Digital Age Networking

for Education

Alcatel·Lucent
Enterprise

Education

Alcatel-Lucent Enterprise Digital Age Networking provides a state-of-the-art network infrastructure that enables digital transformation in the education sector. It empowers educators to use next-generation digital learning tools, which can help improve student success, provide a superior experience, help with retention, and ultimately achieve excellence in education. Furthermore, ALE network solutions help improve campus operations by enabling IoT systems, simplifying staff activities, and reducing the overall cost per student. They also help improve school and campus security with automated and secure management of CCTV and other surveillance systems.

Digital age technologies that help improve efficiency are being adopted by universities and schools at an increasing rate. To stay competitive, schools need to integrate the latest mobility, data analytics, cloud and IoT digital innovations into their operations, processes and computing systems. This trend, known as digital transformation, enables learning institutions to evolve to an infrastructure that supports connectivity for digital applications, IoT and user devices, while enabling workflow optimisation, more efficient processes, differentiated products and services, resulting in improved student and teacher satisfaction.

In the past it took days to provision a service on the network and configure it. Today it takes only seconds to provision using error-free automation with ALE Digital Age Networking. In this new paradigm, the network evolves from being a complex and costly underlying infrastructure, into an enabler of new revenue streams with low operational costs.

Digital Age Networking is based on three pillars and enables educational institutions to enter the digital transformation era.

- A high-performance Autonomous Network can automatically provision network services and automate mission-critical network operations while improving the user experience. In complex university and research centre environments, as well as schools with limited IT budgets, the automated network configuration eliminates manual errors and increases operations efficiencies.

- IoT onboarding enables learning environments to scale-up digitalisation through secure IoT provisioning and management. It can integrate, onboard, and connect a massive number of IoT devices that are at the foundation of the new digital business processes. In schools and research centres it can automate the provisioning of IoT devices in a secure and reliable manner.

- Business Innovation helps universities and schools accelerate their digital transformation with new automated workflows, taking the effort out of labor-intensive or repetitive tasks. In the education sector, business innovation improves the student and teacher campus environment by utilising automated workflows for campus safety and efficient operations.
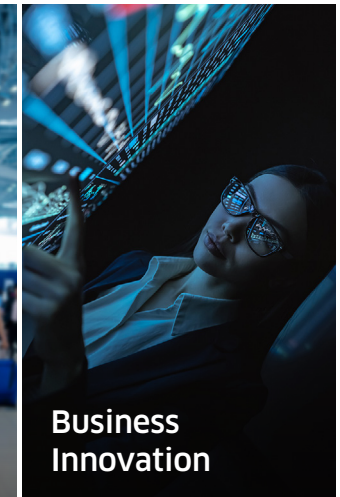
Autonomous Network

Automate mission-critical network operations and improve user experience

IoT

Scale up digitalisation with secure IoT onboarding and management

Business Innovation

Accelerate transformation with automated workflows

Autonomous Network

In any education institution there are multiple groups of users with different requirements. Students need access to the latest education technologies such as on-line courses, Learning Management Systems (LMS), and collaboration tools to communicate with their peers and teachers. Educators need access to grade systems, student information, research systems, as well as all the learning tools. Other staff requires access to administration systems, financial information, and security systems, among others. The Alcatel-Lucent Enterprise Autonomous Network simplifies the diverse need for connectivity, while ensuring that individuals only have access to the applications and systems for which they are authorised.

In a university environment there are many new technologies that are bandwidth hungry – demanding high-performance and unified experience on both wired and wireless networks. Research activities can collect, store and process massive amount of data, for example, a particle accelerator, astronomy image processing, and genome studies. As well, student entertainment and social activities make extensive use of videos including, social media, video streaming, and sport events. And, new learning technologies can consume tremendous amount of bandwidth for online courses, blended learning, and augmented reality. The ALE Digital Age Network leverages Shortest Path Bridging (SPB) which makes it simple to create a wide variety of network services, while maximising all available links to provide better performance and a resilient network fabric.

