

# IP Video – CCTV Solutions for the Transport Industry

*Oliver Vellacott, CEO of IndigoVision, describes how IP Video is offering the transport sector unique solutions to its surveillance needs.*

The threat of terrorist attacks in recent years on transport infrastructure has led to a demand for high-quality and reliable CCTV surveillance that can be continuously upgraded to meet the growing threat. IP Video is providing the CCTV industry with a unique set of tools for solving today's surveillance applications. This is particularly true in the demanding transport sector where IP Video is providing many solutions that are not technically possible or economically viable with traditional analog CCTV systems. The many features and benefits of IP Video can be best highlighted by looking at a number of field-proven case studies.



## Munich Airport: Hybrid IP-Analog Systems

Munich is one of Europe's fastest growing airports with nearly 30 million passengers a year passing through its two terminals. In accordance with new EU regulations all airport employees are required to undergo the same security checks as passengers when entering the secure airside area, consequently Munich Airport undertook a security reconfiguration of its staff access points. This included scanners, security arches and CCTV surveillance, for which Munich airport chose IP Video technology.

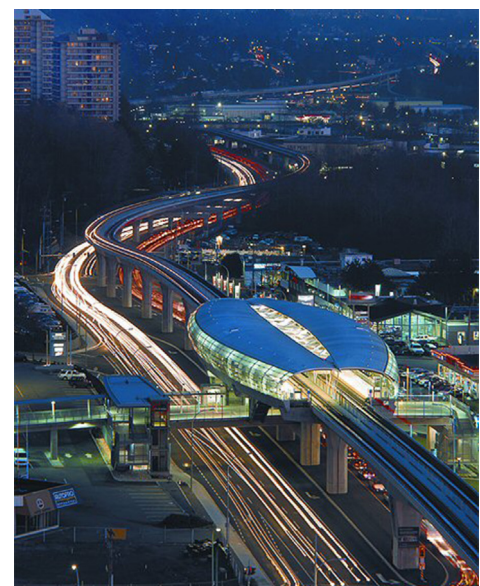
The IP Video system was installed in both Terminals alongside the existing 1800 camera CCTV system. The furthest camera was located over 2.5km from the central control room, the main monitoring point for the airport's entire surveillance system. The system was interfaced to both the existing digital MJPEG system in Terminal Two and the analog matrix system in Terminal One. This allowed users of the existing CCTV systems to have access to the images from the new secure access areas.

IP Video was an ideal choice for this application as it provided high-quality MPEG-4 CCTV images from cameras located over a large area of the airport and a flexible interface path to the existing hybrid mix of CCTV systems. Extending the existing systems would have been far more expensive and would not have provided the same level of scalability for the future. The new IP Video additions have brought many benefits to the airport, but have also ensured that the original investment of CCTV equipment was protected.

## SkyTrain Light Rapid Transit System: Maintaining Investment

TransLink in Vancouver, Canada has upgraded its 880 camera CCTV system on SkyTrain, the world's largest automated light rapid transit system. SkyTrain transports 200,000 passengers a day along 49km of elevated track through 33 stations located in and around Vancouver. IP Video technology was used to upgrade the existing analog matrix/VCR CCTV system and provide a scalable solution that met SkyTrain's video recording and future surveillance needs. The new system allows the recording of much higher quality video and provides station operators with tools to quickly access and analyze recorded footage – important features to meet the demands of homeland security.

Choosing the flexibility of an IP Video system enabled SkyTrain to keep most of their original investment in the existing CCTV equipment, while creating a platform for future growth. All the original 880 cameras were re-used together with the existing matrix switching hardware. At each of the 33 stations the cameras are connected to IP Video transmitter/receiver units. These convert the analog camera signals to high-quality MPEG-4 digital video for transmission over the local IP network at each station.



