



Connected campuses: Digital transformation in action

How smart, shared infrastructure can modernize education

Table of contents

- | Connected campus: Digital technology for empowering student success
- | Technologies for innovation in education
- | Campus app: Improving administration-to-student communications
- | CPaaS and IoT integration
- | Modernization of student services
- | Connected buildings
- | Multi-service and secure infrastructure: The smart campus foundation
- | Wi-Fi 7: Wi-Fi for the modern campus
- | Secure technology: The key to success
- | An expert's perspective on security, automation and visibility into a multi-service network
- | About Alcatel-Lucent Enterprise

A group of six students are walking away from the camera on a paved path that curves through a green campus. The scene is set at sunset, with a warm orange and yellow glow in the sky. The students are dressed in casual attire, including jeans, t-shirts, and backpacks. To the left of the path, there is a grassy area with a wooden bench and large, leafy trees. The overall atmosphere is peaceful and academic.

Connected campus: Digital technology for empowering student success

Schools, colleges and universities around the world are accelerating their digital transformations to become connected campuses.

The time has come to employ technology to build more inclusive, safe, resilient, sustainable and connected campuses. There are challenges to overcome: Declining enrollment, infrastructure needs, and financial sustainability, among others. Smart technologies address these issues and open the door to an array of possibilities based on the internet of things (IoT), home automation and connected buildings. However, these developments rely on the implementation of a robust network and optimized data use. This helps administrators communicate with students and faculty, rationalize expenditure, attract more student enrollment and make on-campus travel easier. Schools, colleges and universities need the right support to navigate through this digital revolution.



Technologies for innovation in education

The digitization of administrative services such as student services, human resources and facilities management provide students and faculty with easy access to services and simplified processes.

Digitalization also enables possibilities for smart services to create [connected campuses](#) that are more efficient and reduce resource consumption by automating waste management, lighting and other networks. Other areas where smart technology is being used to benefit campuses is in transportation – where it is used for on-campus road management to assist in the smooth flow of traffic – and [student safety](#), which is undergoing significant transformation with the implementation of video surveillance.

None of these services would be possible without a strong base of underlying technologies, including:

- Wired networks based on optical fibre and wireless networks using standard protocols (for example: Wi-Fi, Zigbee and Lora)
- A wide variety of applications hosted in a data centre or in the cloud, including business applications and dedicated services
- A growing number of connected objects such as video surveillance cameras, temperature sensors, air sensors and vehicle counters
- Digital public signage, display systems and smart parking lots
- Multi-device and multimedia communications

Campus app: Improving administration-to-student communications

Campuses offer mobile apps to students, directly accessible on their smartphones or tablets. These apps can link different college or university departments together to meet a variety of needs and practical functions.

For example:

A university administration improves its relationship with students by delivering ongoing student services and information. The university enables calls 24/7, entrusting their routing to chatbots that use artificial intelligence (AI) to recognize common requests. Campus authorities can send out text alerts so that students can pick up new administrative documents without having to stand in line.

What is CPaaS?

Communications Platform as a Service (CPaaS) is transforming the way campuses communicate, how they develop new services, and how they interact with students. From notifications concerning the status of requests, to customer surveys and bot integration, a fundamental CPaaS strength is that it connects everything. Contextual information can be seamlessly synchronized during a call or web interaction, allowing public agents or bots to offer a more personal service based on the eServices requested, the web page visited, or previous requests.



