



Digital Age Networking

for Transportation

Brochure

Alcatel·Lucent 
Enterprise

Transportation

The Transportation industry has many sub-segments, however, they all share similar challenges. Increasing safety and security, improving operational efficiency with the Internet of Things (IoT), and delivering a better passenger experience are all top of mind in the transportation industry today. Transportation operators know their networks need to become smarter to support the exponential increase in traffic and passenger volumes as populations grow.

Transportation industry systems are becoming smarter, with digital transformation at the forefront of the change. This transformation spans technology, the environment, as well as integration with the local community and across transportation systems.

The ultimate smart transport system will be fully automated with full visibility of all devices connected to the network. A smarter transportation future will require seamless interaction between machines, objects and people, using automation, IoT, and Artificial Intelligence (AI) to bring these elements together. A holistic approach to a smarter transportation system is essential, and all forms of transport and sub-systems must be considered.

Transportation operations integrate a variety of infrastructures, both physical and virtual. These include network technologies such as radio, LAN, WAN and WLAN, RFID and geo-positioning technologies.

The effectiveness of the smart transportation environment lies in the technology and smart practices' ability to work together to effectively share information for the benefit of transportation operators and for their customers.

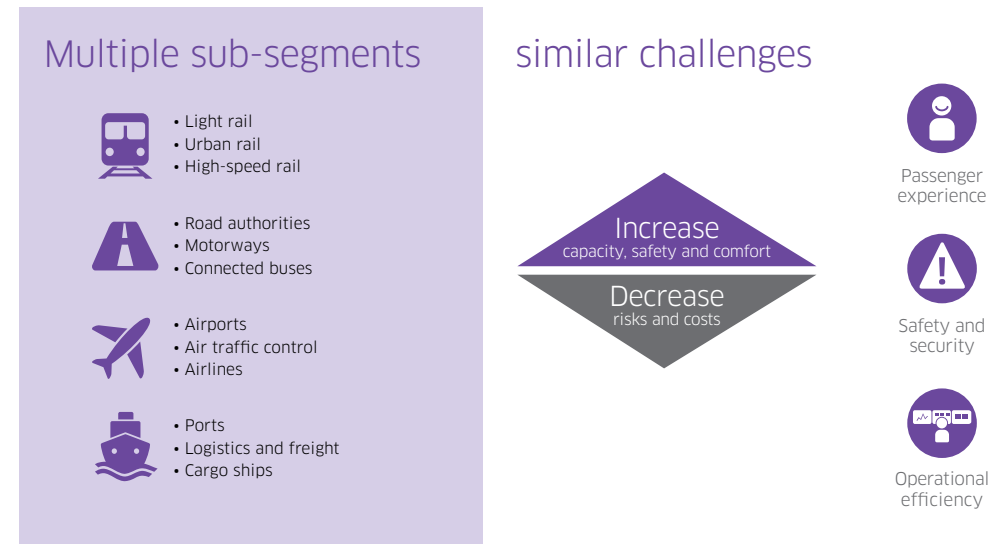
Rail operators traditionally deploy multiple networks, one for mission-critical applications such as control, signaling, security and SCADA, and another for business applications such as ticketing, turnstiles, platform Wi-Fi, and retail. These networks have led to an increase in the number of connected IoT devices. The need to provide more services to improve the passenger experience, digitalize interactions, and increase safety, while supporting a growing passenger demand, is changing network requirements.

Airports require a multi-service, multi-tenant network to support many different applications and uses such as, check-in desks, security, baggage handling, operations, passenger Wi-Fi, and retail shops, to name a few. All of these clients require their own security, Quality of Service (QoS), and bandwidth requirements. With the exponential growth in connected IoT devices, the network must adapt more quickly than ever

before. Airport operators also need to drive operational efficiencies while increasing safety and improving the passenger experience. This demand is increasing the adoption of IoT and new technologies such as asset tracking and location-based services.

Technological developments present road administration organizations around the world with the opportunity to transform the way they manage and operate **highway and road** networks. **Intelligent Transportation Systems (ITS)** provide a combination of leading-edge information and communication technologies required for transportation and traffic management. These technologies can improve the safety, efficiency, and sustainability of transportation networks. They can also reduce traffic congestion and enhance drivers' experiences.

