Improving Security across an Expanding Site

How Treviglas College in Cornwall, UK, used Axis IP-Surveillance and Power over Ethernet to ensure cost-effective, high quality security across an expanding site

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Treviglas Community College – in brief

Treviglas Community College is a purpose-built 11-18 comprehensive college situated on the outskirts of Newquay in Cornwall, England, and serving more than 1,200 pupils from local villages and towns within a 15-mile radius. The college employs a total of 128 people including teachers, administrative and auxiliary staff.

Treviglas – The growth story

Opened in the early 1960s, Treviglas Community College has enjoyed continual expansion over the last forty years. Recent developments include the fitting out of a new sports hall, the building of a new entrance hall and reception office, a new sixth form learning centre, a professional-standard catering room, two new science laboratories, and a new music technology department and recording studio.

Treviglas College has been a Cisco Networking Academy since 2001 and is also unique in offering the UK's first Surf Academy to sixth formers. This practical course is specifically designed to encourage pupils that would otherwise have left school at 16, to stay on and study something they enjoy.

This expansion has triggered a large building programme which is set to significantly increase the size of the college premises by the end of 2007.

Treviglas College's computer resources and network infrastructure

The college uses the School Information Management application called SIMS (*School Information Management System*). SIMS is a custom-built application for schools, helping them to develop and maintain timetables, hold school registration and attendance lists, manage finances and store examination and grading data.

The college network includes a total of 350 devices, mainly RM PCs and Dell laptops, distributed throughout the college. The college has also installed an access control system for securing admission to sixth form areas in order to restrict one part of the college to sixth formers only. This is a network-based system which allows those with swipe cards that can be linked to a SQL database record access to these restricted areas.

The college's IT department has worked alongside local IT integrator and consultancy Perkins Communications during an extensive upgrade of its network infrastructure over the last two years. Perkins supported the in-house team in building a new 3Com Gigabit Switched Local Area Network (LAN) and incorporating 3Com Power over Ethernet-enabled switches managing the college's data and video traffic. Wireless access was provided in the staff room to handle peak demand for network access. It is also being used to provide connections to 5 temporary classroom buildings.

Specifying new surveillance system requirements

It was clear as far back as 2003 that the traditional analogue-based CCTV system the college used had not been meeting the needs of the college for some time.

Gary Durbin, Assistant Headteacher, explained: "*The old system had often left staff compromised because we could not be sure who had been involved in a recorded incident and we found ourselves backing away on several occasions from accusing individuals of misdemeanours because of poor quality CCTV images.*"

Any new system, it was ruled, had to generate and efficiently store images of sufficient quality to positively identify individuals for use as evidence when needing to take action against anyone perpetrating an action against the site or against another person. The system was also seen as a way in which an effective deterrent to any poor behaviour amongst pupils could be established, particularly when pupils viewed each others' behaviour on screen.

Treviglas College's Headteacher, Helen Mathieson, also felt that it was important to cover high density traffic areas such as corridors and stair-wells. Significant numbers and the ensuing pushing and shoving could actually be dangerous from a health and safety perspective as well as potentially allowing bullying.

Helen Mathieson concluded that improvement to the CCTV system was pivotal. She also recognised that the work Perkins Communications had already done in helping to upgrade the college's network placed the firm in a unique position to review the deficiencies of the existing security system and provide recommendation for the best route to improvement of these systems. Mrs Mathieson accordingly commissioned Perkins Communications to produce a report on the shortcomings of the existing system and make recommendations for improving and updating it. This report was completed in March 2004.

"*The old system had often left staff compromised because we could not be sure who had been involved in a recorded incident.*"

The IP Way

The cost of bringing the existing system up to scratch was estimated to be close to £7,000. The report also detailed the equivalent cost of creating a new IP-surveillance system using the latest software provided by Milestone and network cameras and video servers provided by Axis Communications. The total cost for the IP-Surveillance system, it was estimated, would be about £20,000 once a new server was purchased to help store video data, and new cameras were purchased, configured and integrated. This estimate also included redeployment of eight existing CCTV cameras via two video servers into the new networked IP-Surveillance system. Perkins also identified a possible area of savings by deploying Power over Ethernet-enabled Axis network cameras to eliminate costs that would otherwise be associated with running electrical wiring to new cameras.