The student's role in their campus

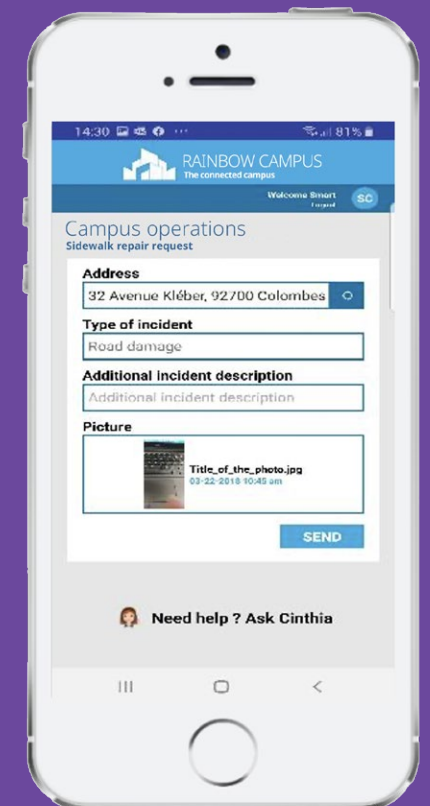
The digital campus encourages student and visitor interaction

Through ongoing dialogue, the campus can anticipate needs, monitor the collective perception of measures it introduces and build new initiatives alongside its students.

Students at the heart of the strategy

CPaaS provides solutions so users can notify the administration in the event of an accident, damage or weather situation.

It also provides students the opportunity to share their opinions on current initiatives, or participate in campus planning.



CPaaS and IoT integration

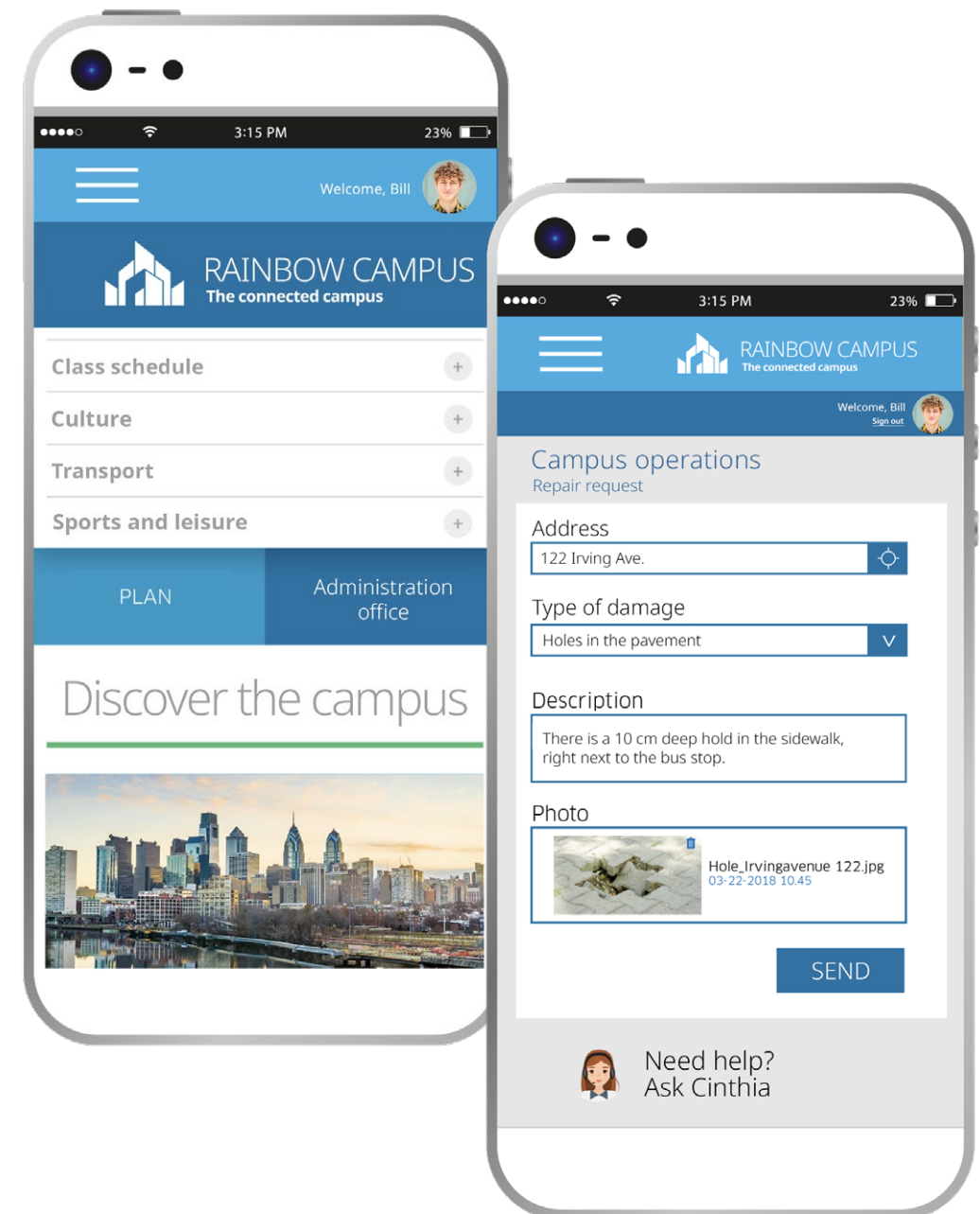
Enable communications between connected objects and humans