Modern **ports** have become multimodal distribution megahubs that link sea, river, canal, road, rail, and air transport routes, vital for international trade, and linchpins for the global economy. IoT is becoming a significant factor in ports as they move to more autonomous ships and systems to drive efficiencies, expected within the next ten years.



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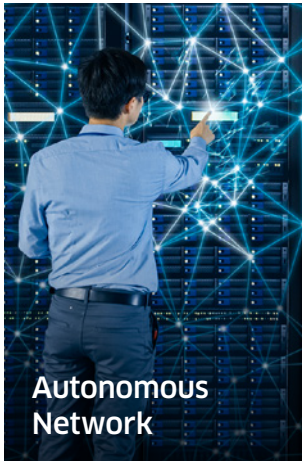
Digital Age Networking for Transportation

Digital Age Networking

Transportation industry challenges can only be addressed with digital age networks. Alcatel-Lucent Enterprise [Digital Age Networking](#) provides efficient, proven, end-to-end solutions for transportation businesses including airports, rail stations, intelligent roads, tunnels, ports and logistics.

Digital Age Networking is based on three pillars:

- An [Autonomous Network](#) provides the reliable infrastructure to ensure mission-critical applications run smoothly. It is designed to improve passenger safety and comfort, and increase system capacity while at the same time, reducing cost and risk.
- [IoT](#) onboarding enables transport operators to scale-up digitalization through secure IoT provisioning and management. It can integrate, onboard, and connect a massive number of IoT devices at the foundation of new transportation digital business processes.
- [Business Innovation](#) helps accelerate digital transformation with new automated workflows, taking the effort out of labor-intensive or repetitive tasks.



