BY JOHN ADAMS

Textbook solution

Electronic security integrator Independent Locksmiths & Security has installed a Milestone IP-based video management solution incorporating Axis and Mobotix cameras, along with Crow AcNet Pro access control at Arthur Phillip High School in Parramatta.

IF there's a classic application in which networked electronic security solutions leverage existing infrastructure it's educational facilities including schools and universities. The key element is the significant investment schools make in their educational computer networks and Arthur Phillip High School in Parramatta is no exception to this rule.

With more than 1500 students, many with laptops, Arthur Phillip High School (APHS) has its own wireless network as well as a 1GB fibre LAN supplemented by a laser link connecting its central server room to remote buildings across split campuses on either side of Macquarie St.

APHS' decision to go with an IP security solution coincided neatly with the NSW Department of Education and Training's investment of nearly $A1 billion in the Computers in Schools Program. This investment saw powerful new IT infrastructure installed at APHS. Important too, it meant that as the new network was installed, the legacy network could be populated by IP surveillance and access control devices.

Supporting the IP security solution at APHS was a grant from the national Secure Schools Program which was set up to help at-risk schools offer safe and secure environments for students and teachers. Given APHS's situation in what is now a buzzing business and recreation hub, enhancing security was vital to the school.

NUTS AND BOLTS

Before we get further into this, let's look at what integrator Independent Locksmiths & Security installed for APHS. For a start the system is built around elements of the school's existing network. The network itself is a quality solution and the IP security solutions maintain this standard by using HP Procurve switches and other high quality components.

On the access control side, APHS is using Crow's AcNet Pro, supplied by LSC, an access control solution with serious flexibility and power. The Crow AcNet solution is modular and starts with small standalone door controllers that can be expanded by linking IP-enabled door controllers to ProNet management software on a PC. At APHS this connection is across the site's LAN.

The Crow AcNet controllers can manage everything from access to lifts, parking, guard patrols, CCTV and time and attendance, so there's plenty of room for expansion in the future. Distributed intelligence is a virtual element of any access solution but importantly with AcNet, cardholder parameters defined at the head-end are immediately pushed down the line to all door controllers.

(from left, rear) Ryan McGovern (ILS), Brad Main (APHS), Mark McKinney (ILS) From left front) Ben Sampson (ILS), Tas Maniatis (Milestone), Angelo Salvatore (Milestone), Ian McKinnon (LAN1)

These smarts go both ways because ProNet gives the system global reflexes that mean alarms and alerts can be generated based on predefined events anywhere in the system. In terms of its operation, ProNet gives system operators a view of movements through doors and alarms in real time. There's also polling mode, separated logs for alarms and access control, all doors open in case of fire and diagnostic tools. All in all, Crow AcNet Pro is a solid solution.

The access control system at APHS includes 130 doors and gates, and uses the school's TCP/IP network to communicate with the ProNet head end. It includes a clever integration of the school bell system with access controlled auto gates onto Macquarie St, allowing gates to open when the school bell is rung.

To allow integration of this function with the Milestone software Independent Locksmiths & Security created a soft button on the VMS and installed an Advantech ADAM 6060 input output module which integrates to the access control system and allows opening and closing of gates.

Next comes CCTV. The IP surveillance solution at APHS employs Milestone XProtect Enterprise 7.0 as the video management system. On the network side the system includes Axis encoders to link 16 analogue cameras over the legacy IP network, as well as a mix of 22 Mobotix D12 and D24 cameras, and some Axis IP cameras including the vandal resistant P3343-VE.

The video control station in the staff room includes 6 x 40-inch LCD monitors and this allows teaching staff to keep an eye on the school. Assisting monitoring further is iRa C3 installed on iPhones and an iPad, which allows staff to keep an eye on the system while moving around the site.

iRa on the iPad

THE SOLUTION

When I turn up at APHS it's easy to see the need for a capable security solution. Parramatta has grown enormously in recent years and the low-rise, heritage fascia of the school's main building – the oldest school building still used in Sydney - is dwarfed by the larger buildings that surround it. Given the changing situation here it's clear that providing adequate security and safety for teaching staff and students is vital.

While the need for safety and security is the big driver, the associated decision to go with an IP-based solution reflects the progressive nature of the school's senior staff. Given APHS's solid academic record and commitment to technology it's no great surprise to find a pioneering spirit driving what is the tidiest security solution I've ever seen in a high school – here or overseas.

