

New College, University of Oxford

EXECUTIVE SUMMARY

The IT office at New College realized that, although their homegrown authentication and registration solution had succeeded for many years, new security measures were needed because of student-driven demand for campus-wide wireless and wired connectivity.

New College decided to implement a Network Access Control (NAC) solution and deployed Bradford Networks' Campus Manager. Bradford was the only vendor that could meet the college's technical requirements. These included: dynamic management of switched ports that let students use the same password for wired as well as wireless access; the ability to configure VLANs more productively and assign membership based on level of membership access; and reducing the incidence of virus-related outbreaks. With Bradford's NAC solution in place, New College could track and shut down rogue access points quickly, expand wireless connectivity and access points throughout the campus, and deliver infrastructure continuity to the entire campus. In addition, more acute visibility into student behavior empowered the college to save time updating their machines, exercise more consistent control, and maintain operational integrity over the college's vital network infrastructure.

THE CHALLENGE

James Dore, IT Officer for New College at Oxford University, was charged with delivering an authentication solution for both students and IT administrative staff that was exceptionally reliable, secure, and virtually transparent.

New College is one of the largest of the 3 colleges within University of Oxford colleges. It is, like all Oxford colleges, an autonomous, self-governing institution that, handles its own overall infrastructure profile and needs.

"Technically speaking, Oxford consists of 38 legally independent entities that collectively use the University's teaching services on an aggregate basis," explained Dore. "Those 38 individual colleges feed off the university's switched Gigabit backbone. That is where the consensus among the various colleges ends, however, particularly in terms of the actual infrastructure plant."

According to Dore, while the University provides a number of centralized services, such as e-mail for students, backup, remote access, VPN systems and more, the individual colleges add their own value to the data, along with internal systems and solutions.

As a result, no single IT-related solution unifies all the colleges. Dore did not let that obstruct deploying a Network Access Control solution that took a proactive approach to authentication.

BRADFORD NETWORKS SOLUTIONS

Campus Manager

INDUSTRY

Higher Education

LOCATION

Oxford, England, United Kingdom

CUSTOMER PROFILE

New College is one of the largest Oxford colleges, with 700 undergraduates and graduates. Like all Oxford colleges, it is an autonomous, self-governing institution. New College is first and foremost an intellectual community. Most Fellows are engaged in academic research as well as teaching, and many are world experts in their subject. Staff and students engage in a lively exchange of ideas that encompass a vast range of subjects. For all members of New College the experience of discussion, not only with specialists in one's own field but also with experts in very different disciplines, is an exciting and enriching one.

"Once I'd seen what Bradford Campus Manager could do it was a no-brainer, especially when it was so obviously designed for a university environment. Its flexibility and the dynamic nature of how it deals with users and machines work very well for us. It was perfect."

James Dore
IT Officer
New College, University of Oxford



THE CHALLENGE (Cont'd)

"When I first arrived, approximately ten years ago, we had no access management at all," said Dore. "An incident occurred involving a rogue FTP server and from that point forward everyone had to register their machines. Throughout 1999 and well into 2000 we looked for a solution that would perform automated authentication and registration. The available systems were largely based on configuring a port statically, however, which was not acceptable as an authentication solution."

One of Dore's graduate students volunteered to write scripts that IT administrators could use to control the college's firewall based on a user's MAC address.

"That proved extremely useful because we wouldn't have to maintain a table of DHCP leases. If the firewall came across an unregistered MAC address, for example, it ported the user over to the registration system and he could not get outside of the network until he was registered. For the next eight years that was our authentication solution of choice," said Dore.

The advent of wireless connectivity and access made Dore realize that this new paradigm required a fresh look at authentication.

"When wireless came into its own on campus and students had to re-register their computer every time they added a network or wireless card, we saw our incumbent solution as less and less flexible," said Dore. "About 18 months ago we decided our homegrown solution had to go and we started looking again for a replacement."

THE REQUIREMENTS

New College's network infrastructure is exclusively based on fifty 3Com Series 5500, 4400 and 4210 switches with the server infrastructure mainly consisting of Novell Netware and SUSE Linux. This is tied into the college's Novell-based e-directory on the back end, with a Gigabit feed to the Oxford University backbone in each direction. There is a smattering of Windows servers, a number of which are running VMWare/VSX as virtual machines. There is also a mix of 150 Windows XP desktops for the administrative staff, also managed by the Novell system. In total there are approximately 1200 nodes, including 700 under- and post-graduates with the rest serving as staff and administration end stations.