Campus emergency notifications

- A sensor or authorized users trigger an alert, which is sent to the campus's centralized emergency management system (EMS)
- The EMS validates the event and encodes the message for distribution
- An alert is pushed to digital signage, mass-notification speakers, desktop pop-ups and mobile app end points simultaneously
- Students, faculty and staff receive the notification while campus safety teams use real-time dashboards to track and coordinate their response
- Once the situation has been resolved, the EMS issues an all-clear notification on all network endpoints

Smart waste management

- Request for a bulky item pickup is made on a campus mobile app from a phone at 10 p.m.
- The request is made to the chatbot, which sends a notification to the relevant department
- The request and related details are passed on to the campus worker the next morning at 9 a.m. Confirmation is sent to the requester, and they are advised that they can deposit the items at the agreed location before 10:30 a.m.



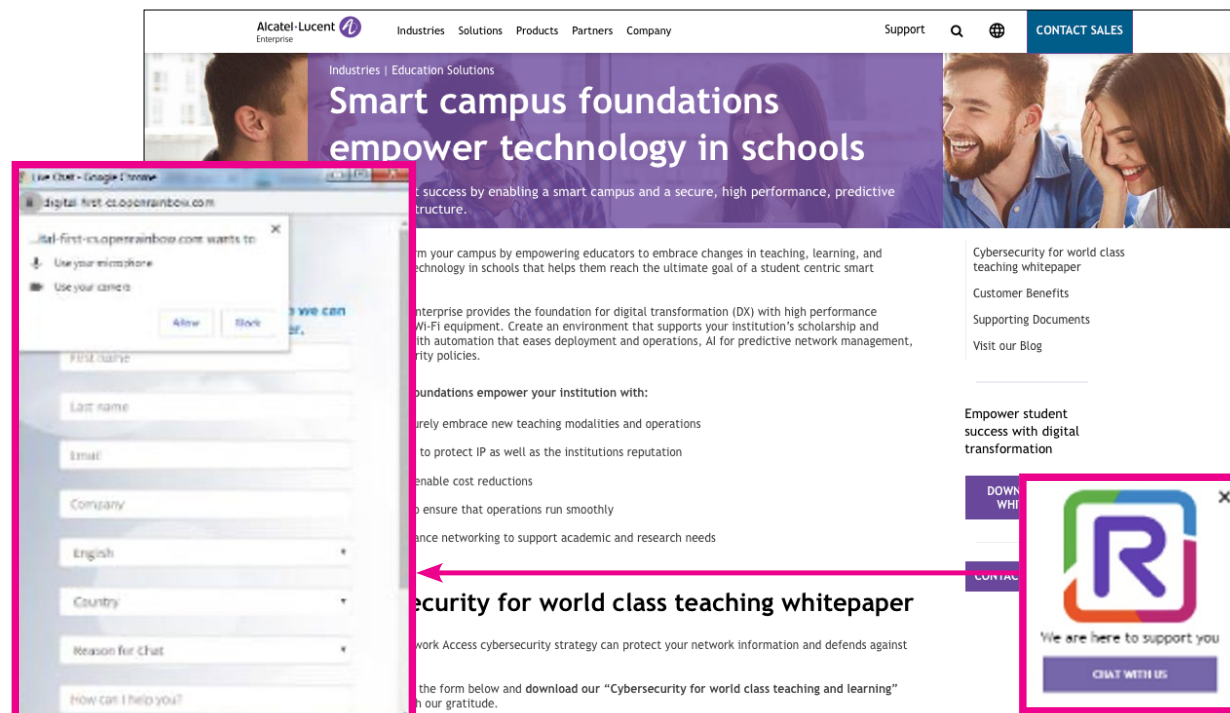
Modernization of student services

One-click connection through your website

Enable agents or automated providers to be selected based on skills, language or service. Once in communication, an agent can engage with the web visitor using the voice/video/sharing option.

Digital appointments

- A click-to-calendar service enables website visitors to connect to a calendar service to make an appointment
