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CASE STUDY

UNITED KINGDOM

HIGHER EDUCATION

CREATING A SUSTAINABLE SMART CAMPUS AS TEST BED FOR INNOVATION

Keele UNIVERSITY

Establish the foundations for a wire-less-first, performant network to span a 617-acre site and cater to a diverse range of users from students to IoT.

Keele University claims to operate from one of the largest university campuses in Europe. But Keele knows size isn't everything. The ambitious UK university wants to create the most sustainable campus in the world.

"We're already ranked highly in global terms," says Simon Clements, Head of Projects and Service Compliance, Keele University. "We want to be a leader and to be carbon neutral by 2030."

BEING A FORCE FOR GOOD IN EDUCATION AND THE COMMUNITY

Many factors need to be brought in line to meet this target. Keele wants to create its own energy and be smarter in the way it consumes it. The university wants to reduce waste and work with partners that mirror its sustainable credentials. Above all, it wants to be a good citizen: a force for good in higher education and the local community.

Central to Keele's plan is the creation of a smart digital campus. This will establish a network of environmental sensors, access controls and building management systems. It will create the data to inform decision-making and a single console from which to manage operations.

The intelligent connectivity requirements of the smart campus are being architected around an Aruba Edge Services Platform (ESP).

UNIFYING THE NETWORK WITH A FOCUS ON THE WIRELESS EXPERIENCE

The Aruba platform introduces a unified wired and wireless infrastructure approach. It includes the deployment of uninterrupted Wi-Fi 6 access across the 617-acre campus through as many as 2,000 access points, including buildings and public spaces. The distribution and access layers for each location will be based on a single architecture comprised of Aruba CX 6300 and 6200 switches. The supervision and management of the entire network will be unified under AirWave Network Management, while unified security and access policies will be applied to the wired and wireless environments via ClearPass Policy Manager.

"Our network infrastructure is the foundation on which the smart campus is built," says Daniel Perry, Keele University's

REQUIREMENTS

- Centrally manage and secure high-performance Wi-Fi across 617-acre site
- Provide the openness to integrate third-party applications
- Create a platform for sensors and smart campus features

SOLUTION

- Aruba Indoor and Outdoor Wi-Fi 6 Certified APs
- Aruba 7240XM Series Mobility Controllers
- Mobility Conductor
- Aruba CX 6300 Switch Series
- Aruba CX 6200 Switch Series
- User Experience Insight
- AirWave for network management
- ClearPass for network access control
- Aruba AirGroup
- BLE Beacons
- Location Services (Blue Dot; Indoor Navigation; Campaigns)

OUTCOMES

- Ensures a wireless-first experience for 10,000+ students
- Encourages dynamic, mobile and media-rich learning experience
- Enables the entire campus to facilitate new forms of research and industry collaboration
- Provides the platform to accelerate smart campus features, reducing energy use and optimising resources
- Allows the university to safely open up its network to community users

> In effect, the network 'instruments' the entire campus. That creates a very exciting opportunity to test innovation. We can offer tech companies, industry and researchers a live environment to test ideas, all under one governance framework.

DANIEL PERRY
CIO, Keele University

CIO. "We can then choose a range of services that run off this network."

Mathew Bailey, Network Manager at Keele University, says the Aruba engagement is recognition that, for most users, the primary network experience was going to be around mobility: "We had to rectify a situation where there was marked difference between the wired and wireless performance. Today, we have consistency and a unified approach."

It enables the university experience to be connected and dynamic. Students, for example, can set up their own connectivity 'bubble', including gaming consoles, speakers, phones and tablets or printers to create a home-from-home experience. They can also access their 'work' devices from anywhere throughout the campus. The new approach also encourages innovation within course material and learning styles: more audio/visual content, increased on-demand content and the ability to invite remote, off-site expertise. The network is a platform from which to explore new ways of delivering further education, higher levels of collaboration and greater variety.

