CITY
UNIVERSITY OF LONDON
EST 1894

Executive Summary

Industry

- Higher Education

Environment

- 24 buildings around London
- 18,000 students
- 2,000 staff members
- 6,000 devices

Challenges

- Resolve reliability issues with the complex University network
- Create an infrastructure that can easily accommodate future requirements
- Overcome the restrictions on making changes to the network

Extreme Solution Components

- Extreme Automated Campus™
- Extreme Fabric Connect™
- ExtremeManagement™
- ExtremeAnalytics™
- Extreme Identity Engines™
- ExtremeSwitching™

Results

- Eliminated error-induced network outages: 100% uptime across all core systems
- Increased satisfaction with IT Services among students
- Accelerated and simplified network administration
- Enhanced ability to control access and separate traffic: multiple VLANs for different user groups

Mobile Learning Garners High Marks at City, University of London

Since implementing the Extreme Automated Campus solution with Extreme Fabric Connect technology, City, University of London, has eliminated downtime in the core, enjoyed unprecedented flexibility for network deployments, and see user satisfaction soar.

With a large numbers of users—all mobile and all with their own devices—and a complex mix of demanding services and applications that run 24/7, managing a university network is no small task. It's hard enough when the university operates on a single campus; the responsibility magnifies for a university with 24 buildings, across multiple sites dotted around central London.

That's the challenge facing Paulo Leal, Network Team Leader at City, University of London. His team is responsible for ensuring City's 18,000 students and 2,000 staff receive the network performance they need and expect. In practice, that means catering for peak loads of up to 6,000 concurrent devices on the University's wired network, plus 10,000 more on wireless. Naturally, the majority of those devices are their users' own. It also involves supporting applications that range from the university's Moodle virtual learning environment, to streamed lectures, to essential back office management and administrative tools such as like SAP.

> *"We have stretched our assets for 10 years which are now end of life and need replacing with up-to-date models to take advantage of extending the Fabric network all the way to the edge client networks and many other features."*
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> **Paulo Leal**
> **Network Team Leader, City, University of London**

Complexity Blocking Change

City had been working hard to deliver the network performance users wanted. The university had focused heavily on building capacity: however, over time, the network topology became so complex and was no longer performing at the required level. Leal said: "It was so difficult to make changes to any aspect of the network. Even something that would ordinarily be quite simple, like moving a server from one data centre to the other, involved huge amounts of planning and reconfiguring. To avoid potential disruption, we would have to wait until the summer vacation to make straightforward changes."

The Potential of Extreme's Automated Campus Solution

It was during one of City's regular roadmap meeting with Extreme and their business partner in 2012 that Extreme's new pioneering solution, Automated Campus emerged as a viable option. Automated Campus leverages the Shortest Path Bridging (SPB) protocol to enable true network virtualisation: if one node fails, traffic is automatically redirected, via the next shortest available path. That means students, teachers and administrators experience no loss of connectivity, and provisioning is quick and easy for IT. Since City was already utilising compatible Extreme Networks Ethernet Routing Switches, the Automated Campus solution could be introduced via a simple software change.

Leal instantly saw the potential, but wanted proof. "It was early days for Shortest Path Bridging and we struggled to find anyone running it," he recalled. "So we decided to trial it ourselves."

The trial lasted 12 months because City could only make necessary changes during the summer. It quickly became clear, however, that the solution lived up to its promise. City introduced SPB on its core network, and also 32 VLANs between its data centres, allowing it to turn two separate sites into one virtual data centre. The impact has been immense. 90% of VLANs are now fabric enabled across the campus.

> *"We don't have to worry about resilience in the core anymore. Since moving to Extreme's Automated Campus Solution, the only downtime we have had on the core and data centre networks was due to our annual upgrades."*
>
> **Paulo Leal**
> **Network Team Leader,**
> **City, University of London**

Reliability Assured

With a growing number of students consuming streamed content, such as lectures, the additional reliability is directly enhancing the learning experience.

During the summer 'off season', the network team runs a full system check, going from building to building switching off each of the core nodes in turn. Some changes can now be made confidently during working hours. "We miss a ping here and there," Leal acknowledged, "but that's it."

> *"One day there was a complete power failure in one of the buildings where a core switch is located. It was the ultimate test—and there was absolutely no impact on users."*
>
> **Paulo Leal**
> **Network Team Leader,**
> **City, University of London**

Proof of the reliability came when in January 2015 City's Information Services was able to report 100% uptime on all core systems. As was pointed out in a University blog, "Google have gone on record as saying that a guaranteed 100% uptime on their services is 'not attainable' (zdnet.com), while Amazon commit to a 99.5%." This is no one-off either; the blog also stated the intention to maintain the 100% uptime across many more months.

Simpler Changes—Virtual and Physical

Alongside this dependability has come another equally valuable benefit: flexibility. Instead of viewing change requests with trepidation, some changes are now made more confidently during working hours because the old complexity and its associated risk have been significantly minimised. "Before the Extreme Automated Campus Solution, to extend a VLAN between the two data centres, we had to configure 36 uplinks on 17 devices, and in doing so we risked creating loops and errors," said Leal. "Now we don't have to configure any uplinks: we just set up the VLAN on two devices."

