



Digital Age Networking

for Healthcare

Digital revolution in healthcare

Alcatel-Lucent Enterprise [Digital Age Networking](#) helps hospitals and clinics connect patients, staff, and the healthcare ecosystem, by delivering network technologies that work across, and beyond the facilities. It optimizes the patient care pathway and improves staff efficiency through innovative network services such as wayfinding and medical asset tracking, which run on top of a reliable, secure and high-performance Wi-Fi infrastructure. ALE technologies also ensure secure network setup, unified access and policy management, automated user and device onboarding, while granting optimal Quality of Service (QoS) for users and medical IoT devices.

The healthcare digital revolution differs from other industries. Healthcare providers have a variety of unique needs when it comes to the network and IT infrastructure. For this reason, it has always been difficult for hospitals, clinics, and assisted living facilities (aged care versus healthcare), to adopt modern technology standards. In addition to privacy and patient safety requirements, access and availability of care

are also major concerns. For healthcare providers to best transition to new technology, they need assurances that the network will be specifically designed to meet industry needs. Some considerations include:

- **Connected medical devices:** A hospital network must be able to identify, securely onboard, and connect a variety of medical devices (fixed and mobile) to their respective applications.
- **Need for high resolution imaging for diagnosis:** 4k imaging and high resolution images are increasingly being used by doctors to improve diagnosis. The network must be able to transfer large image files without network delays or without affecting the performance of the network.
- **Mobile patient information:** Patient information such as EHR/EMR, imaging, and medical files, need to be accessible anywhere, anytime, on any clinician device, and on-demand, with the lowest possible latency.



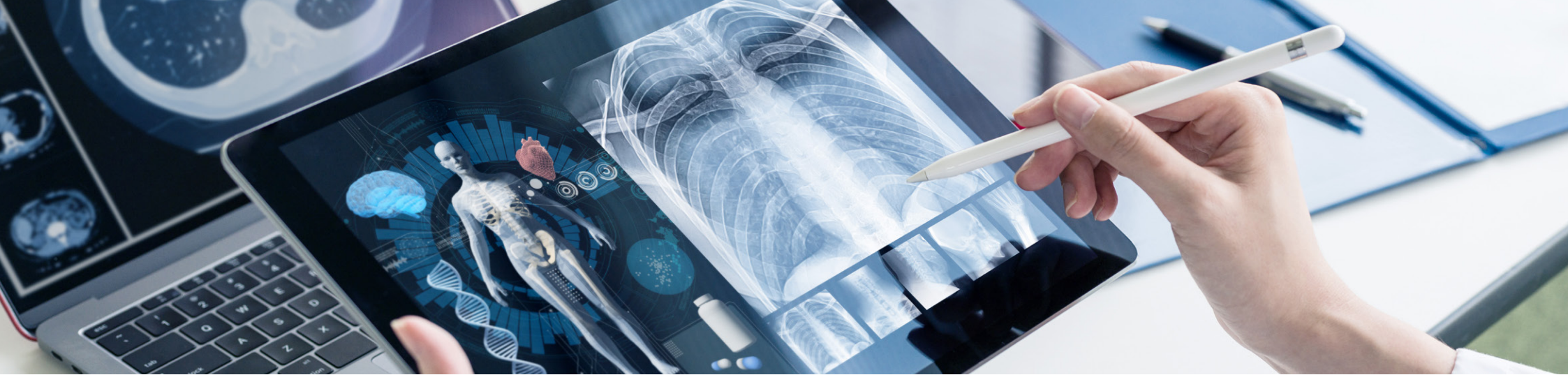
Connected medical devices



High resolution imaging



Access information anywhere, anytime



One of the core challenges for healthcare digital transformation involves the interactions between the network's different departments. Healthcare providers generally have a variety of networks which may be completely isolated from each other. These can include medical IoT, clinical applications, patient records, administrative information, patient/visitor internet access, communication systems, and more.

