

Stockholm puts safety first

Stockholm Transport is investing £25 million in security systems to make its public transport the safest in the world. Rupert King meets Sweden's biggest operator to find out why

Back in the spring of this year Stockholms Localtrafik (SL), the body responsible for public transport in the city for more than 150 years, announced plans to overhaul security on transport with the installation of 1,500 network cameras in its subways and rail stations. Four months later, 1,200 more were ordered to complete the project and last month it was announced buses would be included, taking the total number of camera installations to well over 15,000.

SL accounts for more than half of Sweden's public transport, carrying an estimated 650,000 passengers every day on its metro, buses, commuter trains and local railways. Rising instances of vandalism and driver assaults prompted SL to embark on a security overhaul.

Henrik Virro, head of the security project, says: "We need to secure drivers and passengers in our buses and trains and also to reduce vandalism, which is a big problem in Stockholm. Once this project is complete, in about 12 months, there will be no fears over the safety of public transport."

Axis Communications, the world market leader for network video solutions, was chosen to supply the cameras, which it says are the best security devices on the market.

The Stockholm security project

Two years ago it was decided a fully-integrated security system that covered every mode of transport in the city was needed. Leader of the project, Henrik Viro says: "There are more instances of crime on public than private transport. If this puts people off using it, it must be addressed."

The project involves six key security measures. Cameras, alarms and

warning systems will all be linked to a central security station, which opened in July and is responsible for monitoring and maintaining security on the city's public transport. When complete, Stockholm will be covered by the following:

■ **General surveillance cameras.** These will be installed throughout the transport network, with an average of 40 cameras at each train and metro station and between four and six on every bus.

■ **Identification cameras.** Predominantly to be installed at underground stations covering escalators, meaning there will be no access to stations without passengers being identified on camera.

■ **Unauthorised track access system.** Intelligent cameras will be installed to warn when a person is on a railway track. If so, an alarm is activated in tunnels and the central security centre will warn drivers.

■ **Fire safety.** State-of-the-art fire alarms are being put in all tunnels and stations, which include toxic gas detection systems.

■ **Help phones.** Help phones will be at stations, offering a direct link to the security centre. Integrated within the phone is a camera, which operators can use to see the caller.

■ **Vandalism database.** A database will be built up, monitoring vandalism patterns. Graffiti is a big problem in Stockholm and the database will monitor individual graffiti artists' 'tags' in the hope of catching artists by predicting their next move.

Security staff study the camera footage to maintain safety on the transport network. If a bus driver activates an emergency call, the location of his bus can be instantly viewed on a GPS map and security centre workers can send out a call for the nearest guard to attend the



Top: Henrik Virro, project manager at SL. Above: Johan Lembre, vice-president, product management

incident. Stockholm's guards have the power to restrain anyone breaking the law or disrupting passengers, but do not have the power to arrest.

Unlike the system at underground stations, cameras on the buses will not feed live video back to the security centre, but a supervised system will allow operators to find the footage they want. Under the supervised system, footage is securely downloaded onto a computer once the vehicle returns to the depot. The cameras are also linked in to an AVL (automatic vehicle location) programme which uses GPS to track vehicle locations on a computerised map.

Axis network cameras

The UK is reported to have more CCTV cameras than any other country in the world, with an estimated four million units capturing each and every one of us 300 times a day. This is likely a result of an attitude of fear weighing in more heavily than the arguments of personal privacy and freedom and the fact that our laws on CCTV cameras are incredibly liberal in comparison to the rest of Europe.

In Sweden, every single camera installed needs a permit granted from the local courts. Permit applications are notoriously difficult and include a technical drawing outlining the camera's position and use and a written explanation outlining its



There's more crime on public transport. If it puts people off it must be addressed

purpose - ie what it is looking at. If someone wants to move the camera, even a few feet, a new permit is needed. Nevertheless, between now and December 2007 thousands of them will be springing up in Stockholm, courtesy of Axis.

For rail and metro stations, a combination of 225FD and 212PTZ cameras were chosen. The 212 serves as an overview device, covering large areas with the ability to zoom in without losing image quality or resolution. The 225 is for professional surveillance in tough conditions.

The bus side of the project will see more than 10,000 installations of the 209FD-R across Stockholm's bus fleet. Each bus will have between four and six cameras, with more on longer, articulated vehicles, including one specifically for driver safety.

Axis' vice president, Johan Lembre, said: "There is a strong demand from bus operators for a cost-effective

surveillance solution that helps secure drivers and commuters, and enables evidence to be clearly captured in an event. The 209FD-R is the first camera on the market that really takes into account the environment on board transit vehicles."

