LOGIPIX



About LOGIPIX

Logipix is a global developer and manufacturer of industrial-grade, AI-powered video surveillance solutions, founded in 1996. Logipix International Corporation designs and delivers high-end, application-specific systems for complex operational environments. Logipix serves international markets through close cooperation with partners and customers worldwide, focusing on reliability, scalability, and long-term performance.

Digital Tower Video for ATC

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The Challange of Modern Air Traffic Control

Air traffic demand continues to increase, while airports and Air Navigation Service Providers face mounting pressure to improve efficiency, maintain safety, and optimize infrastructure investments. Conventional air traffic control towers remain a critical element of airport operations, yet they introduce significant limitations. Physical tower construction and modernization projects require substantial capital investment, lengthy implementation timelines, and carefully selected locations to ensure unobstructed visibility. At the same time, airports must prepare for operational disruptions, equipment failures, maintenance activities, adverse weather conditions, and changing regulatory requirements. For regional airports, maintaining a fully staffed control tower can present an additional economic challenge. As traffic volumes fluctuate and operational demands evolve, organizations are seeking more flexible and resilient approaches to air traffic control. Digital Tower technologies have emerged as a key enabler of this transformation. However, replacing tower windows with cameras alone is not sufficient. Controllers require a digital environment that delivers exceptional image quality, continuous situational awareness, minimal latency, and intelligent operational support.

Logipix DTVA was developed specifically to meet these requirements.

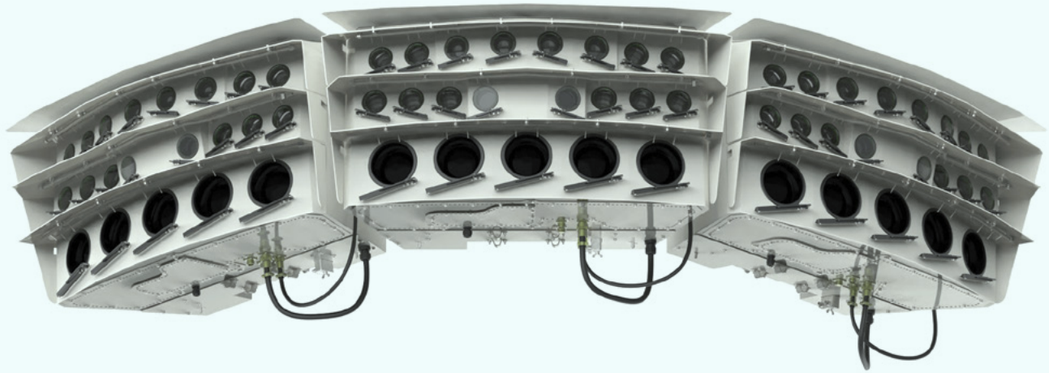
Digital Tower Video for Air Traffic Control

Logipix DTVA (Digital Tower Video for ATC) is a comprehensive Digital Tower platform that recreates and enhances the traditional tower view through ultra-high-resolution panoramic imaging, artificial intelligence, sensor fusion, and real-time operational data integration.

The solution provides controllers with a continuous digital representation of the airport environment, delivering exceptional visual detail across movement areas, airspace, and final approach zones. Advanced AI-powered functions continuously analyze the scene, helping operators identify relevant aircraft, vehicles, personnel, drones, and operational events in real time.

Beyond visual replication, DTVA augments controller awareness with contextual information from existing airport systems, creating a unified operational picture that supports faster and more informed decision-making.

Whether deployed as a Digital Tower, Remote Tower, Contingency Tower, or Emergency Tower, DTVA provides a scalable platform for the next generation of air traffic control operations.





DTVA is the Right Solution if You Aim to...

Future-Proof Tower Operations

- Modernize air traffic control infrastructure
- Deploy digital, remote, or hybrid tower concepts
- Create contingency and emergency tower capabilities
- Build long-term operational resilience

Improve Safety and Situational Awareness

- Deliver a seamless digital out-of-window experience
- Enhance visibility during day, night, and adverse weather conditions
- Detect operational risks earlier through effective AI-assisted monitoring
- Strengthen runway and airspace safety

Increase Operational Efficiency

- Support controllers with real-time decision-making tools
- Consolidate operational information into a single environment
- Reduce workload associated with monitoring multiple systems
- Improve operational continuity during disruptions

Maximize Infrastructure Investments

- Reduce dependence on costly tower construction projects
- Leverage existing airport systems and surveillance assets
- Expand capabilities through software-driven upgrades
- Adapt to future operational and regulatory requirements

Financial Impact and Cost Optimization

- **Reduced Capital Expenditure**
  Digital Tower operations can significantly reduce the need for new tower construction, tower expansion projects, and associated infrastructure investments.
- **Lower Operational Costs**
  Remote and digital operating concepts enable more efficient utilization of operational resources while maintaining required service levels and safety standards.
- **Lower Maintenance Requirements**
  Integrated self-cleaning, de-icing, remote diagnostics, and health-monitoring capabilities reduce maintenance effort while maximizing operational availability.
- **Long-Term Investment Protection**
  The modular architecture allows airports and ANSPs to expand system capabilities through software upgrades and additional sensors without replacing core infrastructure.
- **Improved Operational Continuity**
  By supporting contingency and emergency tower concepts, DTVA helps minimize the financial impact of tower outages and operational disruptions.
- **Fewer Sensors, Greater Coverage**
  Ultra-high-resolution panorama cameras provide exceptional coverage with significantly fewer devices than conventional camera-based solutions.



Safety and Operational Efficiency Benefits

- **Superior Visual Awareness**
  Ultra-high-resolution panoramic imaging provides controllers with exceptional visibility across the airport environment, supporting safer and more effective traffic management.
- **Real-Time Decision-Making Support**
  Artificial intelligence continuously analyzes operational activities and highlights the most relevant situations, helping controllers focus on critical events.
- **Enhanced Runway Safety**
  The solution supports runway incursion detection, final approach monitoring, drone detection, object tracking, and intelligent alerting functions.
- **Reliable Operations in Any Condition**
  Visible-light, thermal, and dual-vision technologies maintain operational awareness during darkness, poor weather, and reduced visibility conditions.
- **Faster Information Access**
  Operational data from airport systems is displayed directly within the controller's visual environment, reducing information lookup times and accelerating decision-making.
- **Unified Operational Picture**
  DTVA integrates multiple information sources into a single operational interface, reducing complexity while increasing overall situational awareness.



