

# FAST FORWARD

EDITION 1, 2019

## TRANSPORTATION FOR THE 21<sup>ST</sup> CENTURY

### WHAT'S INSIDE?

SECURITY, EFFICIENCY  
AND A GREAT CUSTOMER  
EXPERIENCE

GET OUR INDUSTRY  
EXPERT INSIGHTS INTO  
RAIL, ROAD AND AIR  
TRANSPORTATION

Alcatel•Lucent  
Enterprise



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# PERSPECTIVE

Welcome to the inaugural issue of Fast Forward, the Alcatel-Lucent Enterprise magazine for 21st century transportation. We hope this collection of articles, written by some of our leading-edge experts, will provide insights into where we believe the transportation industry is headed and how we can get there together.

We live in a world in motion. With billions of people and things in transit we are challenged with congestion on our roads, in our rail system and in the air. More people and things are moving around the globe faster than ever before. Larger airports, bigger ports and more roads will not address all the challenges facing the transportation industry.

At ALE we are turning these challenges into opportunities with innovative technologies. We understand the need for ubiquitous connectivity with a fixed and wireless network architecture that delivers real-time communications between people and machines, even in the harshest of conditions.

And while priorities may vary from segment to segment within the industry we know that a few things are top of mind for everyone, including:

- the safety and security of travelers
- delivering an exceptional passenger experience
- ensuring operational efficiency .

In today's world, we recognize that safety and security is paramount for both travelers and transportation operators. Forward-looking technology that provides information to help authorities make smarter decisions and can quickly relay useful information to travelers is key.

Solutions that enhance the travelers' experience by helping them get from point A to point B with the least amount of frustration and anxiety means happy travelers that keep on coming back.

At the same time, improving operational performance can improve your bottom line. Centralized provisioning and automated deployment means things can happen quicker with fewer people, which is especially good in harsh environments and in hard-to-reach areas.

All of our article contributors are excited to share their vision with you. We hope that you will find, within the pages of our magazine, some solutions to help you continue to move your transportation journey forward into the 21st century.

**"WE LIVE IN A WORLD IN MOTION. WITH BILLIONS OF PEOPLE AND THINGS IN TRANSIT WE ARE CHALLENGED WITH CONGESTION ON OUR ROADS, IN OUR RAIL SYSTEM AND IN THE AIR."**

## Roch Muraine

Worldwide Sales Director  
Vertical Market - Transportation  
Alcatel-Lucent Enterprise



# ON TRACK: CONNECTIVITY AND CONTROL AT THE CENTER OF RAIL'S FUTURE

Every player in the rail industry is looking to deliver the best possible experience for their passengers. But it can be a challenge trying to attract more passengers and create a more connected experience while at the same time trying to keep operational costs down and expand safety and security measures. It may seem like a catch-22, but crossing this digital divide requires a rethink on how data systems operate and how subsystems are managed.

By **Urs Seiler**, Sales Engineer, ALE, Zürich Switzerland, **Alcatel-Lucent Enterprise**.

Improved connectivity is enabling transportation systems to evolve to meet the needs of a world on the move. From high-speed trains to self-driving cars, the transportation industry is harnessing the power of IP connectivity and the Internet of Things (IoT). Sensors are being rolled out to feed streams of real-time information to applications, which in turn provide operators with live information feeds, and provide passengers with up-to-the-minute travel announcements.

## **EVOLVING SERVICE DELIVERY - GETTING IOT-READY**

Applying analytics to data from IoT devices is a great revenue opportunity for transportation operators. For example, data from location-based services can reveal information such as how much traffic is going through different locations, when passengers visit, how long they stay, what path they take and whether they return. Similarly, analysis of the real-time data from IoT devices can immediately identify travel problems before they cause delays or accidents, and provide warnings when maintenance is required. The implementation of predictive maintenance for rolling stock or track-switches is one of the most important developments in the transportation industry with regard to increasing safety and reducing operational costs.

Systems such as signalling, video surveillance, emergency call and alarm detection, telephony, wireless LAN, ticketing, passenger info systems and announcements, infotainment and internet all contain various devices and applications that may be operated and maintained by different groups or vendors and may require communication with third parties. Rail network operators will have to reassess how best to deploy the supporting infrastructure to achieve the level of connectivity required for the industry and to ensure improved services for passengers.

Whether it is bringing Wi-Fi to passengers on the *New York City* subway, or *connecting the longest rail in the world*, rail

networks are undergoing a connectivity transformation. The question many rail operators are asking is, "How do we cost-effectively manage and maintain the growing IT and digital footprint needed to support transformation?"