- Allow your agents to schedule appointments and connect virtually through voice, video and chat, as well as share documents
- Simple integration of a URL into your website
- Drastically reduce no-shows through notifications and by specifying any required documents, enabled by Alcatel-Lucent Enterprise customization services



eBook

Connected campus: Digital transformation in action



Connected buildings

Transform interaction and services for students, faculty, workers and visitors

Control and monitoring of space automation

- Integration with a third-party automation system for centralized control of lighting, heating, cooling and door opening systems
- Smart control of lights, air conditioning and curtains from a smartphone, smart desk phone and chatbot, among others
- Provide analysis to monitor and improve energy consumption and operating costs

Real-time room reservations and availability

- Find and book the nearest available meeting room
- Real-time programming
- Automated room reservation upon entry or exit

Real-time location of security guards and equipment in case of emergency

- Geolocation of agents and directions to reach them in real-time
- Location of emergency exits, fire extinguishers and defibrillators
- Man-down detection function
- Analysis data

Monitoring of sensitive areas and contact tracing

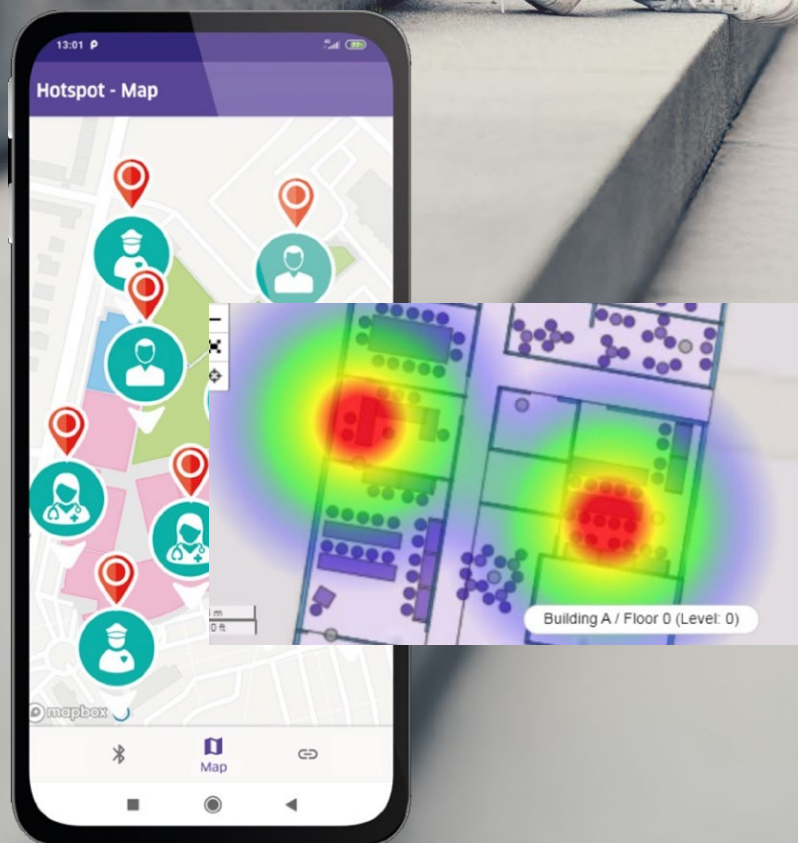
Smart buildings used by students, faculty, visitors or other employees can manage the number of people in a specific area and help enforce social distancing through real-time density monitoring.