This multitude of requirements has led to the need for a converged network, through which multiple networks can be connected, but not consolidated. Maintaining disparate networks almost universally leads to issues with QoS and cost. The ideal solution is to tie everything into a single IT infrastructure to ease network management, monitoring and maintenance, while at the same time maintaining the security level between the networks.

[Digital Age Networking](#) is based on three pillars and enables healthcare providers (hospitals, clinics and assisted living facilities) 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 (clinicians, patients, and staff, among others) experience.
- [IoT](#) onboarding enables healthcare providers to scale up digitalization through secure IoT provisioning and management. It can integrate, onboard, and connect a massive number of medical and non-medical IoT devices that are at the foundation of new healthcare digital business processes.
- [Business Innovation](#) enables healthcare providers to accelerate their digital transformation with new automated workflows, taking the effort out of labor-intensive or repetitive tasks.

Digital Age Networking is based on three pillars:



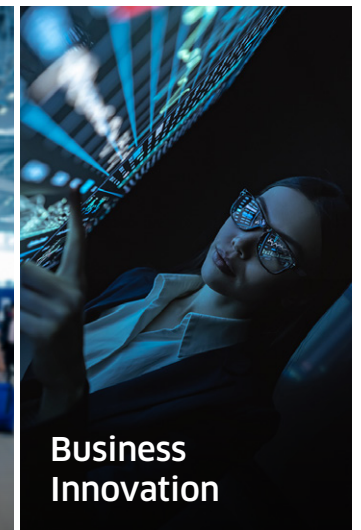
Autonomous Network

Automate mission-critical network operations and improve user experience



IoT

Scale up digitalization with secure IoT onboarding and management



Business Innovation

Accelerate transformation with automated workflows

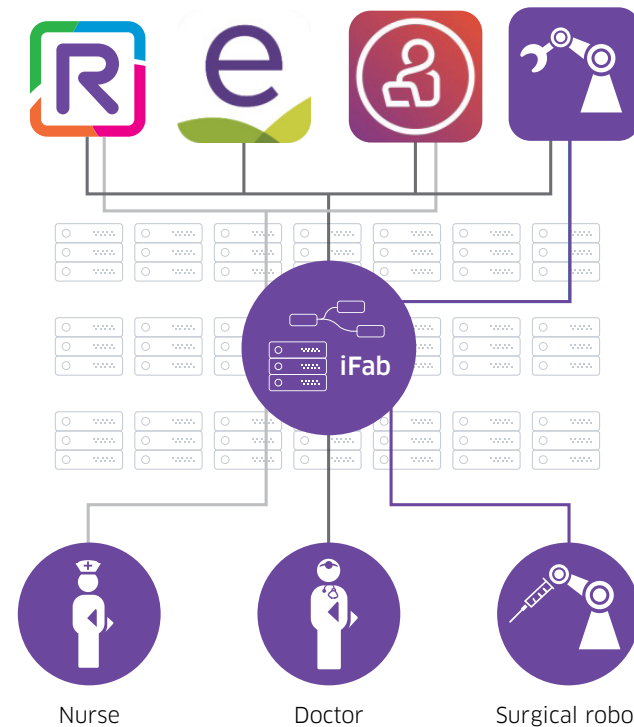
Autonomous Network

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 enterprise network, element-by-element. This is now changing. IT leaders are shifting their focus to business transformation rather than just building and running the infrastructure as was previously required.

The Alcatel-Lucent Enterprise Autonomous Network is configured and provisioned automatically. It ensures mission-critical, secure network operations, while optimizing 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, with the help of machine learning, it will adapt automatically to changing business conditions and provide a secure connection automatically from a user, or object, to an authorized application. By analyzing 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 Autonomous Network provides a seamless connected experience with the [Local Area Network \(LAN\)](#) and [Wireless Local Area Network \(WLAN\)](#) combined with ultra-fast resiliency, secure network access control, and secure diversified code to ensure an OS hardened switch. New generation enterprise Wi-Fi with embedded WLAN control in access points remove the need for physical centralized 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 support deployment requirements ranging from access, to core, and data center. All of this is supported in even the most extreme and harshest 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 NMS provides unified service management and network-wide visibility, which can improve IT efficiency and business agility.