"The college's academic staff can buy what suits their needs so we have a broad mix of PCs, as well as MACs, with a few Linux machines," said Dore. "Students typically bring their own machines and, while they're mostly Windows-based, up to 40% of the student population uses Macintosh."



In evaluating prospective authentication vendors, Dore found that very little had changed over the past six years in how individual vendors approached authentication services.

"We looked at various 802.1x based solutions from all vendors and determined that each was too inflexible for our needs. They either required hot software on the client workstations – which we can't do because most of our machines are privately-owned—or they required us to do static configuration on a port, which is exceptionally labor-intensive. In fact, everything we looked at was designed exclusively for a corporate environment where you know which machines are connected to which socket all of the time. We needed a solution that was built from the ground up with academia in mind," said Dore.

A visit to the Oxford and Cambridge CITC conference gave Dore an epiphany along with hope that his search for a qualified, academically focused authentication and registration solution would succeed.

"I met with the team from Khipu Networks, who have been working with universities and colleges for over three years with the Bradford Campus Manager system. When they demonstrated its functionality, it did exactly what we wanted it to do: dynamic management of switched ports based on user credentials stored in our e-directory system," said Dore. "As a result, we could use the students' existing Novell user names and passwords, which they already used for logging into Windows workstations and for wireless access. Through Campus Manager we found how much information we could glean from each machine and liked it even more."

Bradford's nearly imperceptible network footprint also proved persuasive.

"Unlike some of the solutions we looked at that sat on the firewall and brought network traffic to a crawl, Bradford Campus Manager is an out-of-band solution that does not sit between the college and the Internet backbone," said Dore. "We could maintain our fast connection and give up nothing on the back end."

At the conference, Dore and his team were introduced to Khipu Networks, exclusive reseller of Bradford Campus Manager in the UK. The conferees from New College were especially impressed by Khipu's technical grasp of the solution and their academic experience derived from similar UK-based university and college implementations of Campus Manager.

"The Khipu team was especially good at coming up to speed on our system, relaying questions to the technical team leaders, and convincing college management that the initiative was worthwhile," said Dore. "When we came to the deployment stage, Khipu was hands-on. This included conferring with the university's computing services so that Campus Manager could be integrated successfully into the university's routers."

THE SOLUTION

Bradford Campus Manager – which has been fully incorporated into the New College's wired and wireless domains – paid dividends almost immediately.

"Because Bradford manages both systems in the same ways we aren't as star-struck, so to speak, over managing wireless users as we once were," said Dore. "In fact, Bradford Campus Manager helped us track down a rogue wireless access point that was handing out DHCP leases on the wire. This student-generated lease was interfering with the network functions on that segment because it was sending out incorrect IP details and showing up as an unregistered hub in Campus Manager."

Using Campus Manager, Dore and his IT staff quickly identified the actual user and shut his port down — without having to knock on the student's door.

"Campus Manager showed us which port he was on and, as we know which rooms are connected to which switched port, we can say with fair certainty which student was generating the leases. Once we found the wireless access point it was fairly straightforward to configure a laptop on the same private IP address range used by this student," said Dore.

He added, "Once we discovered he had configured the user name and password from default settings, we logged in, shut the port down remotely, changed the password, locked him out of it, and let him know in strong terms that he had to come and see me if he wanted to use that switch port again. Needless to say, that invitation remains wanting."

According to Dore, Bradford Campus Manager's ability to seamlessly manage both wired and wireless domains also has implications for securing expanded connectivity and infrastructure upgrades on campus.

"We currently have 16 access points and I expect that number will grow rapidly as we expand to several outlying buildings and manage them with the same infrastructure," said Dore. "In fact this expansion is largely due to our implementation of Bradford Campus Manager."

Dore is planning a near-term project to replace all the network hardware that is at least 10 years old in one or more of the outlying buildings. Using Bradford Campus Manager's broad management capabilities, he can upgrade access points and network infrastructure with a single stroke.

"For example, managed switches use Power over Ethernet (PoE) in the new buildings, which allows us to leverage IP phones and wireless access points equally in the same facility," said Dore. "In addition to all the usual management features, Bradford Campus Manager has increase our scope for controlling our network."

In addition to its impact on wireless users, Bradford Campus Manager has also integrated well into Dore's Novell-based e-directory.