*SkyTrain station located on the Millennium Line in Burnaby, a suburb of Vancouver*

Standalone Network Video Recorders (NVRs) have been installed in each station to provide advanced recording facilities for each camera stream. This created a hybrid digital/analog CCTV solution that provides a replacement for the ageing VCR-based recording system. In the long-term, the flexibility of IP Video will allow SkyTrain to benefit from the power of a fully networked system by deploying a virtual matrix to replace the existing analog switching.

## Doha International Airport: Integrating CCTV and Access Control over IP

As part of the preparations for DOHA 2006, the 15<sup>th</sup> Asian Games, Doha International Airport (DIA) in Qatar installed a fully integrated system, which now consists of 1250 cameras and 300 access control points. The 'GE Secure Perfect' access control system was seamlessly integrated into the IP-CCTV system to provide a single security solution.

The entire system is IP-based using the airport's LAN and provides a high level of flexibility and scalability. A CCTV camera or access control point can be located at any point on the network. The alarms from both systems are monitored via the IP Video management software. This is the ideal place to consolidate alarms from an integrated IP-Security system as CCTV is the application most monitored by security staff. The IP Video management software allows operators to monitor live video feeds and recorded footage from the Network Video Recorders (NVRs) as well as status information and alarms from the access control system.

The tight integration of the access control and video management allows the virtual matrix to be driven by alarm events, e.g. a salvo of cameras can be displayed when an alarm is raised from a given access point. Events within the video management software are generated and logged for card swipes, illegal access and tamper detect.

## Hong Kong Traffic System: A Migration Path to IP Video

IP-CCTV technology has been used to extend the capabilities of Hong Kong's extensive traffic surveillance system. The current analog system has been expanded with the addition of 48 cameras using an IP Video system, creating a fully integrated 250 camera hybrid solution. The introduction of an IP-based distributed networked provides a platform for full migration to IP Video in the future.

The migration project also included the development of bespoke software to create an integrated 'front end' for both the existing analog system and the IP Video. This was interfaced with the IP Video Security Management Software, which provides powerful virtual matrix switching features, alarm handling and video analysis tools.

Like many large analog systems, Hong Kong's CCTV surveillance consists of a number of isolated video control rooms which are not interconnected to form a single centrally monitored system – often referred to as 'islands' of video. The IP Video system has created a fully scalable and distributed solution that will allow the future integration of these remote control rooms into one unified system, allowing Hong Kong's Traffic Police to centrally manage and control the region's traffic problems.



*Hong Kong's Traffic Monitoring Centre*

## First Capital Connect Rail Network: Remote Monitoring with IP

Integrated IP Video technology has been deployed as part of a massive CCTV central monitoring and recording project for First Capital Connect (FCC), one of the UK's newest train operating companies. FCC operates trains between London, Brighton, Bedford, Peterborough, Cambridge and King's Lynn over the UK's busiest rail network. As part of its five year, £8 million, network-wide Station Improvements Program, FCC installed a new IP-based video surveillance, recording and transmission system. The project involved the upgrade to 1,194 existing analog CCTV cameras across 63 train stations, which are now all monitored at a new central control room at Enfield, using the company's existing network infrastructure.

The challenge was to bring together the various local and independently monitored analog CCTV systems in order to monitor and manage them centrally. In addition the existing CCTV systems had to be fully operational while the new IP-based solution was installed. Advanced compression and bandwidth management technology were vital for the success of a project of this size. Multiple video streams from each camera can be configured for different applications, for example, high-framerate/high-bandwidth for recording and local viewing and low bandwidth for remote monitoring over the WAN.

## Turku Port, Finland: Wide-Area Surveillance over IP

The Port of Turku, Finland's second largest seaport, has invested in a complete end-to-end IP Video solution to provide an innovative approach to site surveillance. More than four million tonnes of cargo and over four million passengers pass through the port every year and safety and security are paramount to the port's operation.