A network service is a secure connection from a user or object to authorized application(s)

Internet of Things (IoT)

Digital Age Networking supports IoT (or Internet of Medical Things (IoMT) by providing device fingerprinting and secure onboarding so that only known and authorized devices have access to a healthcare network. Market analysts predict that 20-30 billion IoMT devices will be connected to healthcare networks by 2020¹. The question is: How is this done in a secure manner using a single network infrastructure? The network can be secured via [IoT enablement and containment](#), using segmentation techniques (such as VLANs or Virtual Private Networks leveraging Shortest Path Bridging), and unified policies based on departmental requirements, or workflow functions. For example, EHR systems, imaging systems (such as MRI, ultrasound, and X-ray), administrative ERP systems, patient and guest Wi-Fi, security systems (including video cameras and access control), and facilities systems (such as HVAC, laundry and lawn sprinklers). This enables a healthcare provider to operate a converged network, virtually separated, enhancing security for all users, devices and functions. It also empowers clinicians and caregivers with the tools they need to deliver an enhanced patient experience.

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 authorized 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.

¹ - Frost & Sullivan, Internet of Medical Things (IoMT) Forecast to 2021 report.

Brochure

Digital Age Networking for Healthcare





Business Innovation

New business processes are optimized when they leverage user, application, and IoT metrics in real-time. Digital Age Networking can help healthcare providers optimize processes and services. This is the key to innovation, improved productivity, workflow optimization, 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 healthcare providers reap the benefits of their technology investments.

[Alcatel-Lucent OmniAccess Stellar Location Services](#), which include asset tracking and location-based services, can help increase safety and reduce both operational and asset-related costs.

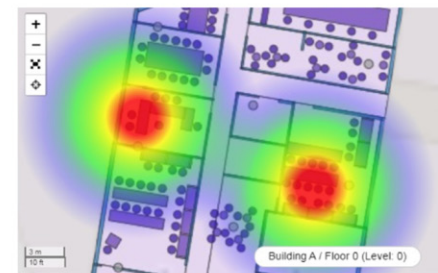
[Alcatel-Lucent OmniAccess Stellar Asset Tracking](#) provides real-time and historical location of users or objects, in indoor facilities, using Wi-Fi and Bluetooth technologies.

This information allows healthcare providers to better understand workflows, increase utilization of equipment, significantly reduce the time it takes to find someone or something, avoid lost or stolen assets, and increase productivity, while enhancing user (clinicians, patients, staff and visitors) experiences. From an operations perspective, misplaced or lost equipment incurs heavy costs to businesses every year. Knowing where assets are in a real-time, or where they are stored, can help healthcare providers

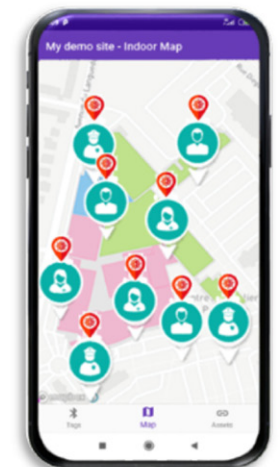
keep equipment costs under control. Other key OmniAccess Stellar Asset Tracking features include real-time hot spot tracking and historical contact tracing which can help identify areas where crowd restrictions are being exceeded, or allow follow-up notifications with individuals in the event of an incident such as, possible exposure to harmful chemicals or infectious diseases.



Quickly locate people and equipment



Hot spot tracking in real-time



Contact tracing history

Brochure

Digital Age Networking for Healthcare

Location-based services in healthcare



1 • Patients are reminded about appointments and can confirm their availability. This reduces missed appointments.

2 • When a patient arrives at the hospital, the Smart Park remembers their parking location (parking lot coverage is required).

Note: The mobile app starts automatically if the app was used previously and the phone has remained active.

3 • Once the patient enters the hospital a notification is sent to the doctor advising that the patient has arrived.