The solution allows you to:

- Define an area to monitor
- Identify the number of people in the area
- Identify, in real-time, when people are too close, as well as when there is prolonged contact (logged timestamp)
- Notify affected staff based on specific criteria (for example: People moving across a boundary, or the number of people entering or leaving an area)
- Use analytics to trace the contact flow history, if necessary

Safety and security in public buildings

- Audio notifications and alerts through phones and loudspeakers
- Emergency call points
- IoT notifications and alerts through different media
- Pre-defined workflows to quickly involve emergency contacts



Multi-service and secure infrastructure: The smart campus foundation

A single network

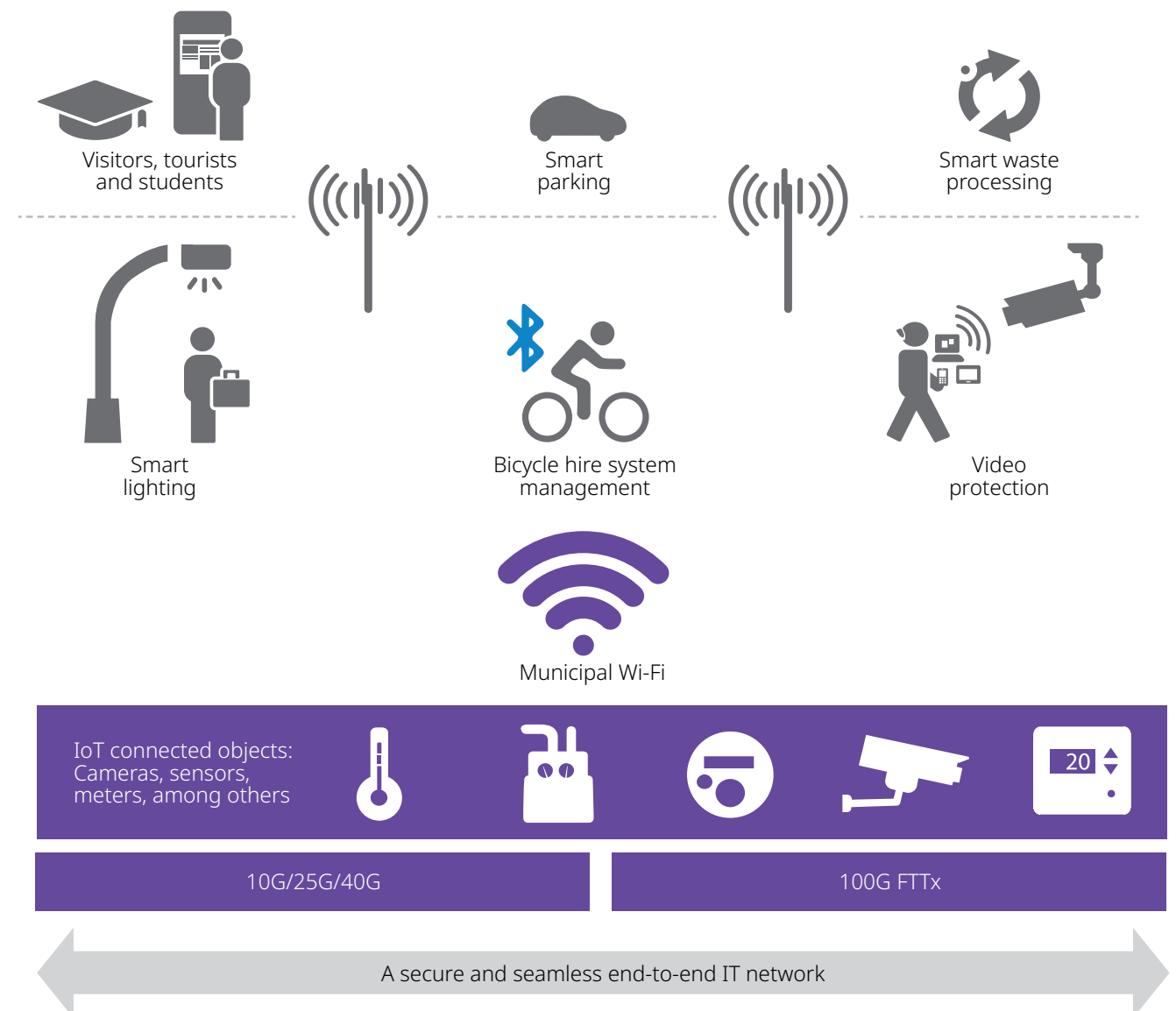
To connect all services and connected objects to a single network, the campus should rely on a secure multi-service infrastructure. Faculty buildings, day care centers, administrative offices, campus police, libraries and other services all gain dedicated applications with high-speed connectivity.

