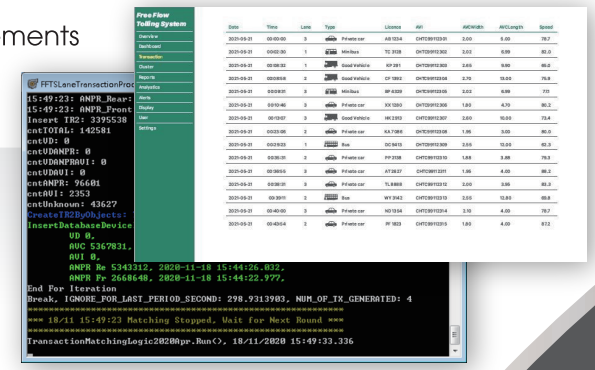
System Architecture

The Software System Architecture Diagram of DAS software is presented as below. In the diagram, the major data storage, data flow and process are performed by the DAS Central, Transaction Processor, and Management Tools.



2. Transaction Processor

- Processes Vehicle Passage and Spatial Matching
- Builds Transaction Record
- Builds Record of Image or Other Evidence to Transaction Record
- Supports Contraflow Traffic with automatic detection
- Ensures Data Integrity for various business requirements



Transaction Processor

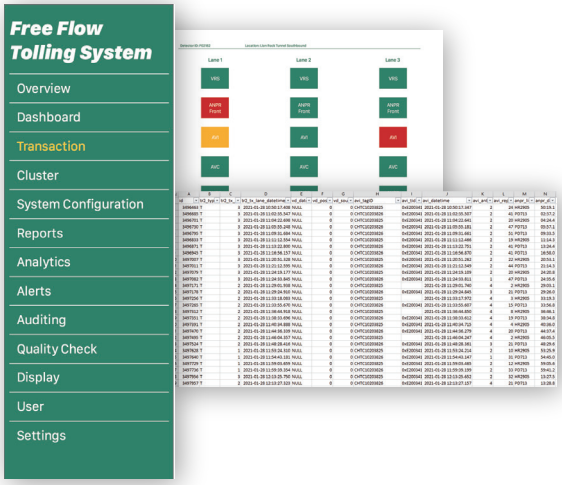
Processes the vehicle passage and generates the Transaction and Evidence Record for back office processing. Flexible Integrity Check for various business logic.

3. Management Tools

- Dashboard and Instant Monitoring to all various detectors, devices and system performance
- Configuration Management
- Provide Reporting Tools for various types and formats
- Provide record review to evidence image, video and transactions
- Real-time quality check/assurance and auditing platform for operators
- Real-time Manual Review process for exceptional case handling
- Support data storage for system auditing process ("Ground-truthing")
- Allow storage of reviewed results for "Deep-learning" process to enhance sequential Optical Character Recognition (OCR)/ Video Analytics performances (Optional)

DAS Central and Management Tool

Providing management tools for system maintenance, configuration, operation, reporting and auditing in a convenient way.



Dashboard and Performance Monitoring

Various monitoring displays and dashboards of the DAS Central and Roadside equipment to display instant devices and system status and performance.

Functionality, Performance and Security Assessment by

Protiviti Hong Kong Co. Limited

The assessment was completed on the **Free Flow Tolling System ("FFTS") DAS system** design which the solution had been appropriately designed with the particular vehicles detection, and spatial matching capability.

ADVANTAGES

1. MODULAR DESIGN

Each detector, sensor, interface with a backend system is properly defined. This ensures the flexibility of future upgrades, and the smooth integration for future front-end implementation. The DAS consists of a number of key modules. They are:

(a) **Vehicle Passages Capturing** – capturing the information from detectors and sensors and generating unique transaction ID for future processing, i.e. the Video Detection (VD), AVI, ANPR, AVC, Vehicle Video Clips, etc.

(b) **Vehicle Passage Data Filtering & Recording** – forming vehicle passage-related records and image-based evidence.

(c) **Transaction and Vehicle Passage Processor** – perform spatial matching based on captured data/information (i.e. the AVI, AVC, Camera System) and building Transaction and Evidence Records.

(d) **Data Integrity Checking** – automatically checking the data generated for assembling the Transaction Record and Evidence Record based on specific relevance and applying flags for further review for lack or violation of relevance between such data.

(e) **Masking & Encryption** - encrypting images with the mask coordinates information, data records also encrypted and Vehicle Registration Marks (VRMs) would be hashing for ensuring high data security and personal data privacy.

(f) **Transaction and Evidence Record Storage and Transmission to Back Office** - send the encrypted records/data to the back office for near real-time subsequent toll collection processing in a secured network through the API Interface.

2. HIGH AVAILABILITY BY REDUNDANCY

The DAS RSE is designed that no failure of a single detection element could prevent the capture of data. This ensures there are no missing vehicle and transaction record.

3. HIGH DATA SECURITY

- The Transaction and Evidence Records are encrypted and authenticated, in accordance with the data security obligation of the Personal Data (Privacy) Ordinance.
- Camera System supports trust objects such as certificate to encrypt image or build secure connection.
- Cyclic Redundancy Check (CRC) calculates to ensure no modification after generating and encrypting the records.

4. SPATIAL MATCHING

The DAS performs automated checks on the data generated for assembling the Transaction and Evidence Records from the raw records of detectors.

5. SCALABILITY

The DAS is configurable, flexible and scalable for the increase in demand, changes in the nature of demand, additional future services and geographic expansion.

6. FUTURE UPGRADES

Protection mechanisms implemented for evidence information protection will receive upgrades for higher level of security in the future.

*All images are for reference only.

AUTOTOLL'S UNRIVALLED EXPERIENCE

Your Strategic Partner

The flexible design and advanced technology of our VGO Free Flow Tolling System can be applied to multiple situations in Smart City Development, such as:

Free Flow Tolling

Electronic Road Pricing

Real-time Traffic Monitoring

Access Control and Surveillance

Parking Access

Autotoll is a proud partner of many public and private Smart Mobility and Smart Living projects.

Awarded Government Contracts

- Traffic Control Surveillance System of the Hong Kong-Zhuhai-Macao Bridge
- Traffic Detectors for Strategic Routes
- Journey Time Indication System
- Speed Map Panels
- Hong Kong e-Transport Kiosk

Business Smart Solutions

- Smart Property Management Solutions
- IoT Solutions
- e-Wallet
- EV Charging
- AutoPark

DRIVING INTO A SMART FUTURE

Scan to know more about our VGO Free Flow Tolling System:

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