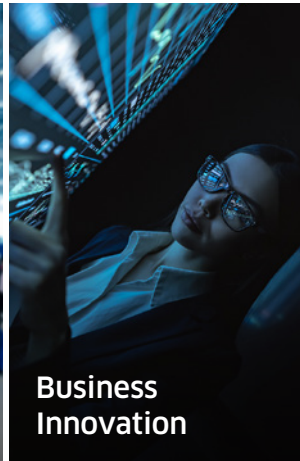
Autonomous Network

Automate mission-critical network operations and improve user experience



IoT

Scale up digitalization with secure IoT onboarding and management



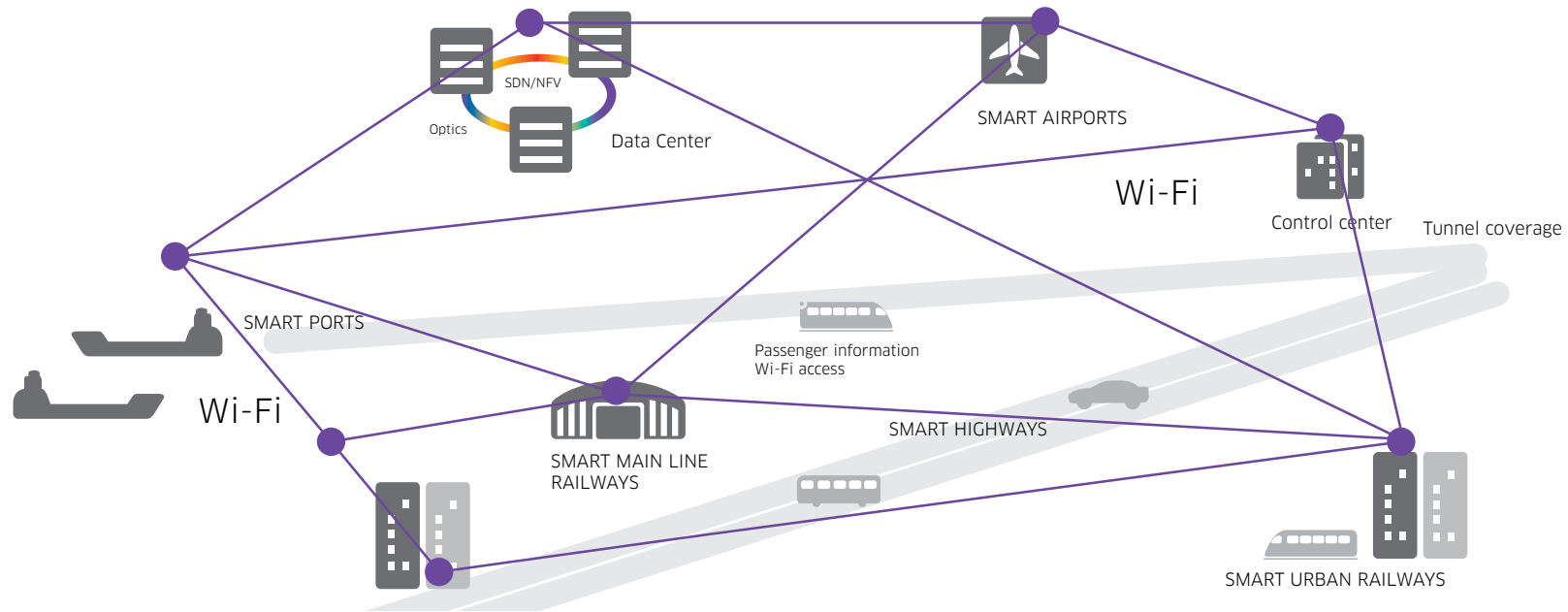
Business Innovation

Accelerate transformation with automated workflows



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Digital Age Networking for Transportation



Autonomous Network

A transportation data network is mission-critical and therefore must be highly resilient, and support many different types of applications, objects, and users, with high levels of security, making it extremely complex. With an Alcatel-Lucent Enterprise Autonomous Network, the network is simplified, tasks are automated, and IT teams can deliver a better level of service and improve SLA's, to provide an enhanced traveler experience. All passenger, staff, applications, and IoT devices can automatically be connected, with the correct level of access, security, and QoS. Network provisioning can also be automated, simplifying the network and reducing human error to provide greater operational efficiency throughout the transportation systems and processes.

In addition, the [Alcatel-Lucent OmniAccess® Stellar WLAN](#) and [Alcatel-Lucent OmniSwitch® LAN](#) equipment use the same onboarding principles. This creates a true end-to-end solution for all devices, applications and users, with support for indoor and outdoor ruggedized switches, and access points (APs) that can withstand harsh environmental conditions. Both portfolios are designed with security in mind. The OmniAccess Stellar Access Points are equipped with WPA3 security while the OmniSwitch products employ secure diversified code to ensure OS hardened switches.

Further, the OmniAccess Stellar WLAN can scale up to 4000 AP's in a single cluster, without the need for centralized physical controllers, which is sufficient for most transportation deployments. The OmniAccess Stellar WLAN also allows new business models to be introduced to reduce costs.

An Autonomous Network is a key pillar in the mission-critical transportation network. It creates virtual connectivity among all the active physical links by choosing the best route for all the packets. It is resilient to physical damage and can manage the segmentation and automation for the connectivity of every user, device, and IoT. An Autonomous Network also enables transport operators to host multiple services and multiple tenants in a single physical network infrastructure.

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 need 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 business agility.