This communications base can be extended to local public sector partners and campus signage, while collecting information from a multitude of connected IoT objects (such as video surveillance cameras, sensors or detectors).

Unified and simplified administration

End-to-end consistency is guaranteed by a single administrative platform. A single networked system environment simplifies the integration, deployment and administration of a digital system and secures the exchange of data.

- Digital traffic between connected objects is confined within dedicated virtual networks
- Whether you connect to the information system using a wired or a wireless network, the user experience remains the same
- IT administrators can fine-tune accessible resources to match a user profile, making it possible to offer different services depending on the role or authorizations attached to each person



Wi-Fi 7: Wi-Fi for the modern campus

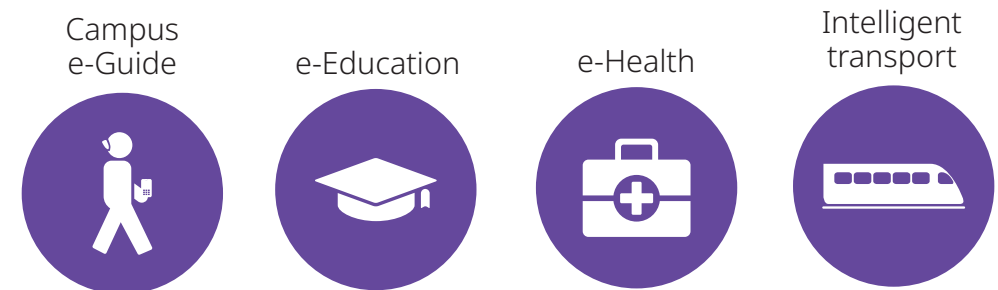
Ultra-accessible local services

The public network is the backbone of a connected campus. Mobile users expect quality local services with high availability. Campus workers on the move need connectivity to access work tools, as well as effective collaboration to provide services faster. [Wi-Fi 7](#) promises more speed, enhanced connectivity and forty times greater bandwidth on each connected device. Installed in strategic locations and used appropriately, Wi-Fi 7 provides more stable and consistent connectivity and extends the battery life of connected devices, in tandem with the Target Wake Time (TWT) function.

Endless real-world examples

Campuses are deploying new, more interactive wireless services for their communities. Publicly accessible forums, multimedia content, videos, surveys, games and virtual tours are available to mobile and smart devices. This connectivity translates into practical uses for students, faculty and the administration, including optimized on-campus traffic flow and parking management, improved student-faculty communication and reduced operating costs through optimized energy expenditure.