CREATING THE FOUNDATIONS OF A SMART CAMPUS

In support of Keele's ambitions of building the foundations of a smart campus, the Aruba architecture enables the university to securely deploy and connect a host of sensors – from environmental monitoring to lighting controls. Keele will be able to adjust and optimise heating and lighting for different buildings based on usage, manage secure role-based access control to specific locations or help visitors navigate the site.

"We want to generate our own energy, with solar and wind," says Clements. "We then need to monitor and ensure this energy is used efficiently. The smart energy network will enable us to save and store spare capacity for use during peak demand."

The plan is also to create a network of charge points for electric vehicles. These will be connected stations with users accessing and paying for usage via an app.

More noticeably, Keele can create a dynamic facilities management service. For example, students will be able to book a library seat. Teaching rooms can be allocated by expected occupancy with students notified in advance. As the campus expands, usage data can inform the design and creation of new buildings, signposting and other facilities.

In addition, Keele is able to utilise the SafeZone app, chosen by the university to enable students to raise an alert in the event of an emergency and for Keele staff to be able to track their whereabouts to ensure a rapid response and assistance.

ALLOWING THE CAMPUS TO BECOME A LIVING LABORATORY

Sustainability is an increasingly important aspect of university life. It can be an influence over students' selection criteria and is also a significant research opportunity.

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For example, Keele has recently finished a trial, testing the carbon reduction impact of blending hydrogen into the gas network. Similarly, its Smart Energy Network Demonstrator (SEND), in conjunction with Siemens, is the largest of its kind

in Europe. Both projects include smart sensors which need secure authentication and onboarding to the network.

The university has also been chosen to help design a new zero carbon smart energy system for the Staffordshire town of Rugeley, as part of a consortium led by ENGIE, a leading player in energy supply, services and regeneration sectors. Together, these projects are examples of 'the campus as an instrument', and Keele's willingness to work with industry.

"These kinds of projects can be a significant differentiator for us," says Perry.

Since 1990, Keele has trebled its student population and significantly expanded the campus - while simultaneously decreasing total CO2 emissions. Over the last six years, it has invested over £1.2m into carbon reduction – and will be investing more every year.

This commitment has meant that for the fourth consecutive year Keele has been placed among the Top 40 universities in the world for sustainability (UI Green Metric World Rankings, 2020), in addition to being named Sustainability Institution of the Year at the 2021 Green Gown Awards. This recognition helps attract research funding, teaching talent and students.

OPENING THE NETWORK TO THE LOCAL COMMUNITY

The network also enables Keele to be a good citizen. Keele is already home to a thriving business community within its science and innovation park, with tenants expecting a high-quality network service. Keele extends network access to local enterprises, start-ups and community projects.

"The advantage of ClearPass is that we can manage different access types and services for different users," says Bailey. "This is the same approach for long-term users or day visitors. We have a single pane of management for the entire network."

Long term, Bailey continues, the goal is to use this network and infrastructure expertise to become an IT service provider for external enterprises, creating a new revenue stream:

"We want to be in a position to embrace any hosting opportunities that come our way."

GREATER FLEXIBILITY TO ALLOW DIVERSITY TO FLOURISH

For CIO Dan Perry, the foundational aspect of the network reflects a broader mission for the university: in a world gone digital, Keele has a role in building digital literacy and confidence among students, academics and staff.

"I'm not convinced all 18-year-olds are happy to hand across their data. We want to establish an ethical framework around the use of that data and to set some principals. This is, therefore, the start of a conversation. How we treat data should be taught as a life skill."

The goal, he continues, is to create an environment where students can choose their own route through the university experience. "It used to be that universities would tell students which tools they could use. We want to provide a service where students can choose the tools that suit them best but to be able to ensure the security of such a diverse environment. We must recognise that not all students are the same and that greater diversity makes Keele a better place. Universities are where you bring people together. We need to design for that range of experience."

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