Johan's boss and president of Axis, Ray Mauritsson, cited quality as a key selling point for Axis, saying: "Network video that provides high-quality images, cost-efficient installations and allows security personnel to easily access the material are the advantages that make our network cameras so suitable."

The 209-FD-R was designed to withstand the harsh on-board environments of buses and trains, working even when surrounded by dust, in high humidity and with strong vehicle vibrations.

The whole unit measures just 4cm in height and is surrounded by a tamper-resistant case. As vehicle interiors aren't designed with cameras in mind, the camera has been created for easy installation on curved walls and ceilings, often lined with soft padding, and for it to remain securely in place over time.

The 209FD-R is the world's first network camera specifically designed for use in buses, trains and other forms of public transport and has a built-in tampering alarm, which sends a signal to the security centre when the camera's view is unnaturally obscured or when the unit is damaged.

Analogue vs digital

All of Stockholm's cameras will be part of a fully-digital system. Although there were not many analogue cameras before the start of the security project, those that were installed will be replaced by new digital models, which offer a wide range of benefits over their analogue counterparts.

In recent years, digital network camera technology has caught up with analogue and now meets the same requirements and specifications. In short, an analogue camera is a one-directional signal carrier, which terminates at the recording device. A network camera is fully bi-directional and integrates into the rest of the system. A network camera even communicates with several applications in parallel, to perform various tasks such as detecting motion or sending different streams of video to different places.

Typically, there have been three >

CAMERA SPECIFICATIONS



1



1 Axis 225FD

- Vandal-resistant design and tamper-proof mounting
- Outdoor-proof with built-in heater and fan. Can operate in temperatures down to -20°C
- Automatic day/night mode functionality
- Ethernet-powered
- Simultaneous Motion JPEG and MPEG-4 images
- Up to 30 frames per second in VGA 640x480 resolution
- Motion detection with alarm image buffering
- Two alarm inputs and one output for external devices such as door sensors

2 Axis 212PTZ

- Full overview based on high-quality 3 megapixel sensor and wide-angle lens
- Instant one-click pan (140°, 400°/sec), tilt (105°, 400°/sec) and zoom (3x)
- Pan, tilt and zoom with no moving parts - no wear and tear
- Simultaneous Motion JPEG and MPEG-4 images
- Up to 30 frames per second

in VGA 640x480 resolution in both overview and zoom mode

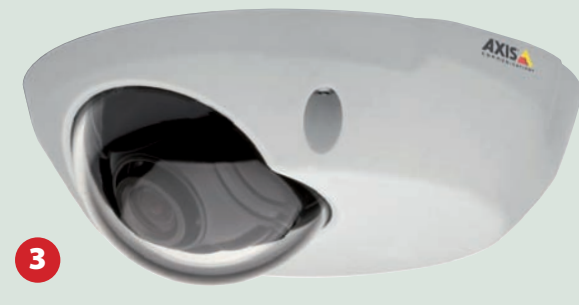
- Ethernet-powered
- Advanced event management including pre- and post-alarm image buffers
- Two-way audio including built-in microphone and audio detection alarm
- One alarm input and one output for external devices such as door sensors

3 Axis 209FD-R

- Robust construction to withstand dust, humidity and vibrations
- Discreet, tamper-resistant casing
- Compact design (4cm high)
- Progressive scan for clear and sharp images
- Up to 30 frames per second in VGA 640x480 resolution
- Simultaneous Motion JPEG and MPEG-4 images
- Ethernet-powered
- High security with multi-level passwords, IP address filtering and HTTPS encryption



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types of analogue CCTV systems and two types of digital systems. Stockholm's cameras will all be digital, which is not only considered by many to produce better images, but digital is easier to manage and, with more functions than an analogue camera, can be more effective.

The shift from analogue to digital cameras has been a relatively slow one, in comparison to other digital technologies, as the co-founder of Axis, Martin Gren explains: "If you look at how fast black and white television moved into colour and then to digital, or how the Walkman was replaced by the iPod, our analogue to digital switch has been far slower.

"We have just below one million installations of our products worldwide, but the hope for the future is obviously that once people start switching, the company will grow as a result."

Old analogue systems used VHS to record the images, which was clearly expensive, time-consuming and produced inconsistent image qualities compared to digital.