What Makes DTVA Unique

- **Built Specifically for Air Traffic Control**
  DTVA is designed around controller workflows, operational procedures, and safety-critical requirements rather than adapting generic surveillance technology.
- **A True Digital Out-of-Window Experience**
  Logipix panoramic imaging technology creates a seamless, continuous visual environment that closely replicates the natural tower view while providing substantially more information.
- **Exceptional Image Quality at Scale**
  Ultra-high-resolution panoramic cameras deliver visual detail that allows operators to identify and assess distant objects without mechanical camera movement.
- **AI-Powered Situational Awareness**
  Advanced computer vision automatically detects, classifies, tracks, and geolocates operationally relevant objects while continuously supporting controller awareness.
- **Integrated Airport Intelligence**
  DTVA combines visual information with operational data from systems such as AODB, ADS-B, MLAT, A-SMGCS, radar, and perimeter security platforms.
- **Operational Resilience by Design**
  The platform supports Digital Tower, Remote Tower, Contingency Tower, and Emergency Tower concepts within a common architecture.
- **Proven Long-Term Reliability**
  Industrial-grade hardware, self-maintaining camera systems, remote diagnostics, and continuous health monitoring ensure dependable operation in demanding airport environments..



Designing Your Project

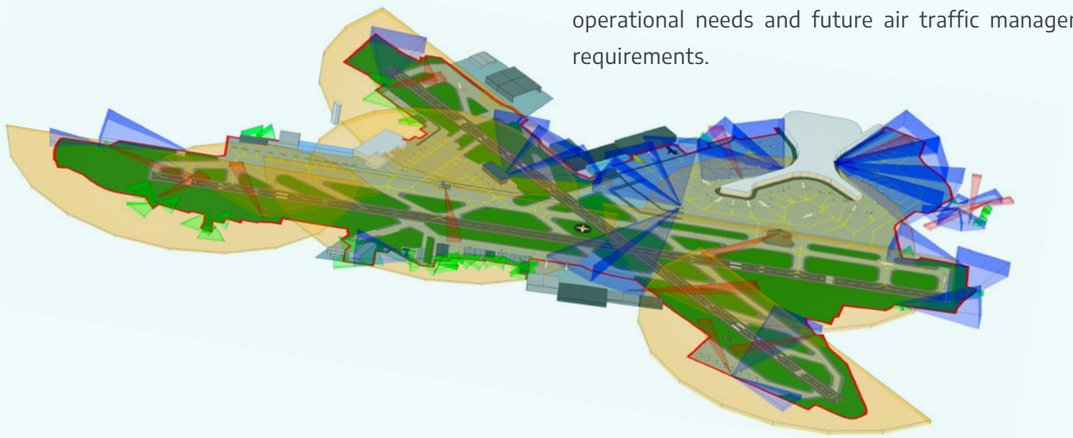
3D Model of Visual Coverage

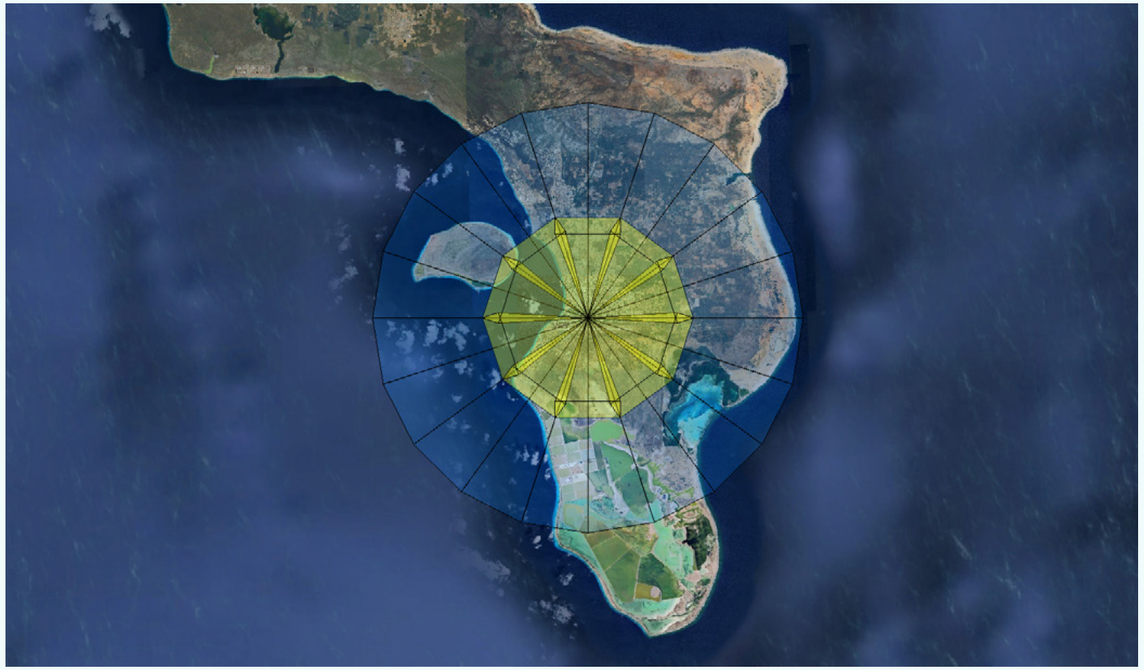
Every DTVA deployment begins with a detailed operational and visibility assessment.

Using advanced 3D modelling techniques, Logipix engineers create a digital representation of the airport environment to determine optimal camera locations, required image resolution, coverage areas, and system architecture. This approach ensures complete operational visibility while minimizing infrastructure requirements and project costs.

The resulting design is tailored to the airport's operational objectives, regulatory environment, future expansion plans, and chosen tower concept.

Because DTVA is built on a modular and scalable architecture, airports can begin with a targeted deployment and expand capabilities over time. Additional sensors, software modules, and integrations can be introduced without disrupting ongoing operations, ensuring that the system evolves together with operational needs and future air traffic management requirements.





System Extension

The Logipix solution is built on a modular and scalable architecture that supports seamless system extension. Airside coverage can be expanded by adding cameras and sensors, while additional DTVA functionalities can be easily unlocked through software upgrades. This approach enables the activation of new analytical, monitoring, and automation features without hardware replacement or system downtime, ensuring long-term adaptability to evolving operational and regulatory requirements.



Technology Overview

Main Application Areas

Digital Tower

A Digital Tower recreates the conventional out-of-window view of an air traffic control tower in a fully digital environment using ultra-high-resolution panoramic cameras and real-time video. Beyond replicating the traditional tower experience, Logipix DTVA enhances controller situational awareness with AI-powered object detection, augmented reality overlays, and integrated airport data. The result is safer operations, improved operational efficiency, and a future-ready platform for modern air traffic management.