Getting electronic security onto the network was a task that fell to Arthur Philip High School's deputy principal, Brad Main, with enthusiastic support from APHS principal, Lynne Goodwin. According to Main, the decision to go IP was logical once it was established there was a need to improve the security of the school's campuses.

"By virtue of our location in the middle of Parramatta we were identified by the NSW Dept. of Education and Training as being eligible to apply for a grant under the Secure Schools Program," Main explains. "We considered our needs and found they applied mostly to the perimeter of the school but there had been incidents within schools in the area around us that involved outsiders invading the grounds.

"That's what got us starting off very small at the front door with access control to the main building and then we decided to access control gates to secure access to the split site. From this point, we moved on to controlling access to classrooms in buildings around the site while at the same time we looked at upgrading our existing surveillance system."

According to Main, not long after APHS started moving on their security project, DET announced the Digital Education Revolution which incorporated a centrally managed network in NSW schools supporting 1500 networked laptops for students and 150 for staff.

"This new network was an improvement on what we had in place and it freed up the legacy network for electronic security," Main says. "The new school-wide network is a robust system of high standard. "We have a 1G laser link between the 2 sides of the school. There's Fast Ethernet throughout buildings and 1G fibre links from building switches back to the server room.

"The installation of the new network meant we also had wireless coverage on the campuses on both sides of Macquarie St. But the key element of the network upgrade was that the old IP network was still functional and free for our use to carry security traffic.

"Rather than re-cabling everything we thought we'd rather tap into what we had already paid for," Main explains.

While APHS had no access control system in place at the beginning of the project, there was a legacy video surveillance solution and it was decided to integrate still useful elements of this solution while removing inadequate elements, including the DVR.

"The analogue video surveillance system was particularly unreliable," Main explains. "Every time we tried to look for information on the system it was either not there or we were unable to see or access it."

Main says that while upgrading the access control system it was clear that it would be best to integrate

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an enhanced surveillance system into protection of school entrances.

"Ryan McGovern from Independent Locksmiths & Security who was installing the networked access control system suggested we keep the analogue cameras. He recommended using encoders to integrate them into a hybrid surveillance solution with the head end and monitoring screens located in the staff room and we liked this idea.

"Ryan always maintained we should have a plan for expansion which we would not need to implement but that would make things much easier if we ever decided to do so," Main explains. "As it happens, we have finished phase 2 of the security upgrade and are now starting phase 3, which is the elimination of blind spots in the system."

Storage server

Main says the process of installation has taken about 2 years with a lot of that time spent getting the necessary funding – he says once the funding happened the installation was very quick.

"The installation itself began in December 2009," he says. "Things really started when year 10 and 12 had finished for the year leaving us with empty classrooms. At the same time funding came through we had finished our specification and things went from there," Main explains.

"It was just a matter of asking where the installers wanted to start and scheduling classes away from that area. A few weeks later it was Christmas holidays so the entire school was free. We started out by installing the access control systems and this job was finished in January."