We don't want to catch shoplifters, we want to stop them doing it in the first place

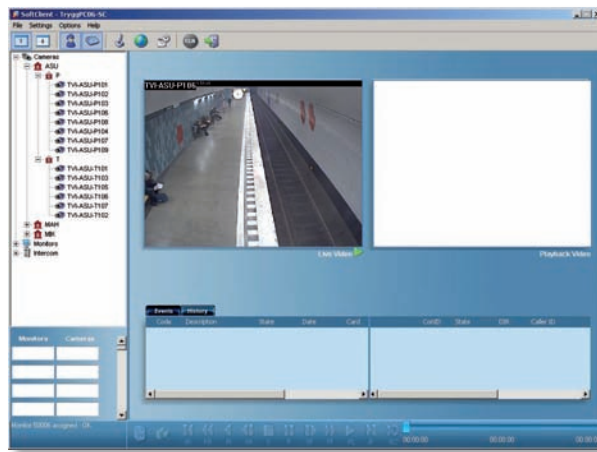
Analogue systems now tend to be linked to DVRs, which have replaced the old video tape with a recordable hard drive.

The images are digitalised and compressed in order to fit as much footage onto the drive as possible, but with modern hard drives getting bigger all the time, space is less of an issue.

The most advanced analogue systems include a network switch to send the images from the hard drive to computers, so operators can monitor footage from head offices, rather than having to wait for the footage to come to them.

Some systems can monitor live and recorded footage, while some can only monitor recorded.

A network video system replaces the hard drive with a server, which then passes footage on to a



computer via a network switch. Such systems are still compatible with old, analogue cameras, but with the added advantage of off-site recording and easy future upgrading. It is far easier to upgrade a video server system to incorporate digital cameras than an old VHS or DVR system.

The latest in camera technology is what Stockholm has invested in - a network video system using network cameras. A network camera is a camera and computer in one unit. Images are captured, then digitalised and compressed by the camera. The video is then transported over an IP-based network and is recorded to a PC. Not one component of the system is analogue.

A network video system using network cameras has the advantage of employing high-resolution cameras, which are capable of producing consistent image quality.

Cameras can also be powered over Ethernet wires and have pan/tilt/zoom functions.

Some of the more impressive functions of digital cameras are their in-built ability to report suspicious behaviour when captured. This is vital, because it has been suggested in various case studies that camera monitoring professionals are often not effective.

Typically, a security officer will have to simultaneously view large numbers of screens and there is the possibility of missing incidents, which in turn means action will typically be reactive.

Intelligent cameras are proactive, so rather than looking to prosecute individuals after the damage is done, they provide the best chance of preventing that damage in the first instance.

Checkpoint systems is a multinational manufacturer of technology-driven solutions to protect people and assets. Using a combination of Axis products and software, they hope to reduce Europe's



From top: View of one of Stockholm's underground station platforms; Ray Mauritson, president, Axis; Martin Gren, co-founder, Axis

annual loss suffered from retail crime, which currently stands at more than €32 billion.

Simon Edgar, Checkpoint's European business manager outlines the need for businesses to protect their assets: "The size of the problem here is huge. Customer theft is only a small part. It has been shown that staff actually steal more than customers now in just about every industry you can think of. The UK is the worst in Europe for this.

"What we want isn't to catch the shoplifters or members of staff helping themselves, but to stop them doing it in the first place. The solutions we provide will do this, thanks to Axis cameras and state-of-the-art software systems."

Axis looking to the future

Axis Communications introduced the world to the first network camera ten years ago. Since 1996, it has seen a decade of steady, but slow, growth. As business' in the public sector gobbled up the rewards of the .com boom, Axis plugged away to get to where it is today - the world leader of network digital video systems with around a 25% share in the market - double that of its nearest competitor.

Despite the temptation to get in on the act, Axis stuck to its guns, as co-founder Martin Gren explains: "We have no desire to join the Japanese firms and become a low-cost camera company. We are a professional video camera manufacturer, aiming our products at businesses and we shouldn't lose sight of that."

Recently named number 13 in the top 50 security companies in the world based on financial results (an 11-place leap from last year), 2006 has been a good year for the security specialists. The company's vision for the future is summarised as "5x5" - it wants to be five times bigger in five years time - and based on the quality of its cameras, there is no reason why it shouldn't be.

SL is the biggest transport operator to place an order with the camera manufacturer to date, and with the last unit scheduled to be installed by this time next year, it is hoped operators in other parts of the world will be keeping an eye on the unrivalled safety features that Stockholm's buses, trains and metro are set to enjoy.

■ Axis Communications' UK base is in Preston, Hertfordshire, and can be contacted on 0870 1620047 or by emailing steve.gorski@axis.com.