> "*The college's IT team recognised the benefits of using the up-to-date and well-maintained network and the CAT 5e cabling infrastructure already in place.*"

Perkins report reveals CCTV system had been poorly maintained

The Perkins report revealed the college had a poorly maintained black and white CCTV system which was installed in 1995, and outages and requirement for repairs had become frequent from 1998 onwards.

Of the total of 16 CCTV cameras deployed across the site in 1995, only three were producing reasonable pictures nine years later. Four were completely unusable and required replacement whilst others were out of focus, corroded, incorrectly sited and/or required refocusing and the fitting of auto iris control to reduce picture flare.

Cable glands on some of the external camera housings were undone due to locking nuts on the glands being incorrectly fitted originally. The lack of a preventative maintenance schedule over the years had allowed insects, moisture and salt to enter the housings with inevitable results. Coaxial cabling had been laid loose across the roofs of college buildings, which had created a tripping hazard for those maintaining roofs. Some of the coaxial cable was of poor quality and was clearly contributing to poor image quality. The old main multiplexer unit was also found to be causing interference and fading and was in urgent need of replacement.

Keith Perkins, Proprietor and Consultant, Perkins Communications, explained: "*The cables for several of the CCTV cameras ran to junction boxes on the flat roofs of the college. Mechanical joints had been made without any adequate waterproofing. The boxes were sited in areas prone to the build-up of rainwater. So, within about three years the sealing around the lids of the boxes and cable glands had perished. Water had seeped into the cabling, creating outages. In one case two cables had been inserted through the same compression gland!*"

The report also detailed that image quality degradation was further accentuated through the use of poor quality VHS tapes which had been over-used and not rotated effectively.

Tender process

Following the report, a number of local CCTV installers were invited to tender along with Perkins Communications. One estimate came in marginally below Perkins Communications' bid and one was significantly higher.

The college's IT team favoured an IP-based surveillance solution having already trialed a network camera several years previously and recognised the benefits of using the up-to-date and well-maintained network and the CAT 5e cabling infrastructure already in place across all the buildings of the college.

So, in June 2004, after a period of two months for submission and consideration of the tenders, Perkins Communications was awarded the contract and installation work began.

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The new IP-Surveillance system – in depth
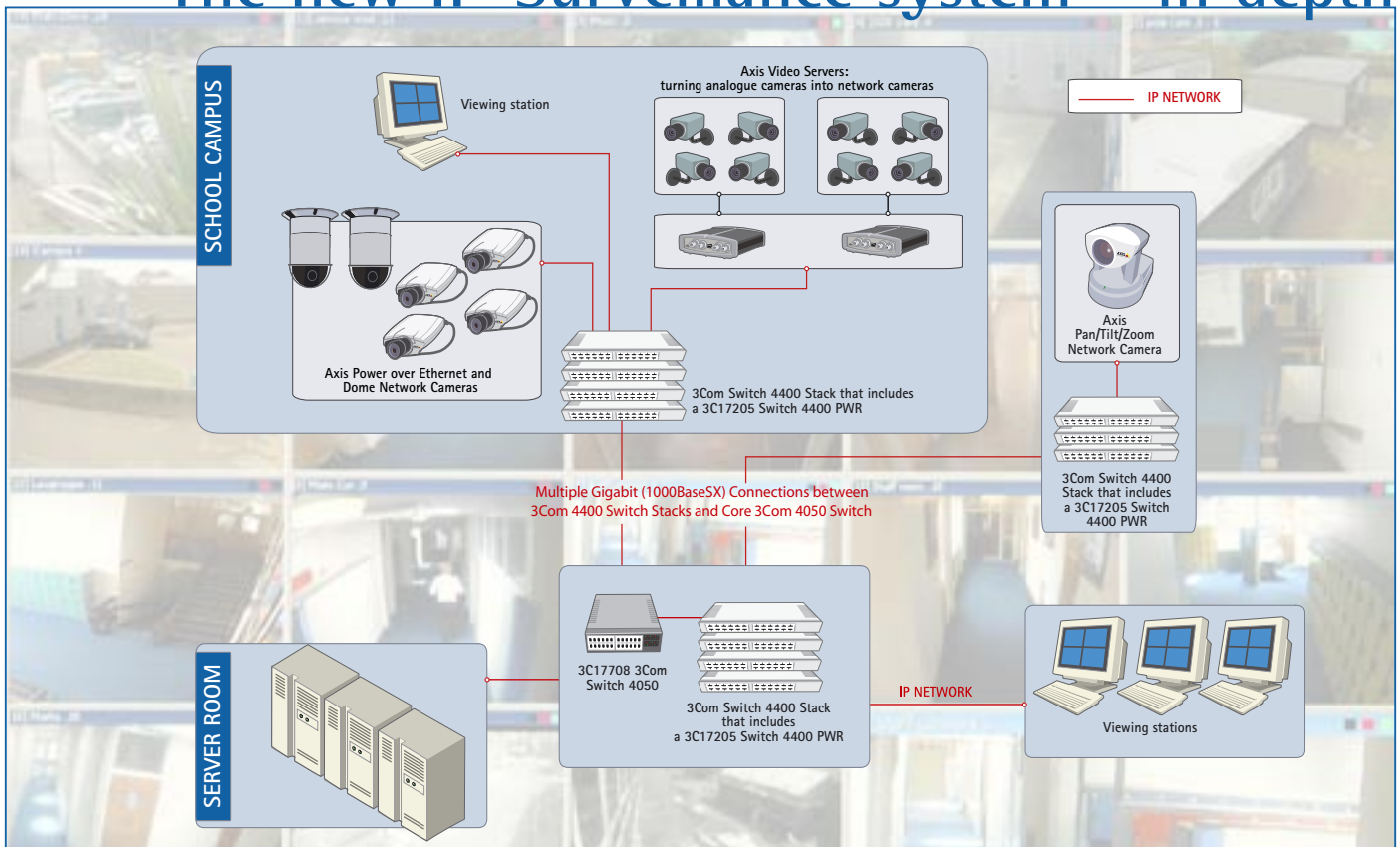
Two AXIS 241Q Video Servers with four analogue cameras on each are deployed to take images from existing analogue cameras and relay them into the network. A total of 18 AXIS 211 Power-over-Ethernet Network Cameras, and one AXIS 2130 PTZ Network Camera were deployed across the entire campus. A total of 27 cameras feed into the Milestone XProtect Enterprise Version 5.0 system for handling, storage and management of camera output.