Remote Tower

A Remote Tower extends full air traffic control capabilities to remote, regional, or low-traffic airports without requiring a conventional control tower at each location. Using ultra-high-resolution panoramic imaging, real-time video with sub-second latency, low-bandwidth operation, and intelligent decision-support tools, DTVA enables controllers to safely manage airport operations from centralized facilities. This approach reduces infrastructure and operational costs while increasing flexibility, scalability, and service availability across multiple airports.

Contingency Tower

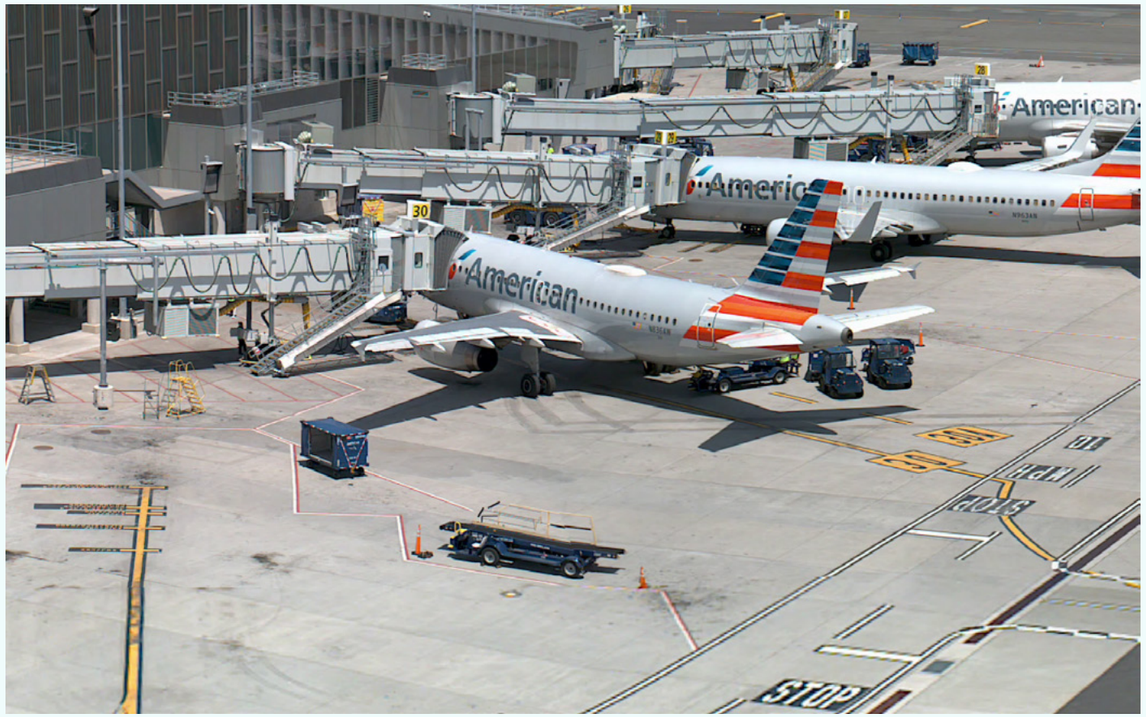
A Contingency Tower ensures uninterrupted air traffic control operations whenever the primary control tower becomes unavailable due to maintenance, technical failures, security incidents, or other unforeseen events. Logipix DTVA provides controllers with immediate access to a complete digital tower environment, allowing airports to maintain operational continuity, minimize disruptions, and preserve the highest levels of safety without relying solely on the physical tower infrastructure.

Emergency Tower

During emergency situations, every second counts. Logipix DTVA enables the rapid deployment of a fully operational digital tower environment by providing real-time panoramic video, integrated airport data, and AI-assisted situational awareness. The solution allows air traffic services to continue safely and efficiently from an alternative control location, strengthening airport resilience and reducing the operational impact of unexpected events.

Digital Out-of-Window Experience

Logipix DTVA recreates the natural out-of-window view of a conventional air traffic control tower through ultra-high-resolution panoramic imaging. The seamless panoramic video provides controllers with a continuous, distortion-free view of the airport environment, eliminating blind spots and reducing the need to switch between many camera feeds. Multiple independent digital zoom windows allow operators to simultaneously maintain a complete overview while examining distant objects in exceptional detail, creating an intuitive and efficient working environment that closely replicates—and enhances—the traditional tower experience.



Low-Latency Operation

Reliable air traffic control depends on immediate visual feedback. Logipix DTVA delivers ultra-high-resolution panoramic video with an end-to-end latency of less than one second, ensuring that displayed events accurately reflect real-time airport operations. Combined with smooth 20 fps full-resolution video streaming, the system enables controllers to monitor aircraft and vehicle movements naturally, respond confidently to rapidly evolving situations, and maintain full situational awareness without perceptible delays.



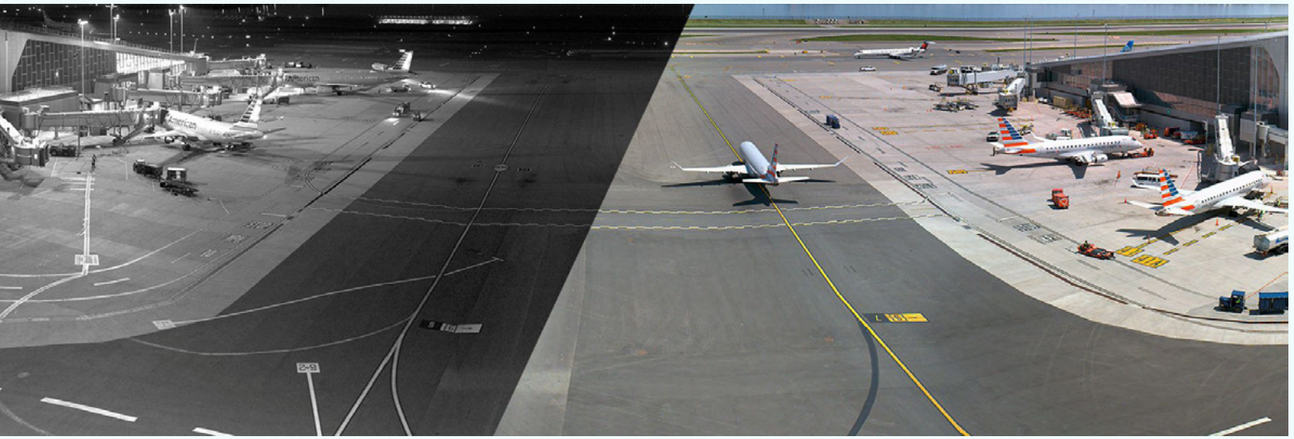
Digital Tower Panorama Camera Platform

The Logipix Airspace Panorama Camera is the core imaging technology behind DTVA, designed for Digital Tower applications where exceptional image quality, reliability, and wide-area visibility are essential. It combines ultra-high-resolution panoramic imaging with advanced onboard processing to deliver a seamless digital out-of-window experience.