4 • The patient checks-in and opens the app. Their location is identified on the 3D map. The patient is provided with directions to the consultation room and arrives on-time for the appointment.

5 • When the patient is ready to leave, directions to their vehicle are provided by the Smart Park feature.

6 • A visitor arrives at the hospital to see a friend. They look up their friend in the hospital app and get directions to the floor and room.

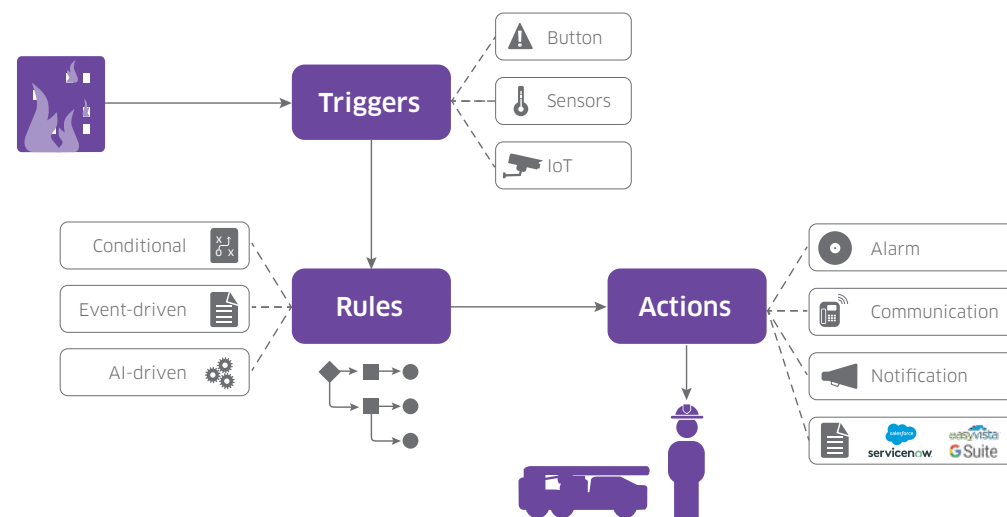
7 • As the visitor passes by the gift shop, promotion coupons and notifications can be sent to them.

8 • Security staff can be easily located and assigned to security positions to address any incidents.

9 • Asset tracking helps hospital personnel quickly locate equipment. It can also provide notification of patients inadvertently wandering away from their confined area in the hospital.

[Alcatel-Lucent OmniAccess Stellar Location-based Services \(LBS\)](#) includes wayfinding (self-navigation indoors), and geonotifications (push messages) based on geolocation, all managed from a cloud application. **Wayfinding** enables turn-by-turn directions to a patient's room as well as other points of interest such as, cafeteria, restrooms, radiology, waiting rooms. **Geonotifications** are messages that can be sent to the mobile devices of nursing staff, doctors and visitors, for example, to remind them to sanitize their hands before entering and leaving a certain area or patient room helping to reduce the spread of infection and contagious disease. LBS enables businesses to understand user behaviors and patterns. The LBS cloud application captures the data and provides analytic dashboards that can be used to optimize people, assets, and operational workflows. This information can help healthcare facilities run more efficiently, enable indoor navigation, and generate revenue by offering customer promotions and services based on the customer's location such as visitors passing by a gift shop.

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. It can be used to optimize people, assets, and operational workflows. This information can help and facilities run more efficiently.