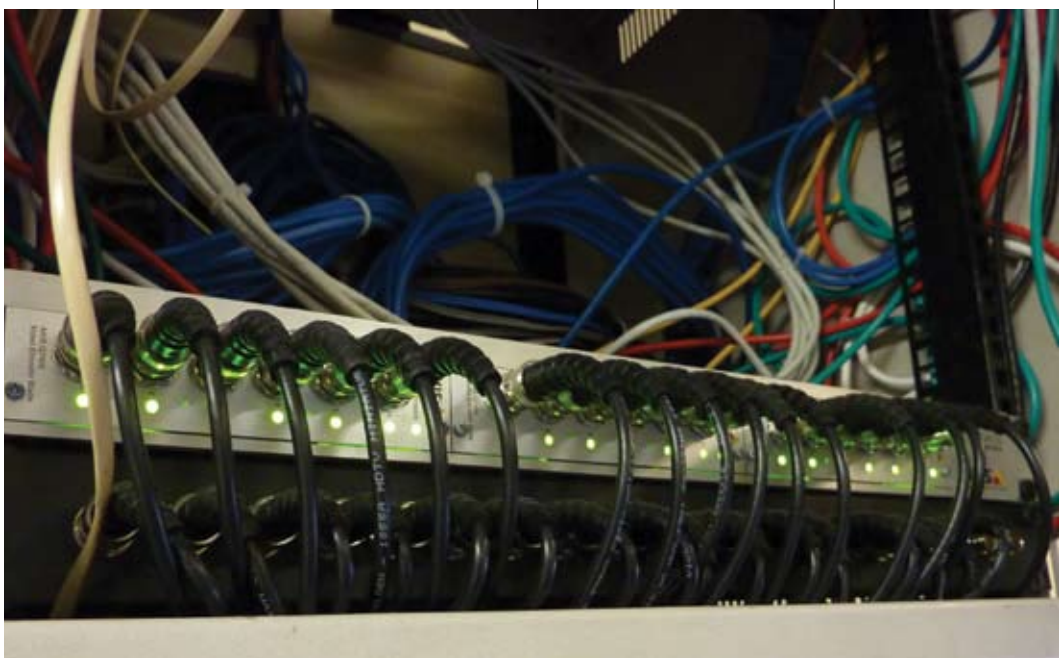
THE INSTALLATION

Much of the credit for this system has to go to Independent Locksmiths & Security and to general manager, Ryan McGovern, whose commitment to expanding a family business into a serious integration contender is palpable.

Independent Locksmiths kicked off its integration division with access control but the inclusion of IP surveillance into this mix takes things up a notch. According to McGovern, the switch to networked electronic security has been a big learning curve.

"It's a different skill-set to locksmithing," he explains. "In terms of this job, APHS was an existing locksmithing client and we installed some access control doors for them and it just went from there. Importantly, this is a trusted and longstanding relationship. We support the school's keying information, we are local having been based in the Parramatta area for 35 years – there's a loyalty there."

Axis encoder



McGovern says a big part of the success of the installation at APHS was having the right people for the job.

"We recently employed Ben Sampson, formerly of CSD, who had helped us with some Concept installations – delivery, installation and commissioning, and supporting our techs in the field," McGovern says.

"We got to know Ben pretty well – he knew the direction we wanted to take with the business – when there was an opening available he joined

our team. Ben's very strong with integration, making things talk to each other, he knows operating systems and how to get the best out of technology. That was a big help to us at APHS."

Of the decision to go with a networked solution, McGovern says with the government investing so much in IP infrastructure in schools it made sense for APHS to go down the IP route.

"They already have building distributors and a campus distributor in the server room – leveraging these was the best solution. Off the building distributor there are switches with Cat-5 radiating out to the data outlets and fibre back to the head end.

"So from everyone's perspective the beauty of IP was easier installation and expansion. IP means if we have a blind spot over in a corner of the school or we need to provide another door controller we just need to find the nearest data point – which might be on the other side of a wall in a class room," he explains.

"We then find a secure location in a nearby store room and cable back to that, address the camera and straight away it will be up and running. Making things easier, all the IP cameras are PoE and are supported by PoE switches around the site. Expanding the access control side is easier, too."

According to McGovern, the Independent Locksmiths & Security team installed the access control system first.

"The installation of Crow AcNet was very simple. The panels are in a store room and serve the readers in nearby corridors and entrance points. There is no physical head end – the head end is a software solution on an authorised computer which can be wherever you want.

"We chose AcNet because it's a capable solution that did all APHS needed. It has battery backup, the audit trail is dumped to a workstation over the network - it's also an affordable solution given the networking capability and the system architecture, which is a network of 2-door and 4-door modules," McGovern says.

"Importantly, the fact there's no physical head end means there's no running cables to one or more central points. Instead we can just use the network between buildings."

As part of the tour of the APHS site, we take a look at one of the locations in which the AcNet panels are installed and it's as tidy as you'd expect, with power and RS-485 on one side of the panel and RJ-45 on the other.

"During the access installation we put in our 2-door access controllers in classroom blocks in locations with data points in them," McGovern explains. "Structurally we have a TCP/IP 2 access control unit and normal 485-bus controllers piggybacked off that and they cable out to the doors locally.

"Operationally, the idea with the access control is to be able to monitor the flow of students and to view issues in the playground and to do it from the staff room. Obviously that vision included access control and CCTV."

According to McGovern, the access control system gives teachers the ability to manage access remotely as well as automatically control access to various entries across the site.