Unlike conventional multi-camera systems, Logipix panorama cameras create large, distortion-free images through advanced multi-sensor stitching, eliminating blind spots and visible seams. With 160–960 MP resolution and 20 fps streaming, controllers can monitor the complete airport environment while digitally zooming into distant aircraft and vehicles with outstanding detail.

Built for 24/7 mission-critical operation, the system integrates wide dynamic range imaging, low-light performance, edge AI processing, and visually lossless JPEG2000 compression for efficient low-latency transmission and recording.

The rugged marine-grade enclosure, combined with integrated heating, cooling, de-icing, remote health monitoring, and automated diagnostics, ensures reliable operation in demanding airport environments while minimizing maintenance requirements.



Key Advanteges

- **Full 360º virtual ATC experience with ultra-high resolution Panorama Cameras**
- **Seamless multi-sensor geometric stitching with no blind spots**
- **Binocular-quality digital zoom without mechanical PTZ movement**
- **AI-powered onboard image processing using custom silicon**
- **Marine-grade construction with integrated heating, cooling, and de-icing**
- **Continuous remote health monitoring and automated maintenance functions**
- **Designed for decades of reliable 24/7 operation**

AI-Powered Situational Awareness

Logipix DTVA combines advanced Computer Vision Technologies with Artificial Intelligence to continuously detect, classify, track, and geolocate aircraft, vehicles, personnel, drones, and other operationally relevant objects. Intelligent algorithms analyze movement patterns in real time, automatically identify potential safety risks, and highlight significant events directly within the controller's field of view. By filtering large amounts of operational information and presenting only the most relevant situations, DTVA reduces controller workload, accelerates decision-making, and enhances overall operational safety.

Low-Level Computer Vision Functions

Low-level AI functions provide the fundamental building blocks of the Logipix Computer Vision engine. Operating continuously on every video frame, they identify, analyze, and understand objects throughout the monitored airspace and movement areas with exceptional accuracy.

Object Detection

The AI engine continuously detects both moving and stationary objects throughout the entire panoramic field of view. Operating on full-resolution image streams, the system identifies operationally relevant targets in real time, ensuring that no activity remains unnoticed across the monitored area.

Multi-Target Tracking

Once detected, objects are automatically tracked as they move through the airside, even when crossing multiple camera views. The system simultaneously follows cooperative and non-cooperative targets while maintaining consistent object identities and movement histories, providing uninterrupted situational awareness.





Motion Prediction

By analyzing object trajectories, speed, and direction, the AI predicts future movements and identifies potentially hazardous situations before they occur. This predictive capability enables proactive alert generation, allowing controllers to respond to emerging events rather than reacting after they develop.

Intelligent Classification

Advanced deep-learning algorithms automatically classify detected objects according to their visual characteristics. Aircraft, vehicles, personnel, drones, animals, and other operationally relevant objects are accurately identified, allowing the system to apply object-specific operational rules and prioritize alerts accordingly.

GPS Geolocation

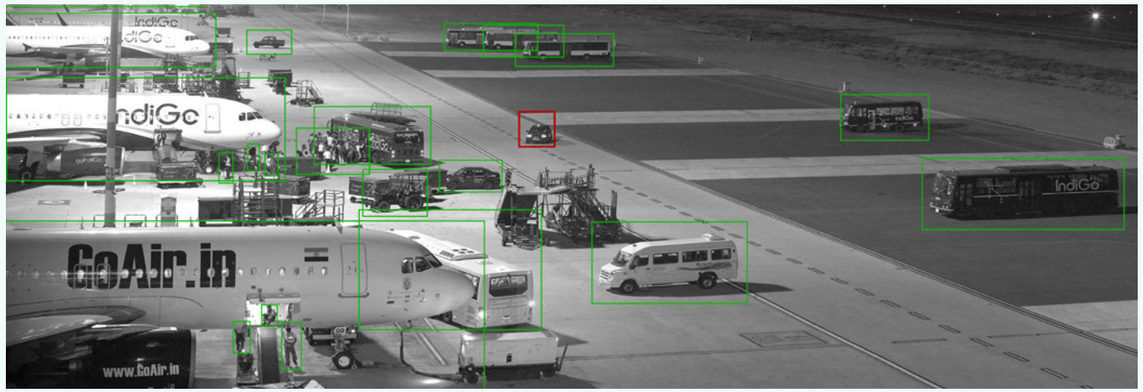
Every detected object is automatically assigned precise real-world geographic coordinates. This allows visual detections to be seamlessly integrated with airport maps, operational databases, radar systems, and other positioning technologies, creating a common operational picture.

Intelligent Geofencing

Virtual zones can be created anywhere within the monitored environment without requiring physical infrastructure. Configurable rules based on object type, direction of travel, or operational conditions allow the system to automatically detect unauthorized movements and generate graduated alerts whenever predefined boundaries are crossed.

High-Level Computer Vision Functions

Building on its Computer Vision foundation, Logipix DTVA combines multiple data sources and intelligent decision-support technologies to provide controllers with a comprehensive understanding of the operational environment. Rather than simply detecting objects, the system interprets situations, correlates information, and presents only the most relevant operational events.



AI-Powered Drone Detection

The growing presence of unmanned aerial vehicles (UAVs) presents an increasing challenge for airport operations, where even small drones can pose significant safety risks and cause costly disruptions. Logipix DTVA incorporates an advanced Drone Detection module combining artificial intelligence, multi-sensor fusion, and real-time tracking to rapidly identify both cooperative and non-cooperative UAVs within the airport environment.

Deep-learning Computer Vision algorithms continuously analyze ultra-high-resolution panoramic video to automatically detect and classify multirotor, fixed-wing, and hybrid drones. By distinguishing UAVs from birds, aircraft, and other airborne objects, the system reduces false alarms while achieving detection latencies of less than one second. For reliable detection under diverse environmental conditions, DTVA fuses panoramic camera data with thermal imaging and 3D MIMO radar. Cross-sensor validation increases detection confidence and enables reliable identification of small Group 1 UAVs at distances of up to 2 kilometers, including during adverse weather and low-visibility conditions. Every detected drone is automatically geolocated, tracked, and displayed on the interactive airport map, together with its movement history, speed vector, and trajectory.