The CCTV system includes numerous dome cameras, providing high-quality digital images via a wireless LAN, which spans an area around the port of over 10km<sup>2</sup>. The cameras provide surveillance for the main entrance, car parks, the port's rail network, the docks and the approaching seaways. In addition the port operates a mobile CCTV vehicle that provides flexible surveillance quickly and easily to any area around the port. The vehicle is based on a standard saloon car and is fitted with a range of environmental sensors, for measuring parameters such as radioactivity and toxic gases, as well as a wireless CCTV camera and monitor. Should a large or unusual ship enter the port the vehicle can be dispatched to monitor the event in areas that are not covered by the fixed cameras.



The Port of Turku, Finland's second largest seaport

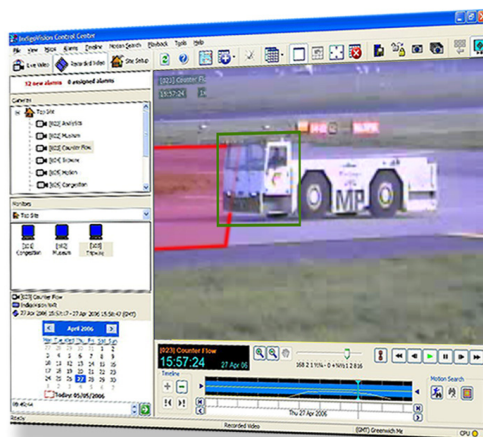
The wireless IP Video system resulted in considerable savings for the port operator compared with a traditional analog CCTV solution. The combination of wireless and IP Video provides an ideal solution for site-wide monitoring of large areas.

## Amsterdam Airport: IP-based Analytics

Schiphol, Amsterdam's International Airport, is using advanced IP Video analytics to prevent accidental or malicious intrusion onto runway and hangar areas. With over 20 million passengers passing through the Netherlands' busiest airport each year, the airport operators were keen to deploy the latest technology to help improve the safety and security of aircraft movements.

The analytics algorithms run in real time at the camera ensuring that operations staff in the dedicated control room are alerted automatically to intrusions as they are detected. This ensures a timely response to any potential emergency or security situation.

Seventeen fixed CCTV cameras cover the active airside area of the airport and these are connected back to the control room via a hybrid fiber and wireless LAN. The analytics mode 'Virtual Tripwire' is used to designate unauthorized areas in each camera's field of view. Whenever a vehicle or person crosses into these areas an alarm is automatically raised and the appropriate camera view is displayed in the control room. It was not possible to implement such a system using traditional analog video systems, because of the distances involved and the need to use real time analytics.



Schiphol Airport is using advanced IP Video analytics to prevent accidental or malicious intrusion onto runway and hangar areas.

Video management software allows the operations staff in the control room to view live and recorded video from any of the cameras. All video is recorded on two Network Video Recorders (NVRs), providing up to 14 days of continuous real time recording. The operations staff can also run the same analytics on the recorded video for post-event analysis.

The LAN is based on an existing fiber network installed within the airport building which was extended using a fault-tolerant wireless mesh network. The furthest camera is located in excess of 1km from the control room.

## Summary

The overriding feature of all these case studies is the huge distances over which the systems are deployed, whether it is the long distances of a rail or road network or the wide areas associated with airports and ports. Cost effective and reliable CCTV surveillance over these distances can only really be achieved using IP Video. The case studies show that IP Video can co-exist with legacy systems and provide a simple migration path for the future, an important benefit for end users considering an IP Video solution for their application.



*IP Video is providing the transport industry with a unique set of tools for solving today's CCTV surveillance applications.*



### About the Author

Oliver Vellacott founded IndigoVision in 1994. He was previously a product manager with a background in intelligent camera products. Oliver studied piano at the Guildhall School of Music before gaining his first degree in Software Engineering from Imperial College London and then a PhD in Electrical Engineering from Edinburgh University.

*Dr Oliver Vellacott, CEO,  
IndigoVision Group plc,  
The Edinburgh Technopole  
Bush Loan Edinburgh EH26 0PJ  
Tel: 0131 475 7200  
Fax: 0131 475 7201  
[www.indigovision.com](http://www.indigovision.com)*