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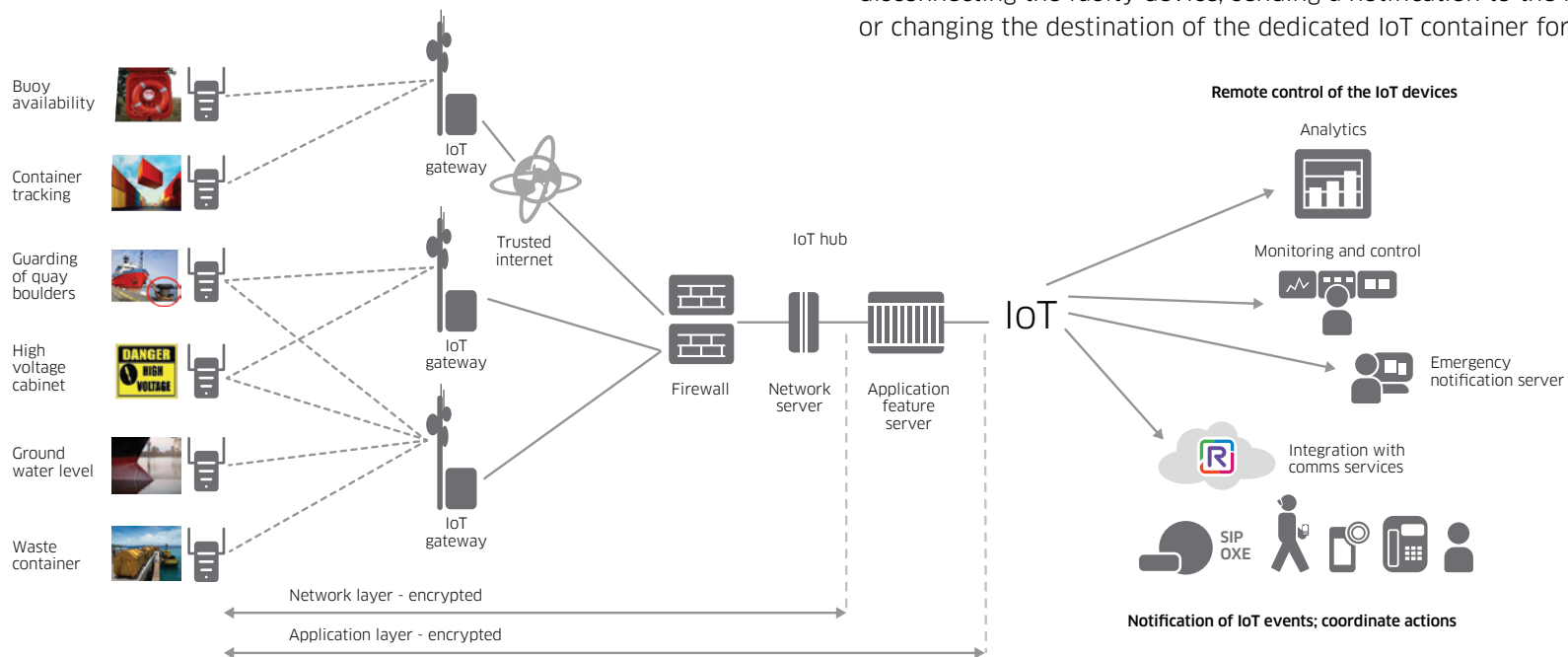
Digital Age Networking for Transportation

Internet of Things (IoT)

IoT is driving efficiencies across all transportation segments. It can increase safety, improve the passenger experience, as well as drive down operational costs. However, with the exponential increase in IoTs, transport operators may struggle to cope with the demand to connect and manage potentially hundreds of thousands of IoTs.

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 the whole enterprise network becomes vulnerable to attack vectors such as a Trojan horse or other viruses. When you consider the fact that transportation operations 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 efficiently and securely onboard IoT devices while protecting the transport operators' network.



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, ensuring 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.

Business Innovation

New business processes are optimized when they leverage user, application, and IoT metrics in real-time. Digital Age Networking can help transport operators 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 operators 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.

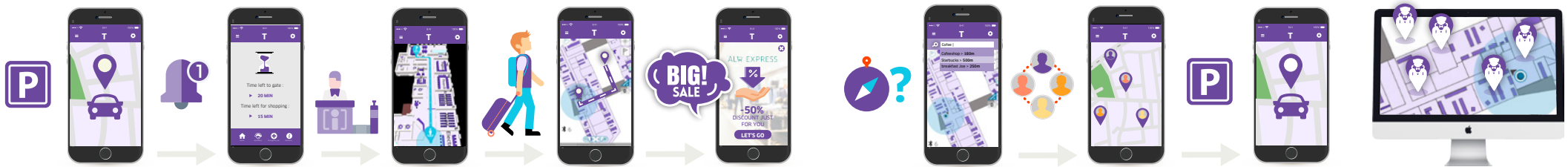
[Alcatel-Lucent OmniAccess Stellar Asset Tracking](#) provides real-time and historical location of users or objects, in indoor facilities, using Wi-Fi and Bluetooth technologies. This information allows transport operators to better understand workflows, increase utilization of equipment, significantly reduce the time it takes to find someone or something, avoid lost or stolen assets, and increase productivity, while enhancing passenger experiences. From an operations perspective, misplaced or lost equipment incurs heavy costs to operators every year. Knowing where assets are in a real-time,

or where they are stored, can help 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 emergency incident such as, possible exposure to harmful chemicals or infectious diseases.