Configurable alert zones notify operators of restricted airspace violations, while seamless integration with DTVA and third-party Video Management Systems provides a comprehensive operational picture for rapid assessment and response.

Key Capabilities

- **AI-powered detection and classification of multirotor, fixed-wing, and hybrid UAVs**
- **Reliable discrimination between drones, birds, aircraft, and other airborne objects**
- **Multi-sensor fusion combining panoramic video, thermal imaging, and 3D MIMO radar**
- **Detection of small (Group 1) UAVs at distances of up to 2 km**
- **Real-time GPS geolocation, tracking, and trajectory visualization**
- **Interactive map with speed vectors, track history, and restricted zone monitoring**
- **Automatic alert generation for airspace incursions and zone violations**
- **Full integration with DTVA and third-party Video Management Systems**

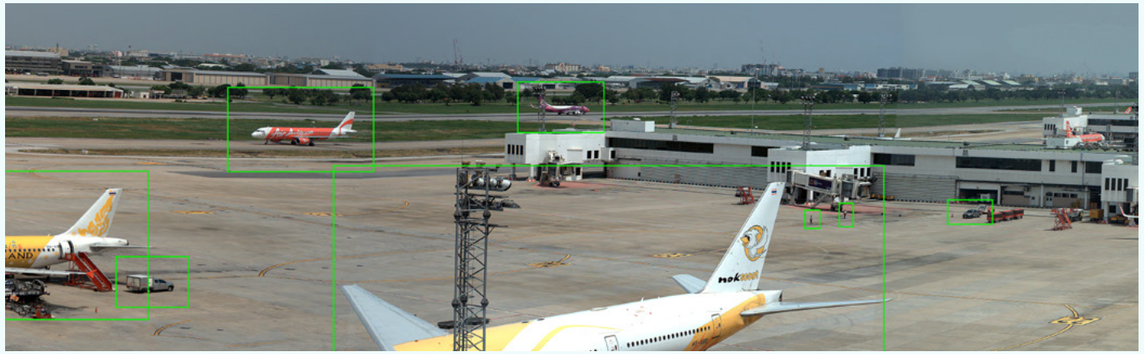
Glide Path Monitoring

Logipix DTVA extends the capabilities of Digital Tower operations with dedicated Glide Path Monitoring, providing air traffic controllers with a detailed visual assessment of aircraft during final approach and landing. Combining high-resolution visible-light cameras with advanced thermal imaging, the system delivers continuous real-time observation of approaching aircraft, enabling controllers to accurately monitor aircraft alignment, altitude, and approach stability throughout the landing sequence.

Purpose-built telephoto cameras capture exceptionally detailed images from long distances, allowing controllers to verify critical visual information such as landing gear deployment and aircraft configuration while maintaining complete awareness of the surrounding operational environment.

AI-powered Computer Vision continuously detects and tracks approaching aircraft, automatically following their movement and providing intelligent zoom functions that maintain optimal image detail during every stage of the approach. The system can also identify deviations from the expected glide path, assisting controllers by highlighting potentially hazardous situations before they develop into operational risks.

To ensure reliable operation under all environmental conditions, Logipix integrates high-performance thermal cameras that maintain clear visibility during darkness, fog, rain, and other reduced-visibility conditions. By combining visible-light and thermal imagery, DTVA delivers dependable glide path monitoring throughout the day and night, supporting safer landing operations regardless of weather conditions.



Key Capabilities

- **Visible-light and thermal cameras dedicated to final approach monitoring**
- **Real-time observation of aircraft during approach and landing**
- **AI-powered aircraft detection and automatic tracking**
- **Monitoring of aircraft alignment, altitude, and glide path stability**
- **Visual verification of landing gear deployment and aircraft configuration**
- **Automatic detection of glide path deviations and operational anomalies**
- **Reliable monitoring during day, night, and adverse weather conditions**



Airside Operational Functions

In addition to ATC-specific capabilities, Logipix DTVA incorporates a comprehensive suite of AI-powered Computer Vision functions developed for advanced airside monitoring and operational safety. Built upon the proven Logipix Airside Augmented Reality Solution (LAARS), these intelligent functions extend situational awareness beyond the tower environment by continuously analyzing aircraft, vehicle, and personnel movements across the airport.

The platform supports automatic Landing & Take-Off Registration, Runway Incursion Detection, Foreign Object Debris (FOD) Detection, Virtual Access Control, Automatic Traffic Enforcement, Collision Prediction, and Perimeter Protection. Working together with AI-powered object detection, tracking, and sensor fusion, these capabilities help improve operational safety, reduce controller workload, and support faster response to potentially hazardous situations.

As these functions are shared with the Logipix LAARS platform, detailed descriptions and technical information are available in the Logipix Airside Augmented Reality Solution (LAARS) brochure.



Additional High-Level AI Capabilities

- **Automatic LND & TOF Registration**
- **Runway Incursion Detection**
- **Automatic FOD Detection**
- **Virtual Access Control**
- **Automatic Traffic Enforcement**
- **Collision Prediction**
- **Object-Based History Search**
- **AI-Powered Perimeter Protection**