"The playground is across the road and the students can go and play there during recess and lunch," he says. "We installed gates on either side of Macquarie St and integrated the access control system with the bell system so the gates could operate when ringing the bell.

"So from everyone's perspective the beauty of IP was easier installation and expansion. IP means if we have a blind spot over in a corner of the school or we need to provide another door controller we just need to find the nearest data point – which might be on the other side of a wall in a class room"

Ryan McGovern, Independent Locksmiths & Security

"The way it works is that when the bell goes for recess, the gates to play areas across the street open. When the bell goes for the end of recess the gates trigger a relay on the access control system which powers a motor and the gates close.

"We now have that on soft buttons on the Milestone XProtect software in the staff room so if teachers viewing CCTV screens see students inside the secure playground or waiting to go into the playground at set times they can open the gates remotely."

Meanwhile, Main says the beauty of the access control solution from the point of view of teaching staff is that it has improved student attendance, as well as improving safety and security.

"The access control system has improved attendance in classes," he explains. "There are warning bells to indicate classes will start in ten minutes and then the gates close. So the kids make sure they are where they need to be or they are inconvenienced by having to explain to teachers why they are in the wrong places."

An interesting feature of access controlled classrooms is that students cannot go into class until a teacher has arrived with their access credential. This characteristic of the system improves security in classrooms as well as encouraging better behaviour.

"A feature of Crow's ProNet network software is that it can integrate with video surveillance and we're currently working on proof of concept so as to allow this additional layer of integration at APHS," says McGovern.

"The way this integraton would work is that in the access control event log, a symbol of an image comes up thanks to an event like Access Denied, allowing operators to call up footage of that event from an associated camera."

VIDEO SURVEILLANCE

While the access control side was not a stretch for Independent, McGovern says things weren't so easy with the IP video solution.

"The access control installation was fairly straightforward for us," he explains. "But there was a learning curve with the IP surveillance in terms of getting everything talking and recording. It's a lot more sophisticated getting an IP solution working than installing analogue and a DVR, where you run coaxial cable and just plug it in – it's a whole other world.

"You are moving into server-based software applications, IP addressing, subnets, IP configs. Getting a camera going on the other side of the school – there's a world of learning in it which blurs the edges of security and IT."

But according to McGovern, once these challenges are dealt with, the beauty of IP is that you can utilise nearby data points.

"As I said earlier, IP means you are using existing infrastructure and it is comparatively inexpensive to expand – you are not burning

endless hours and investing tens of thousands to pull cable back to a distant head end," he explains.

"Decentralised systems are beautiful to upgrade. You install the camera – cable it back to a store room switch point, plug it in address it and the camera is running. It's the same simplicity with the Crow AcNet access control system."

Once the access control solution was in place the installation team waited until the Easter break to install the video surveillance system.

"The CCTV installation was carried out over Easter," says McGovern. "It included the analogue cameras we had taken onto the network with encoders, as well as Mobotix D12 180 degree cameras in the quadrangle that we'd cabled up as part of phase one.

"There was a DVR in the old analogue system and all the coax was cabled to that location. During the upgrade we installed an Axis 4-Blade encoder and pulled all the coax to that 1RU unit and into a coax patch panel – each channel with an IP address to get it onto the network.

"We specced the job for 65 cameras-plus so there is 20TB of storage on 5 Snap 410 servers that we installed in Phase One with an HP Blade Server," McGovern explains. "We used Milestone Enterprise software because it supports multiple recording servers – when we get to 40 cameras we will pop another of those servers in."

A wander through the school grounds shows that camera coverage is extensive with solid views of corridors, playgrounds, entries, the perimeter and the staff and visitor carpark. While there are some older analogue cameras on the site, the bigger jobs are handled by more powerful units.

"We are using the Mobotix D12 with dual day lenses in the playground to give us 180 views during the day," says McGovern. "We capture the entire playground with just 3 of those cameras. You don't get a perfect horizon on these cameras but the view is very good."

Later when we're checking out the camera views in the staff room it's clear McGovern is right. The images are very good. This isn't surprising given the system's heavy hitters are powerful Mobotix

megapixel cameras – D12s and D24s, supported by Axis IP cameras and legacy analogue over Axis encoders.

The Mobotix cameras are dealing with backlight very well and delivering their trademark depth of field. In terms of set up, the camera views are excellent, allowing a good view of most the school and corridors with some healthy overlap.