The AXIS 2130 Pan Tilt Zoom Network Camera is situated on an eight metre tilt over column in a glass dome housing and provides coverage over the adjoining primary school's playground as well as the college buildings and playing fields. Since the establishment of this PTZ, problems of vandalism across both sites have been very noticeably reduced.

A Dell Server with 700 Gigabit SATA Drives has been deployed to hold all images. Image recording is triggered on motion and records at maximum of 25 frames per second using medium compression ratios and 640x480 resolutions for viewing.

Images are kept for nine days and are archived for a total of 30 days, these are archived on both hard drives and Sony Ait 3 drive with 100 GB tape storage.

The caretakers of the college are specifically tasked with checking the units for any evidence of damage and reporting any maintenance requirements to the IT department to avoid deterioration in quality of output over time. They work until 10PM and then a private security company begins work to patrol the grounds through the night.

The benefits of Power over Ethernet

The use of AXIS 211 Power over Ethernet (PoE) Network Cameras made sense for several reasons. In particular, corridors there had very few power outlets and those that were there were not situated at ceiling height, creating the need for a great deal of wiring if the college was going to provide power to devices in the traditional way. The presence of asbestos ceiling tiles in one building meant that any new wires would have to have been carried in unsightly plastic retainers which tended to fall or be ripped off walls and ceilings over time.

Keith Perkins expands on the benefits of centralised power management for IP-Surveillance systems: "*PoE has a potential additional advantage of building greater resilience into the surveillance system. A UPS (Uninterruptible Power Supply) or 3Com's redundant power supply can very easily be connected to each 3Com 4400 Switch PWR. In other words, if electricity supply is lost due to tripping or a fault in the local sub station, the surveillance system can continue running alongside the college's computer network. Their core network switch and server can also be protected by this same UPS.*"

PoE was also favoured because in June 2003 there had been an incident in which someone had disabled a camera simply by opening up the fused supply box connected to a specific camera associated with the device. That illustrated another benefit of going down the PoE route.