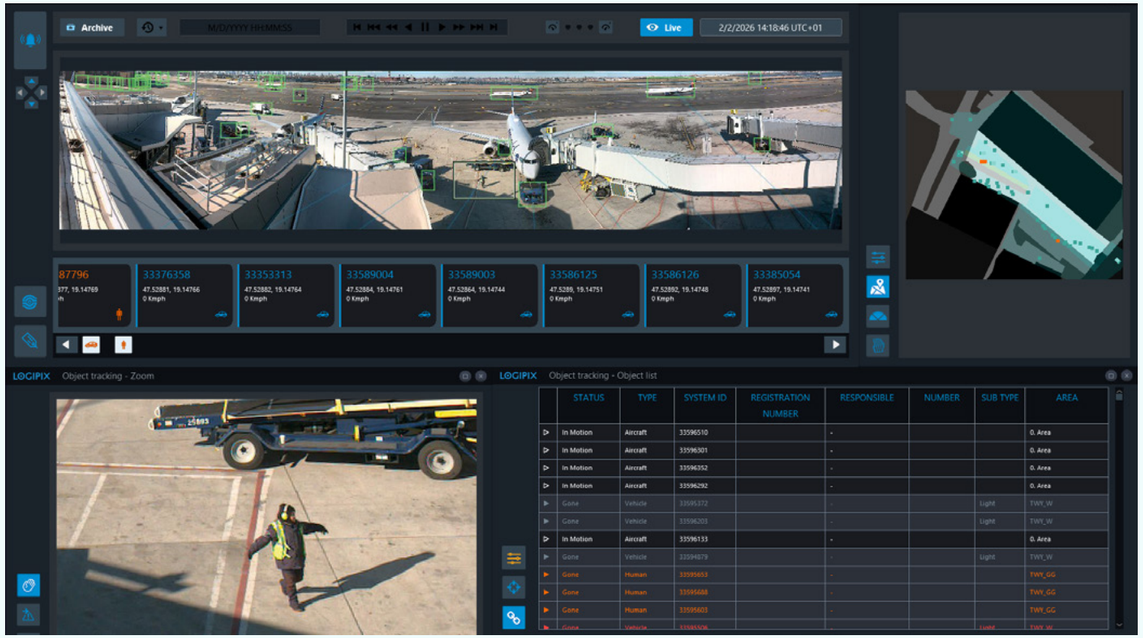
Operational Intelligence

DTVA fuses live panoramic video, AI-generated object data, and integrated airport information into a single, unified interface, guiding operator attention to the most relevant situations in real time. Contextual visual and textual cues—including an interactive map and synchronized object labels—help controllers detect hazards earlier, respond faster, and maintain complete situational awareness across airside operations.

Multi-Level Alert Management

Intelligent alert management automatically evaluates operational events based on configurable rules and assigns different priority levels according to their significance. Controllers receive clear visual and audible notifications for safety-critical situations, enabling them to focus immediately on the events that require attention while minimizing unnecessary distractions.





Interactive Live Map

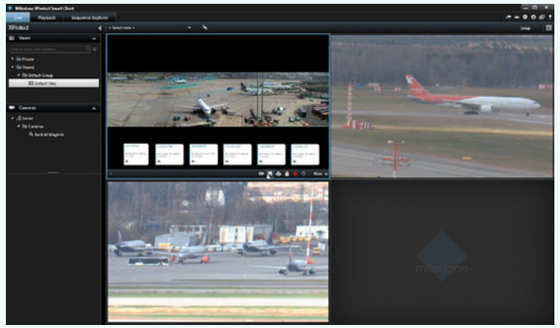
All detected objects are displayed in real time on an interactive airport map using their calculated GPS positions. Operators can instantly visualize object locations, movement history, travel direction, and operational status, providing valuable spatial context and simplifying coordination across the airport environment.

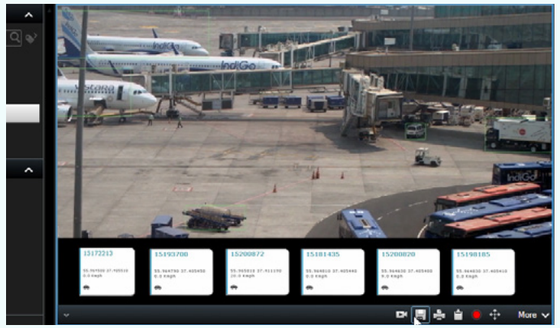
Virtual PTZ

The Logipix Virtual PTZ technology enables seamless integration of DTVA into virtually any third-party Video Management System (VMS) without compromising functionality. Unlike conventional video streams, which transmit only image data, Virtual PTZ combines ultra-high-resolution panoramic video with AI-generated object information and Augmented Reality overlays into a standard ONVIF-compliant Full HD stream. As a result, operators can access the complete Logipix experience—including object labels, flight information, alerts, and intelligent visual indicators—directly within their preferred VMS platform.

Virtual PTZ also transforms panoramic cameras into fully interactive digital PTZ devices. Operators can navigate the ultra-high-resolution panorama using familiar pan, tilt, and zoom controls, allowing them to inspect any area of interest with exceptional detail while preserving access to the full panoramic scene. This intuitive workflow eliminates the need for proprietary client software and significantly simplifies integration into existing airport control room environments.

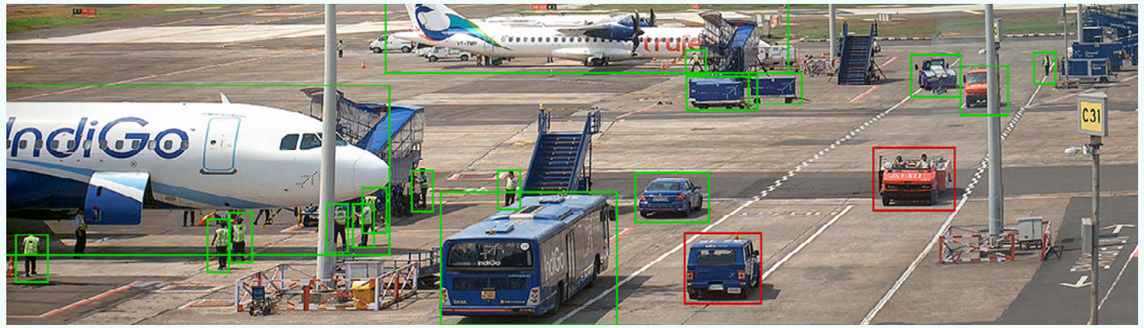
By preserving all AI-generated contextual information within a standards-compliant video stream, Virtual PTZ enables airports to extend the capabilities of their existing VMS infrastructure while benefiting from Logipix's advanced Computer Vision, sensor fusion, and Augmented Reality technologies.





Key Capabilities

- **ONVIF-compliant integration with third-party Video Management Systems**
- **Full Augmented Reality overlays embedded directly into the video stream**
- **AI-generated object labels, alerts, and flight information synchronized with live video**
- **Interactive digital pan, tilt, and zoom navigation within panoramic images**
- **No proprietary client software required on the receiving platform**
- **Preserves the complete Logipix AI and Augmented Reality experience across third-party environments**



Airport System Integration

Logipix DTVA is designed for seamless integration with existing airport infrastructure, combining operational data from multiple third-party systems into a single, unified digital tower environment. Through open, standards-based interfaces, the platform exchanges information with Airport Operational Databases (AODB), A-SMGCS, ADS-B, MLAT, radar systems, perimeter intrusion detection systems, vehicle management platforms, and other operational applications.

By fusing these data sources with ultra-high-resolution panoramic video and AI-powered Computer Vision, DTVA enriches the controller's view with contextual Augmented Reality information. Aircraft identification, flight numbers, operational status, and other relevant data are automatically linked to tracked objects and displayed directly within the panoramic image, eliminating the need to switch between multiple systems.