Pulling all the surveillance components together is an HP server in tidy rack space in the server room, which gathers in video signals from remote buildings and swings them over to storage servers as well as making them available in the staff room across the network.

"Down here we have the HP server which is running XProtect Enterprise software and we have our 5 snap servers here – each has 4TB," explains Independent's Ben Sampson. "The Mobotix cameras are recording at 3MP four frames per second, while the analogue cameras are recording at 4xCIF, 25 frames per second so there's a need for plenty of storage.

"The overall layout includes a D-Link Layer 3 switch and there are cables running off to the snap servers and cables going to the APHS network for transmission to the staff room. That's really the entire solution."

THE VIDEO WALL

Our next port of call is the video wall in the staff room. It's a tidy job and from the perspective of a school install, it's a serious setup with six 40-inch LCDs mounted in banks of two. I've seen industrial sites with less viewing horsepower than APHS has.

The screens are directly opposite a long, central table and this allows staff to keep an eye on the school grounds. There's a control station on a bench under the screens and an-off-the-shelf server is installed adjacent as a Milestone client and

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> *Brad Main*

manages display duties. Allowing additional flexibility is an iPad with an app from Lexech Labs that allows viewing of camera scenes over the 3G network.

"We decided the control centre should be the staff room and the video wall and control station have evolved as we have gone along," explains Main. "We originally had the 2 screens with a view to going to 4 but our principal was so impressed with it that we decided to go up to six.

"In this configuration the surveillance system works well and has changed teacher and student behaviour. Students will say "Look on the cameras and you'll see" and teachers will check footage so they come from a position of knowing exactly what happened in the event of an incident. Teachers can also stand near the cameras so encounters with students are recorded."

Central to the video wall is the performance of Milestone's XProtect Solution.

According to Ben Sampson, just after Independent started the installation there was a new release of XProtect Enterprise.

"As soon as this upgrade came out we installed it and it has worked flawlessly," Sampsom says.

A particular feature of the system is a synchronised screens function which is extremely useful for tracking incidents around the school. You can launch a view or a camera and the system gives a list of thumbnails refreshed for motion that you can scroll through.

When you find the event you are looking for, you can play it back in the preview window, move the screen, synchronise and double click so all the displays are synchronised to the same time. This means you can follow a recorded incident around the whole campus across all cameras in 'real time'.

McGovern says another neat feature of Milestone XProtect is that it allows you to swap cameras between screens.

"You can right click, send to, and drag and drop the camera view to another screen – it means you're not logging onto separate computers to manage each screen – it's very easy."

CONCLUSION

McGovern is justifiably pleased with the system installed at APHS but he says there were a few issues during installation.

"There were some network issues. We were relying on a network that we did not run, through switches that we did not commission and in the event of a problem you are left wondering is it the camera, is it the VMS, is it the network?" he explains.

"So there were challenges there. With a system this size you need to make sure nothing is missed. The biggest challenge for us was getting our heads around IP and getting the server built and commissioned and linked to the network storage – but we're pros now. It's one of those things."

According to McGovern, the Milestone software has been excellent.

"The reason we embraced Milestone is the philosophy of open platform," he explains. "Open platform is the future – we like the integration with handhelds and we know that if we see some new camera or device that offers greater functionality we can incorporate it into a Milestone system. If we had gone with another solution that was proprietary you don't have that flexibility.

"As an example we are currently putting in some gates to the school carpark that will have motorised access control. There is going to be a camera overlooking those gates and we want to do some license plate recognition so as vehicles drive up, the system will recognise the license plate and open the gate with no need for a credential. That's the flexibility of an open plan system."

Main too, is pleased with the performance of the AcNet access control and the IP video systems

"Overall the system works well," he says. "The Milestone software is very intuitive. Ryan, Mark and Ben have given me minimal training and I'm confident of retrieving footage and sharing footage with other staff in the event of incidents," Main explains.

"Not only can we see at a glance all that's going on around the school, it's very easy to operate – the teachers can work the system if they need to. You can zip through it. As well as this we have remote control of gates around the school using the AcNet access control system.

"A school is a pretty hard environment – kids can do things other people don't do," Main says. "Along with this there can be related network issues that we have to manage in real time – we have to isolate problems. It's an evolving system and as we overcome each challenge, the system gets more and more robust."