[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 through an airport, railway or other transportation facility, to specific locations, as well as points of interest such the retail outlets, restaurants, cafeterias or restrooms. **Geonotifications** messages that can be sent to the mobile devices of transport operators, employees and travelers. Emergency notifications can be sent, as well push notifications from retailers can advise of ongoing promotions.

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 businesses and facilities run more efficiently, enable indoor navigation, and generate revenue by offering customer promotions and services based on the customer's location.

Location-based services in transportation



1 - When a traveler arrives at the airport parking garage, 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.

2 - As the traveler enters the airport they receive notifications about their departure gate and boarding time.

3 - When the traveler opens the app, they can see where they are located in the terminal and can find the closest and shortest check-in and security lines.

4 - Once through security, the traveler can enter the flight number to get directions to the gate. It also provides an estimate of how long it will take to get to the gate.

5 - As travelers make their way through the airport, promotional coupons and notifications can be sent for duty-free shops, restaurants, or other retail outlets.

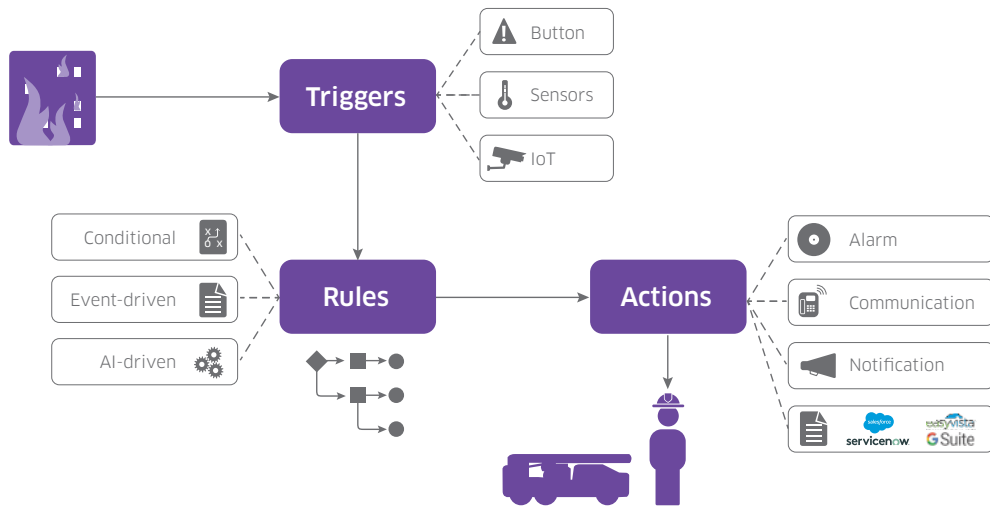
6 - Travelers who have time to spare can browse the map, click on a POI (point of interest) to get directions to their favorite coffee shop or breakfast spot.

7 - The traveler can share their location with their Facebook, Wechat or LinkedIn community.

8 - When the traveler returns from their trip they can easily locate their car using the Smart Park feature.

9 - In the event of an emergency, airport security administrators can use the tracker feature to quickly locate and mobilize security staff.

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, as shown in the diagram below.





Summary

Digital Age Networking is the Alcatel-Lucent Enterprise blueprint that enables transport operators to digitally transform their business, reduce risk, increase capacity, safety, security and operational efficiency, and also improve the passenger experience.

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 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 operator 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 operators 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, simplifies the creation and roll-out of new automated digital business processes. This is the key to operational innovation, enhanced productivity, and enabling new revenue streams.

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