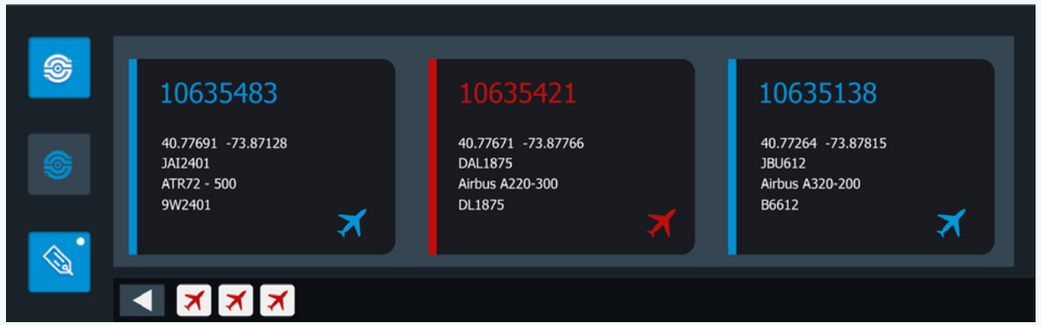
The integration architecture supports REST, ONVIF, and custom APIs, enabling bidirectional communication with both existing and future airport platforms. Low-latency data synchronization ensures that video streams, operational data, and AI-generated events remain continuously aligned across the entire system.

The result is a comprehensive operational picture where visual information, airport data, and intelligent analytics work together to improve situational awareness, accelerate decision-making, and simplify daily air traffic control operations.



Key Capabilities

- **Integration with DDS, AODB, A-SMGCS, ADS-B, MLAT, radar systems, PIDS, and vehicle management platforms**
- **Real-time fusion of operational data with panoramic video**
- **Dynamic Augmented Reality overlays displaying aircraft identity, flight number, and operational status**
- **Open integration framework supporting REST, ONVIF, and custom APIs**
- **System-wide synchronization with less than one second latency**
- **Unified operator interface without context switching**
- **Exportable operational and event data for reporting, KPI evaluation, and post-incident analysis**



Technologies Behind Logipix Functions

Sensor Fusion

Logipix Sensor Fusion Technology combines data from multiple independent sources—including panoramic video, thermal imaging, radar, ADS-B, MLAT, and A-SMGCS—into a single, coherent operational picture. By processing raw, uncompressed sensor data before combining it, the technology minimizes information loss and achieves the highest possible accuracy in object detection, classification, and geopositioning. Originally developed for Logipix sensors, the fusion engine is equally capable of integrating data from qualified third-party systems, extending its accuracy advantages across the entire airport environment.

AI-Powered Video Content Analysis

The Logipix Computer Vision engine operates directly on full-resolution, uncompressed image streams, ensuring the highest possible detection and tracking accuracy, including for distant or small objects. A Multidimensional Gaussian Background Model continuously adapts to changing lighting and weather conditions, cleanly separating moving objects from the learned background, while an embedded neural network preserves relevant stationary objects that conventional motion-based methods would otherwise miss. Object Feature Extraction, Motion Behavior Analysis, and Motion Path Estimation algorithms work together to build a self-learning, continuously improving analytical model of the operational environment.





Panoramic Technology

Logipix panoramic cameras combine the images of multiple sensors into a single, seamless panoramic view through precise geometric stitching. Because all sensors capture their images synchronously, objects are never duplicated or lost at stitching boundaries, even as they move across the field of view. Dedicated white balance and tone correction algorithms smooth color and exposure transitions between sensors, producing a continuous, distortion-free panorama that behaves as a single ultra-high-resolution camera rather than a collection of independent feeds.

Augmented Reality

Logipix Augmented Reality overlays context-aware visual elements—color-coded object indicators, tracking paths, and informational labels—directly onto live panoramic video without obscuring the underlying image. These elements are generated from fused sensor and Computer Vision data and move in perfect synchrony with their associated objects, remaining accurate even as aircraft, vehicles, and personnel cross multiple camera views. By presenting relevant information exactly where and when it is needed, the technology reduces cognitive load and accelerates controller decision-making.

Low-Latency Operation

Delivering ultra-high-resolution video with sub-second, end-to-end latency requires custom onboard processing rather than conventional camera architectures. Logipix designs, builds, and optimizes every step of the imaging chain in-house—from the moment a photon hits the sensor to the moment a rendered pixel appears on the operator's screen. This "pixel to pixel" control, combined with purpose-built edge AI silicon, allows panoramic cameras to capture, process, and stream hundreds of megapixels of imagery at up to 20 fps without introducing delay. The result is outstanding image fidelity, precise synchronization, and minimal latency, ensuring controllers always observe the airport environment as it is happening.

PTZ cameras in the system

High-end Logipix PTZ cameras efficiently complement the system. A special function allows the PTZ cameras to be assigned with the Logipix Panoramas by registering common spatial points that are visible to both cameras. This function allows operators to control the PTZ cameras by selecting the area of interest in the panoramic image.





Smart Storage Management

The system continuously records the videos. Thanks to the Logipix Ageing Technology, storage period of video streams can be greatly prolonged. The system intelligently drops frames from the video stream according to a configured period. As the JPEG2000 stream consists only intra-frame images, the footage will be still available after video stream ageing, but with reduced fps.





Cybersecurity

Logipix cybersecurity is designed to meet the strict security requirements of airport environments. The system protects sensitive operational and video data through proprietary encrypted communication, strict access control, and tamper-resistant storage. Full encryption of raw video streams and cryptographic signing of exported recordings ensure data integrity and traceability. Regular vulnerability assessments, penetration testing, daily database backups, and device binding mechanisms provide resilience against evolving cyber threats while supporting secure, uninterrupted airside operations.



System Health Monitoring

Logipix provides continuous remote monitoring of system health through automated health reports, SNMP traps, and a centralized notification center that delivers real-time feedback on hardware and network status. This enables early detection of anomalies and proactive maintenance before issues escalate. Physical maintenance requirements are minimized through built-in self-cleaning and deicing systems, ensuring reliable operation in harsh weather conditions while reducing on-site intervention and maintenance costs.