The cost per camera of providing a wired electricity supply to a camera is close to £100 based on £70 cost of the electrician's time for a half day and a further £30 in cabling, fuse box and other materials. Cost savings would have amounted to £1,800 for the 18 new cameras being deployed across the college. These savings were enough to immediately pay for any costs associated with buying and deploying PoE-enabled switches that in total could power 120 devices. PoE usage also enables much more cost-effective extending of the system as requirements and college premises expand in the future.

Video evidence at the click of a mouse

Video evidence is only one click away. One notable benefit of installing the new PTZ camera overlooking the playing fields was to eliminate the smoking that used to go on behind a large tree in the corner of the playing fields. Gary Durbin explains: "*It was a nightmare job for teachers to walk out some 300 yards from the college buildings to the far corner of the playing fields knowing full well that by the time you get there the smokers would have moved elsewhere. By illustrating to known culprits that we could now zoom in on the tree to a degree that we could positively identify them, we were able to stamp out smoking in this area almost entirely.*"

Securing access to cameras

To avoid any possible abuse or misuse of access to surveillance images, access to the cameras direct from web browsers was barred by ensuring that username and password access is strictly enforced. A setting on the cameras also prevents anyone accessing the cameras from a device located on Treviglas network.

Peter Botterill, Network Manager for the college explains: "*The fact that students sitting on the college LAN cannot even find the cameras on the network, let alone access them without authorisation, adds an extra layer of security which we were keen to have in place from the outset.*"

New IP-based system ensures quality of output and reliability

Gary Durbin explains a clear benefit of the quality of output of the new cameras: "*We have used video evidence to explore alleged vandalism of a car on college grounds. In one particular case we found that a teacher, who had claimed to have had his car damaged in the car park of the college had, in fact, arrived in the morning with the dent already in his car door but he had not spotted it before arriving. These sorts of incidents have been easily sorted out without wasting senior management time and avoiding unnecessary creation of ill-feeling. It's only possible to deal effectively with these sorts of incidents because of the quality of images we are getting from the new cameras.*"

Gary Durbin concludes: "*The new system is completely reliable. Authorised staff have come to trust the system to the point where they now drop into the IT department to ask specific designated contacts there to locate a security event that they have heard about or witnessed earlier in the day. It's always there and the quality is always high enough to identify individuals.*"

Into the future: extending the IP-Surveillance system

The college is planning to deploy additional Axis network cameras to monitor remaining boundaries of the college. It is also considering installing cameras in the reception area to monitor traffic in and out of the main door and to ensure all visitors report to reception before going any further into the building.

A fibre optic cable links the primary school next door and there have been discussions about extending Treviglas' IP-Surveillance system to cover the primary school as well. The Milestone XProtect system also offers the capability of integrating the access control system with the college's IP-Surveillance system over time; pupils using swipe cards to go into restricted areas will thus trigger video recording so that visual identification of card holders can be verified.

Benefits in brief

Savings
Treviglas College has been able to use an upgrade of its network infrastructure to review whether another key application – its surveillance system – could be effectively brought into the network and upgraded simultaneously. The fact that these two pieces of work have happened sequentially, working with the same local integration partner Perkins, has led to savings in that very little additional network equipment was required and significant installation savings were gleaned from deploying Power over Ethernet cameras.

Reliability and scalability
The result is that the college now has an up-to-date, fully functioning and comprehensive IP-Surveillance system which is expandable as the college grows and requirements change. Maintenance is now properly managed through close co-operation between the college's caretaker and IT department.

Peace of mind
The system delivers high quality coverage of the college's buildings and grounds such that teachers have come to trust it to deliver images of sufficient quality to support discipline college-wide and identify intruders to help increase the peace of mind of staff, parents and pupils.

Helen Mathieson concluded: "*The new surveillance system is now an effective deterrent against any intrusion and anti-social behaviour on college grounds. It also reinforces our desire to create a safe environment for students, something which the Department for Education and local education authorities would find extremely interesting.*"

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About Axis

Axis increases the value of network solutions. The company is an innovative market leader in network video and print servers. Axis' products and solutions are focused on applications such as security, surveillance, remote monitoring and document management. The products are based on in-house developed chip technology, which is also sold to third parties.

Axis was founded in 1984 and is listed on the Stockholmsbörsen (XSSE: AXIS) Attract 40-list. Axis operates globally with offices in 16 countries and in cooperation with distributors, system integrators and OEM partners in 70 countries. Markets outside Sweden account for more than 95% of sales. Information about Axis can be found at **www.axis.com**

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