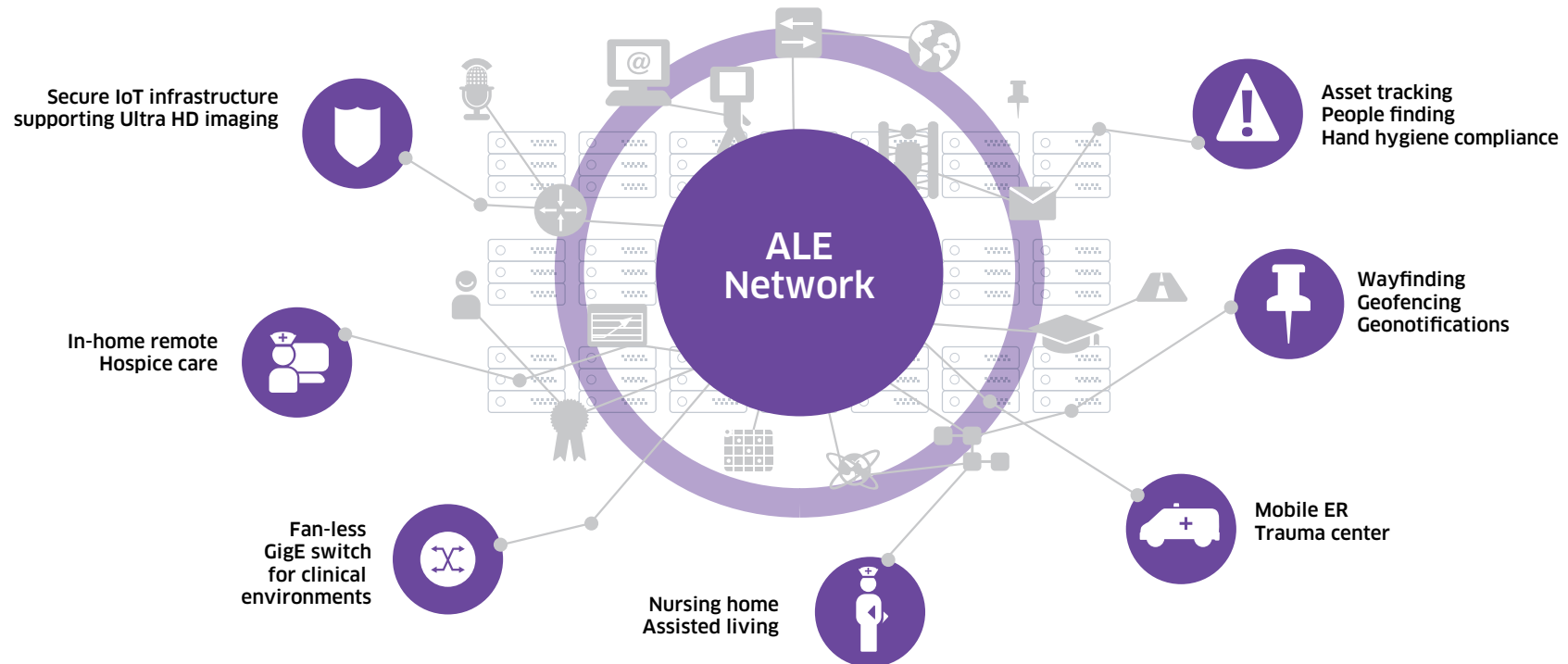


Healthcare use cases

Digital Age Networking for healthcare supports multiple care areas including:

- Network infrastructure performance improvements for LAN and WLAN equipment to support EHR systems and 4K imaging
- Introduction of in-home remote/hospice care solutions, nursing home/assisted living solutions for small to large networks
- Location-based services (LBS) providing indoor navigation, geolocation and geonotifications

- Asset tracking to locate people and assets, while providing hot spot tracking and contact tracing
- Zero-touch and secure, remote office, clinic, assisted living facility setup with access to all main site resources
- The ability to quickly set up a trauma center/triage area with full high-performance network capabilities





Summary

[Digital Age Networking](#) is the Alcatel-Lucent Enterprise blueprint that enables healthcare providers to 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 people, 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 the customer preference.
- **Secure and efficient onboarding of IoT devices:** Segmentation keeps devices in their dedicated containers and minimizes the risk of having the device and network compromised. IoT containment can help healthcare providers 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. Rainbow Workflow simplifies creation and roll-out of new automated digital processes. This is the key to innovation, enhanced productivity and optimized workflows. Business innovation leverages real-time analytics to provide an accurate business view, location services to enable innovative new digital business processes and automated workflows.

Alcatel-Lucent Enterprise is committed to developing networking technology and solutions that help organizations realize their business potential through digital transformation.