Main Features and Functions

Monitoring & Visualizations

- 360° Digital Tower Monitoring
- Digital Out-of-Window Experience
- Low-Latency, Sub-Second Operation
- Real-Time Airspace Monitoring with 160-400 MP Panorama Cameras
- Thermal Panoramas for difficult visibility conditions and night monitoring
- Real-Time Airside Monitoring with 300-960 MP Panorama Cameras
- Interactive Map
- Interactive Object List
- In-Memory Object Database
- Video History

AI-Powered Functions

- Glide Path Monitoring
- Object Tracking
  - Detection | Classification | Tracking
  - Merging Motion Information with Images
    - Object Indicators | Path History | Heading
  - Object Labeling
- Geofencing
- Virtual Fence
- Access Control
- Situational Awareness
  - Proximity Alert
  - Collision Prediction
- Automatic Traffic Enforcement
  - Overspeed | Line Violation | Traffic Light
- Automatic FOD Detection

Virtual PTZ

- ONVIF VMS Integration
- Embedded Augmented Reality
- AI Object Labels & Alerts
- Digital Zoom Navigation
- Third-Party VMS Compatibility
- No Proprietary Client Required
- Bandwidth-Optimized Streaming
- Full-Resolution Panorama Navigation
- Live & Recorded Video Support

Integration

- Data Distribution Service (DDS) Protocol
- Positioning Systems: ADS-B, MLAT, A-SMGCS
- Radar Systems and Rangefinders
- AODB (Airport Operational Database)

Perimeter Security

- PIDS Triggered Intrusion Detection
- VCA-Based Intrusion Detection
- Highest Detection Accuracy Possible
- Automatic Zoom in on Alarmed Area
  - ePTZ (Automatic Zoom on Panoramic Images)
  - Automatic PTZ Zoom

Maintenance

- Remote Maintenance
  - Health Report | Notification Center | SNMP Notification
- Hardware Maintenance
  - Self-Cleaning | Deicing

Key System Components



Logipix 300 MP Panorama Camera



Logipix 200 MP Panorama Camera



Logipix 160 MP Panorama Camera



Logipix 20+1.3 MP Dual Vision Glide Path Camera



Logipix 6 MP PTZ Camera



LAARS Software Package



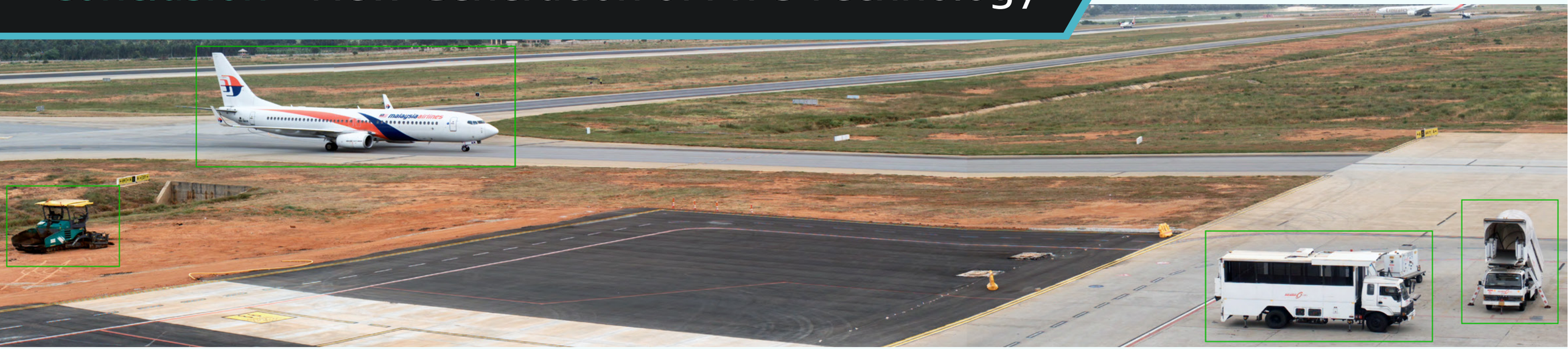
Logipix Network Video Recorder 5th Gen

Technological Strengths of the Solution



- **Ultra-High-Resolution Panoramic Imaging**
  Purpose-built panoramic cameras deliver seamless, distortion-free views with exceptional image quality, enabling operators to monitor large areas while preserving fine details at long distances.
- **AI-Powered Computer Vision**
  Advanced Artificial Intelligence continuously detects, tracks, classifies, and geolocates operationally relevant objects, transforming video into actionable operational intelligence.
- **Deep-Level Sensor Fusion**
  Information from panoramic cameras, thermal sensors, radar, ADS-B, MLAT, A-SMGCS, and other sources is fused into a single, coherent operational picture for maximum situational awareness.
- **Augmented Reality**
  Real-time contextual overlays—including object labels, flight information, alerts, and tracking data—are displayed directly within the live panoramic image, accelerating decision-making.
- **Low-Latency Video Processing**
  End-to-end latency of less than one second ensures controllers receive an accurate, real-time representation of the airport environment, even when streaming ultra-high-resolution panoramic video.
- **Virtual PTZ Technology**
  Transforms panoramic cameras into interactive digital PTZ devices while preserving AI-generated Augmented Reality within standard ONVIF video streams for third-party VMS integration.
- **Industrial-Grade Reliability**
  Mission-critical hardware with integrated heating, cooling, de-icing, self-cleaning, and continuous remote health monitoring ensures dependable 24/7 operation in demanding airport environments.
- **Scalable Modular Platform**
  A flexible architecture supports Digital Tower, Remote Tower, Contingency Tower, and Emergency Tower concepts while allowing future expansion through additional sensors and software modules.

Conclusion - New Generation of ATC Technology



Logipix DTVA represents a new generation of Digital Tower technology, combining ultra-high-resolution panoramic imaging, Artificial Intelligence, sensor fusion, and Augmented Reality into a single, integrated platform. Designed specifically for modern air traffic control, the solution recreates the traditional out-of-window experience while extending it with intelligent decision-support capabilities that enhance safety, operational efficiency, and controller situational awareness.

By seamlessly integrating airport operational systems, advanced Computer Vision, and purpose-built panoramic camera technology, DTVA enables airports and Air Navigation Service Providers to modernize tower operations without compromising reliability or performance. Whether deployed as a Digital Tower, Remote Tower, Contingency Tower, or Emergency Tower, the platform provides the flexibility and resilience required to meet today's operational challenges while preparing for the future of air traffic management.

Built on decades of experience in ultra-high-resolution imaging and mission-critical video systems, Logipix DTVA delivers exceptional image quality, robust long-term reliability, and a scalable architecture designed to evolve with changing operational and regulatory requirements. The result is a future-ready Digital Tower platform that empowers airports to improve safety, optimize operational performance, and protect long-term infrastructure investments.