IT infrastructure has evolved over the last 20 years to where it is now fully automated. Networks unfortunately have not kept up. While it takes minutes to deploy a new application, it can take days or even weeks to manually configure the network, element-by-element. This is now changing. IT leaders are shifting their focus to transformation rather than just building and running the infrastructure as was previously required.

The ALE Autonomous Network is configured and provisioned automatically. It ensures mission-critical, secure network operations, while optimising the user experience. As part of the Autonomous Network architecture, Intelligent Fabric (iFab) technology automates the deployment of the network and simplifies moves, adds, and changes, while reducing the time and effort it takes to maintain and operate a network. In the future, it will adapt automatically to changing conditions and provide a secure connection automatically from a user, or object, to an authorised application. By analysing network configurations, Quality of Experience (QoE) measurements, and known issues, correlated with network hardware and software version information, the network management software will be able to suggest configuration changes and updates to the administrator.

The ALE Autonomous Network provides a resilient and seamless connected experience with the Alcatel-Lucent OmniSwitch® (LAN) and Alcatel-Lucent OmniAccess® Stellar (WLAN) combined with ultra-fast convergence, secure network access control, assured Quality of Service (QoS), and secure diversified code to ensure an OS hardened switch. New generation Wi-Fi with embedded WLAN control in access points remove the need for physical centralised controllers. This distributed architecture delivers the best performance and scalability, and ensures high availability, with operational simplicity and low total cost of ownership (TCO). The WLAN solution is coupled with a comprehensive wired LAN that supports deployment requirements ranging from access, to core. All of this is supported in even the most extreme and harsh environments.

A single Network Management System (NMS) provides an additional level of integration between wired and wireless networks. This reduces the IT manager workload as they no longer have to handle two management systems with two sets of policies and configuration rules (one for the LAN, and another for the WLAN). The ALE NMS provides unified service management and network-wide visibility, which can improve IT efficiency and agility.

A network service is a secure connection from a user or object to authorised application(s)
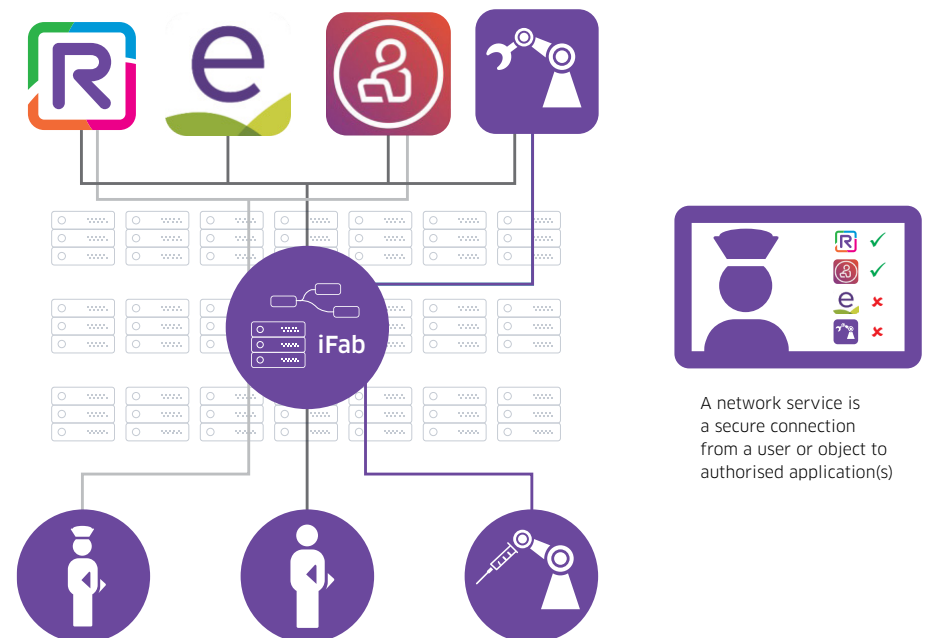
Internet of Things (IoT)