Because of that ease, City now has dozens more VLANs on its network—"we create them all the time," Leal added light heartedly—meaning it can better separate traffic types and control access to different information and resources, including student learning materials. A perfect example is the University's catering contractor's need to control inventory. "In other universities, they have to set up an Internet connection in multiple locations via

(A) DSL lines. We told them they don't need to do that; just buy a single firewall to tunnel all traffic back to their data centre and use their own internet connection, not using City's public IP range. That costs them less and is far easier to manage." It was the same principle Leal and team adopted to separate wireless clients and control access to resources and devices.

Physical moves are just as straightforward. When a server is moved between data centres, it just needs to be plugged in and the network configures it dynamically. Leal was very impressed when the University installed 75 new Virtual Service Platform Switches from Extreme—part of a programme replace older equipment—in just two hours in the Data Centre. "Because of Extreme's Automated Campus, it took longer to unpack all the hardware than it did to configure an SPB Cluster and have it ready for deployment!" Leal added.

Another simplification for Leal's team is that Extreme Networks Configuration and Orchestration Manager is now utilised for daily network management. This tool offers a graphical view of their network, which not only supports troubleshooting but also allows rapid device and VLAN setup as well as one-click changes to virtual routing. Usefully, it also automatically creates an audit trail of all changes made, meaning they can be traced and undone where necessary. "We continue to exercise change control," Leal said, "but these days we don't really need to."

Satisfaction Soaring

Of course, the critical issue for Leal and his team isn't configuration speed – it is user satisfaction. Here too, the move to the Extreme Automated Campus soltuion has proved a huge success. Every year, City conducts an annual student survey and one of the questions is about whether or not the IT services are adequate for their studies. "

Our answers were not as positive as they should have been, but since moving to Extreme's Automated Campus solution, there's been a vast improvement and their satisfaction with IT Services is soaring."

> *"Because of Extreme's Automated Campus solution, it took longer to unpack all the hardware than it did to configure an SPB Cluster and have it ready for deployment!"*
>
> **Paulo Leal**
> **Network Team Leader,**
> **City, University of London**

Leal is determined to keep it that way. In line with his vision, Extreme Identity Engines is now running in production and being deployed across the campus. This will transform access control for users and devices—invaluable given the huge variety of devices that students and staff utilise—and allow a leap forward in the university's use of mobile learning. "It will mean that every device is assigned to the right network, which is perfect," Leal confirmed. "And it will mean that configuration is even simpler; we can leverage Identity Engines to configure the edge switches, and the Core and Distribution layers don't need to be touched at all."

Extending the Lifecycle

The University has just finished the implementation of 360 edge switches to the ERS 5900, and Core switches at the remote sites to VSP 4000s. This has enabled the University to stretch the Extreme Fabric Technology from the Edge layer to the Core and the remote sites providing the rich features and functionality of a stealth multi-tenanted, zero-touch environment.

The existing Extreme Core Switches were upgraded at minimal cost to the Extreme Fabric. Extreme's enhanced interoperability has allowed a seamless migration with minimal disruption to the university's applications. City benefits from all aspects of the Extreme Automated Campus solution, including: Extreme Fabric Connect, Extreme Management Center, ExtremeSwitching, ExtremeAnalytics, ExtremeControl, and access to the Extreme Support Services. City's recent investment in Extreme's new 100GB Core Infrastructure, featuring the VSP 8400 and VSP 8600 switches, not only provides them with the full benefits of Fabric Connect, but also provides them investment protection with future-proofed technology ensuring alignment with their long-term strategy.

A Long Way Ahead of the Competition

"I'm very happy we stayed with Extreme Networks," Leal concluded, "Extreme Networks is leading the way, especially where campus networks are concerned, development has really accelerated in the last few years, and the regular meetings we have with the Extreme team mean we are always aware of the next stage in the roadmap."

City, University of London has a virtual network that is the envy of its peers, the pride of its networking team, and an asset to students and staff. The Extreme Automated Campus solution has future-proofed the network too—any planned hardware or software changes can be made without risk or redesign.

"Because of Extreme's Automated Campus solution, it took longer to unpack all the hardware than it did to configure an SPB cluster and have it ready for deployment!"

Paulo Leal
Network Team Leader,
City, University of London

About City, University of London

Founded in 1894, City, University of London is a leading international university located in the City of London. It has 18,000 students (46% at postgraduate level) from more than 150 countries and staff from over 75 countries, and is ranked first in London for student satisfaction for two consecutive years according to The Complete University Guide 2017 and 2018.

It is also the first UK University Student Centre to receive the Service Mark Quality Standard from the Institute

of Customer Service to a broad spectrum of businesses in the UK and internationally.

Find out more at www.city.ac.uk.

"Institutions such as City, University of London need to deliver demanding, complex, secure services and applications which need to be uninterrupted providing the quality of experience demanded by students, staff, and third-party contractors. Networks designed with port speeds and density to fulfill the requirements outlined and managing such a large complex density of users and buildings is challenging. Extreme Fabric Connect, which is a key component of the Extreme Automated Campus solution, removes these complexities and provides IT departments with a simplified automated managed network with integration and reliability demanded by the end users and senior stakeholders. Thus allowing IT staff to concentrate on delivering next generation solution."

John Morrison
Vice President of EMEA Sales and Services,
Extreme Networks