"The e-directory service uses Netware and takes control of the network except for one particular service. It's essentially a very efficient database with a copy on each Novell network server. Users authenticate to the directory in the server that is least busy rather than to a domain controller as in Active Directory. As a result, any network server will service network requests. When Campus Manager performs LDAP to the e-directory, the authentication load is equally distributed to all servers," said Dore.

That integration also has benefits for the college's burgeoning conference trade.

"Using e-directory, we generate conferee user names nearly on the fly, giving conferees a user name unique to them and to the conference they're attending," said Dore. "We leave these names with the conference organizers so their guests can log in at will. Those users are then separated into a dedicated VLAN so their traffic does not impact other networks or users unrelated to the conference."

With the deployment of Bradford Campus Manager, Dore believes he can parlay the lessons learned from this microcosm of college conferences into something far more valuable.

"One of the developments we're considering is to take as many users as possible, place them in different VLANs, and apply different firewall rules to each group based on their needs and their VLAN membership," said Dore. "For example, students can have one level of access, academics and staff another while administrative support staff gets unlimited access."

For Dore, an additional benefit of implementing Bradford Campus Manager is his ability to control viral outbreaks more satisfactorily.

"Because our users are generally very mobile – most of them are

students with laptops – they can take their unsecured machines out of the college network, which is fully protected by a firewall, and into a completely unprotected network. Their machines could be infected by a virus, which they bring back onto campus," said Dore. "Through Bradford Campus Manager we now force them to keep their machines fully updated, which effectively eliminates viral outbreaks."

Taking control of his network, even on an automated basis, is also a benefit for Dore.

"Bradford Campus Manager's built-in scanning system, which includes a check for viruses as well as Windows patches, made it very easy for us to force updates and secure computers we don't own. It's a great help because it forces the user to do it or risk losing network access. The downside for them is that they can no longer hit 'ignore' and carry on as before," said Dore.

THE FUTURE

From the transparency of its footprint and its ability to track down rogue access points to preventing virus infections and promoting a secure network, the product's robust authentication features have persuaded Dore that, as Bradford Campus Manager comes into its own, so will the quality of college IT services.

"On a near- as well as long-term basis, implementing Bradford Campus Manager will save us a lot of time on updating students' computers and providing virus updates for them. Removing that burden – which was a major drain on our IT staff – will save us lots of time," said Dore.

His experience with Khipu Networks in general and Bradford Campus Manager in particular, was all worth it.

"Bradford Campus Manager has provided me with detailed insight into who's using what machine on our network. That's information we just didn't have previously and, practically speaking, it's not visibility we would ever turn down. We're very pleased with the decision we've made."

ABOUT KHIPU NETWORKS

Khipu Networks are a UK based advanced systems integrator, focusing on supplying innovative secure compliant infrastructure solutions across the public and private sector. Hampshire-based Khipu Networks Ltd are the security division of the White Clarke Group of companies. Khipu Networks are the exclusive supplier of the Bradford Networks Campus Manager solution into the Education arena.

NAC Centre of Excellence for Education (NCEE)

A designation given selectively to those Bradford Networks Partners who have completed certification training, focus on the network security needs of Educational institutions and have demonstrated exceptional proficiency in the area of network access control. To apply for this level of designation, partners must have sold Bradford Network's Campus Manager product for a minimum of two years and successfully installed the Bradford solution at a minimum of twenty (20) distinct institutions.

As a result of Khipu Networks successful work within the Education space, they were awarded Specialist Reseller of the Year in 2007 by Computer Reseller News (CRN),

"For Khipu the New College implementation was uniquely defined by its shared backbone with the University of Oxford and the specifics of the University's infrastructure environment. This was particularly true in that New College was the first of the University's federated campuses in which we deployed Bradford Campus Manager to regulate student registration and network 'scan-based' authentication. During the implementation phase we not only had to formalize how Campus Manager reacted to and with the New College infrastructure, but also had to be sensitive to those same requirements when it came to the University of Oxford's own environment and infrastructure. To ensure that his expectations were met, especially because this was a new way of authenticating students to the network, we worked very closely with James Dore during the entire implementation process and, most especially at the start of the new student semester. As Khipu we pride ourselves in not only doing the initial due diligence required to ensure every one of our implementations is successful, we also are very much invested in our customers' long term goals."

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ABOUT BRADFORD NETWORKS

Bradford Networks develops advanced network access control solutions for wireless, wired and VPN networks. Bradford's award-winning, out-of-band appliances leverage existing network infrastructure to automatically enforce NAC policy at the network edge making networks more secure and efficient. Privately held, Bradford Networks is located in Concord, NH.