The Internet of Things (IoT) in education spans multiple areas. In the education sector, there are many devices that support learning and research, for example, smart boards, 3D printers, robotics, and projectors. IoT also helps to ensure a superior experience for students and staff. It starts with student's personal devices such as, video games, Apple TV, Amazon Alexa, as well as university IoT devices such as digital signage, vending machines, smart washing machines, and parking sensors. Campus operations can also be optimised with connected and intelligent systems including HVAC, lighting, sprinkler systems, and sensors in the washrooms. Another area where IoT provides significant benefit is in ensuring campus safety. IoT enabled devices such as surveillance cameras, door locks, smoke detectors and other sensors help to provide early alerts about dangerous situations.

All of these IoT devices must be onboarded and provided with the required network resources for proper operation and monitoring. IoT enablement technology automates these activities; as well it ensures the network is secure and that only authorised individuals have access to authorised systems, minimising the exposure to cyber attacks.

However, the limited processing power of connected objects prevents devices from having embedded, sophisticated security capabilities. This creates two major problems; devices are hard to configure, and they are easy to hack. The highest security risk is not the objects themselves, but rather the doors they open to other network segments. Once the object is compromised and hacked, the whole network becomes vulnerable to attack vectors such as a Trojan horse or other virus. When you consider the fact that educational institutions connect thousands, if not millions, of these objects, the challenge becomes clear; configuration and management of individual devices is totally unrealistic, and the security risks are enormous.

Alcatel-Lucent Enterprise's IoT containment approach is designed to provide an automated solution to securely onboard IoT devices while protecting the network at the same time.

Three major steps to connect, manage, and properly control any IoT device must be followed:

- **Discover and classify:** Each object connected to the network must be discovered and classified. Digital Age Networking provides the ability to access a very large (29+ million) device database to immediately identify the object connected to the network and automatically provision a configuration associated with a specific device.
- **Virtual segmentation:** It is critical to segment a single physical network infrastructure into separate virtual networks or containers, to ensure that each service or application has its own dedicated segment, enabling proper function and secure operations.
- **Continuous monitoring:** The network monitors behavior to ensure that the IoT devices and applications are functioning as desired. Each authorised object is stored in an inventory. This enables IT to know exactly and instantly, how many devices are connected on the network. It is important to continuously monitor a connected object on the network to take immediate action in the event that there is a deviation from usual behavior. In the event of unusual activity the network can take actions such as, disconnecting the faulty device, sending a notification to the network administrator, or changing the destination of the dedicated IoT container for further verification.

Business Innovation

Automated workflows can provide specific and quantifiable information about the user connectivity experience and access to applications, and can compare it to benchmarks in other institutions in order to develop recommendations for improvements. Another important aspect that educators are trying to understand is what determines student's success. ALE Digital Age Networking collects a variety of information such as, where students congregate and with whom, class attendance, applications' usage, and devices used. This information combined with data collected from other systems can feed into a automated workflow system to help assess which students are more likely to succeed and which ones are more likely to drop out. While there is still a long journey to get to that point, intelligent networks can contribute to the process.

New processes are optimised when they leverage user, application, and IoT metrics in real-time. Digital Age Networking can help educational institutions optimise processes and services. This is key to innovation, improved productivity, workflow optimisation, and an enhanced user experience.

Technology innovations including IoT, location services, and collaboration platforms are at the forefront of business process and services automation. Alcatel-Lucent Enterprise is leading the way by integrating these components to help educational institutions reap the benefits of their technology investments.

Alcatel-Lucent OmniAccess Stellar Location Services, which include asset tracking and contact tracing, can help increase safety, reduce the spread of infectious diseases, manage occupancy limits and reduce both operational and asset-related costs..