The rise of wireless devices is exponentially increasing mobile user expectations



Public Wi-Fi for smart campuses





Secure technology: The key to success

How IT teams can approach IoT with confidence

Objects connected to a campus network can expose shared resources or be leveraged to extract private data passing through the network.

Network segmentation prevents the entire network from being compromised in the event of an attack on a vulnerable object or machine. It also provides automatic and secure integration of IoT devices while simultaneously protecting the network.

An IoT containerization strategy ensures efficient and secure integration and support of multiple sensors and connected devices. It consists of three elements:

- 1. Detection and classification:** Each object connected to the network must be detected and classified. The [Digital Age Networking](#) solution provides access to a database of more than 29 million objects to instantly identify an object connected to the network, and automatically set up a configuration associated with a particular device.
- 2. Virtual segmentation:** Segmenting a single physical network infrastructure into separate virtual networks or containers is essential to ensure that each service or application has its own dedicated segment, enabling suitable operation and security.
- 3. Continuous monitoring:** The network monitors the behavior of [IoT](#) devices and applications to ensure they are functioning properly. Each authorized object is stored in an inventory. This allows the IT department to know exactly how many devices are connected to the network in real-time. It is important to constantly monitor a connected object on the network in order to take immediate action in the event of any deviation from its usual behavior. In the event of abnormal activity the network can react and disconnect the faulty device, send a notification to the network administrator or change the destination of the dedicated IoT container for further checks.

An expert's perspective on security, automation and visibility into a multi-service network

How is infrastructure key to the development of smart campuses?

The digital transformation of a campus requires a powerful, robust and resilient digital foundation enabling an infrastructure that supports the connectivity needed by users, digital applications and connected objects in a reliable and secure way. For this to be achieved, infrastructure must evolve into a true service-oriented network with a high degree of automation. [Digital Age Networking](#) is part of this new paradigm, enabling universities and colleges to join the digital transformation age. The solution is based on three key elements: An autonomous network, automatic and secure IoT integration and business process innovation.

What about IT teams' workload on a campus-wide network?

Automation allows us to save a significant amount of time. The [Autonomous Network](#) is automatically configured and made available, ensuring critical and secure network operations while optimizing the user experience. In the future, this technology will automatically adapt and enable secure connections from users or objects to authorized applications.

This architecture combines high availability, ease-of-use, low total cost of ownership (TCO) and a very high level of security.

As a result, teams on the ground can work faster. Administrative tasks that used to be done manually, such as configuring network access for terminals, are now automated. Network maintenance is simplified and infrastructure TCO is significantly reduced. This allows even a small operations team to control a secure network covering the entire campus community.

Can we accurately control all network elements and connected objects?

While essential for the development of new services within the framework of smart campuses, the connection of a large number of connected objects is a challenge both in terms of deployment and security. Configuring and managing each of these objects and their network connectivity can be a time-consuming process that carries considerable security risks.

The Alcatel-Lucent Enterprise IoT containerization strategy is designed to provide an automated solution to integrate IoT devices securely and efficiently, while simultaneously protecting campus networks.



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About Alcatel-Lucent Enterprise

Alcatel-Lucent Enterprise solutions for the [education](#) sector deliver [student-centered learning](#), [smart campuses](#), [safe campuses](#) and [education continuity](#). Our solutions help you comply with stringent requirements and deliver a secure experience.

We find solutions to connect everything with efficient technologies, designed for you. Our goal is to provide customized technologies that meet the needs

of our customers. Our mission is to connect all your devices with [Digital Age Networking](#), [Digital Age Communications](#) and [CPaaS Solutions](#) and services to ensure your institution's success. In the cloud. On premises. Hybrid.

ALE is committed to developing effective technology solutions for our customers, connecting people, machines, objects and processes, while creating a more sustainable future for all.