Alcatel-Lucent OmniAccess Stellar Asset Tracking provides real-time and historical location of users or objects in indoor facilities using Wi-Fi and Bluetooth technologies. This information allows education institutions to better understand workflows, increase utilisation of equipment, significantly reduce the time it takes to find someone or something, avoid lost or stolen assets, and increase productivity, while enhancing user experiences. From an operations perspective, misplaced or lost equipment incurs heavy costs to schools and universities every year. Knowing where assets are in a real-time, or where they are stored, can help facilities keep equipment costs under control. Other key OmniAccess Stellar Asset Tracking features include real-time occupancy management and historical contact tracing which can help identify areas where crowd restrictions are being exceeded, or allow follow-up notifications with individuals in the event of an incident such as, possible exposure to harmful chemicals or infectious diseases.

Occupancy management is simplified with the ability to quickly check people density in predefined areas. Limits can be set and automatic alerts can be sent when occupancy limits are exceeded.

Real-time and historical data with a geolocation context enable the development of new innovative digital business processes and services. Integrating data from the OmniAccess Stellar Location Services with a business collaboration tool like Rainbow™ by Alcatel-Lucent Enterprise enables automation of simple or repetitive tasks. It also enables the development of workflows that can be automated using **triggers**, **rules**, and **actions**.
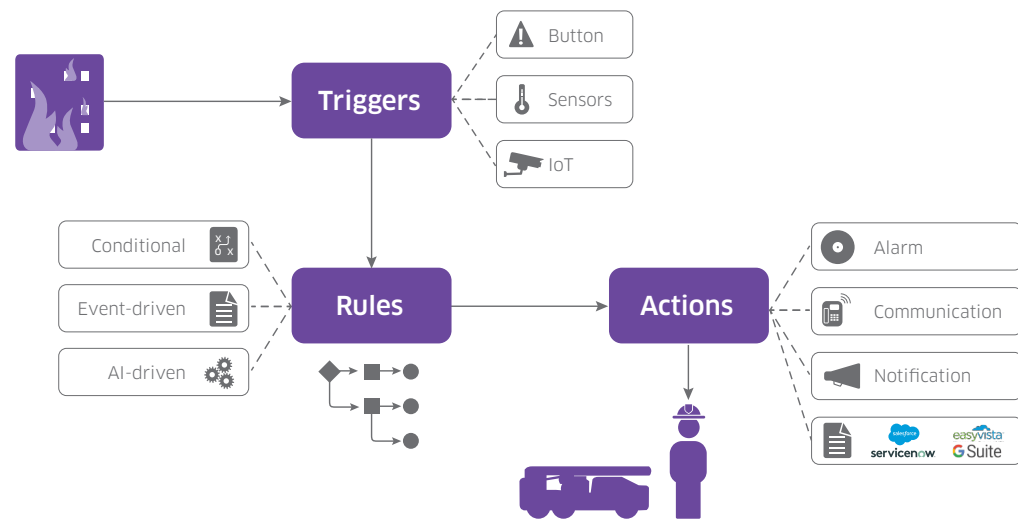
Summary

Digital Age Networking is the Alcatel-Lucent Enterprise blueprint that helps schools and universities enter the digital era and enable their digital transformation.

The ALE digital transformation blueprint is based on three pillars:

- **An Autonomous Network that easily, automatically, and securely connects students, teachers, processes, applications, and objects:** The Alcatel-Lucent Enterprise Autonomous Network is based on a streamlined portfolio complete with a true unified management platform, delivering common security policies across the LAN and WLAN. The Autonomous Network also provides deployment flexibility indoors, outdoors, and in industrial environments. Network management can be delivered on-premises, in the cloud, or in a hybrid deployment, depending on customer preference.

- **Secure and efficient onboarding of IoT devices:** Segmentation keeps devices in their dedicated containers and minimises the risk of having the device and network compromised. IoT containment can help educational institutions easily and automatically understand if the device is behaving properly, or not, and help to keep the network safe.

- **Business innovation through workflow automation:** Integrating user, applications, and IoT metrics in real-time, with geolocation data into Rainbow workflow capabilities, simplifies the creation and roll-out of new automated digital process and services. This is the key to innovation, enhanced productivity and optimised workflows.

Alcatel-Lucent Enterprise is committed to developing networking technology and solutions that help learning institutions realise their potential through digital transformation.

Alcatel·Lucent
Enterprise