## **KEEPING UP WITH CONNECTIVITY - THE MODERNIZATION OF DATA INFRASTRUCTURE**

Although traditionally serial-based, rail and metro communications networks are quickly moving towards IP/Ethernet. As a result, a modern rail network now typically operates sub-systems off an access backbone network within the core network. A single, unified IP network infrastructure for most systems, immediately enables better connectivity between people, smart 'things' and processes. One data network that can carry traffic for multiple systems over a common infrastructure provides a manageable digital footprint with simplified IT administration.

Moving railway operations from multiple separate networks to a converged mission-critical architecture reduces the number of networks that need to be supported and dramatically simplifies network command and control requirements. Being able to integrate open platforms, such as new cloud-based applications, into the operations control center can further accelerate day-to-day operations.

However, a poorly planned and ineffective data infrastructure, as well as the introduction of new devices, can potentially place a strain on network resources, resulting in poor performance and the introduction of new vulnerabilities which could ultimately affect a travellers' experience.

## **CYBER RISK: THE COST OF CONNECTIVITY?**

The connectivity boom and the growing number of possible points-of-entry and devices to protect is beyond what most IT teams can manage. Like all businesses, railways are vulnerable



**“WHETHER IT IS BRINGING WI-FI TO PASSENGERS ON THE NEW YORK CITY SUBWAY, OR CONNECTING THE LONGEST RAIL IN THE WORLD, RAIL NETWORKS ARE UNDERGOING A CONNECTIVITY TRANSFORMATION.”**



to cyber-attacks. These can cut off access to commercial and business applications, compromise passenger information, and even put railway operations at risk.

It is nearly impossible to manage all of the different devices when they are rooted in individual subsystems that require their own management and maintenance. While Ethernet, IP and converged networks bring many benefits to railway operations, integrating subsystems also increases the risk that an isolated threat could become a much bigger problem. However, security risks should not be seen as the cost of doing digital business. Containing IoT without constraining it is one of the core principles behind building a secure network for rail, or any other intelligent transport system.

### **KEEPING AN EYE ON CONTAINMENT**

Network segmentation lets operators create virtual isolated environments, known as IoT containers, on a single network. These are data traffic containers, where common devices are grouped together and only a select group of users and servers, called IoT platforms, can interface with them. An example of this in a rail network would be the IP security cameras. Deployed in and around a station, operations facilities or at the track-side, these IP cameras are relegated to their own virtual container and are only accessible by authorized staff responsible for security.

These cameras can then only interface with the server that controls them, and the traffic patterns associated with them can be monitored. When IP security cameras are only allowed to transmit video data, anomalies in the traffic pattern can be immediately detected and flagged to management and those devices quarantined if necessary. If one IoT container suffers a security breach, it cannot be used to break into other sensitive areas of the network that may be attractive to hackers. For example, if the HVAC system is compromised by a cyber-

attack, sensitive systems such as financial booking systems, security systems, passenger signage, and administration are kept logically separate and safeguarded. This security strategy reduces threats without incurring the cost or complexity of operating separate networks.

### **A SMARTER INFRASTRUCTURE PAVES THE WAY**

New technologies deployed at the edge of the network can make daily operations faster and less expensive. Power over Ethernet can simplify and encourage device and sensor installation as it eliminates the need for wiring in difficult places, making it easier to extend an organization's digital reach. However the transformation of operations and improvements of services available to passengers requires a rethink of the infrastructure behind them. Without a smart infrastructure in place to manage them, nothing will work. A focus on converging networks ensures that costs are lower than conventional networks, roll-out is easier and expanding and amending the network in the future is straightforward. ■



#### **ABOUT URS SEILER**

Urs joined the ALE team in 2007. As a technical sales expert, he assisted in advancing data sales in the Swiss marketplace. Today, Urs continues to provide his expertise in the Transportation industry as a Sales Engineer focused on rail. Urs has a Bachelor's degree in Electrical Engineering and an Executive Master of Business Engineering.

# DELIVERING “HIGH-TECH IN A SIMPLE WAY” ON RAIL’S INCREASINGLY COMPLEX DIGITAL NETWORKS

No less a person than Albert Einstein once said; “The definition of genius is taking the complex and making it simple.” The words of the famous physicist came to mind on a recent visit to the control room of a metro network, where the staff showed us the huge array of data that is now available to them.

By **Daniel Faurlin**, Business Line Manager - Vertical Network Solutions, **Alcatel-Lucent Enterprise**.

These immense quantities of data, along with the increased number of networks, applications and devices that are employed across rail and metro networks, has changed how our industry works, irrevocably. And when it comes to signalling and train control, digital transformation offers both huge opportunities and some significant challenges.

Although traditionally serial-based, rail and metro communications networks are moving to IP and, in wired networks specifically, to IP/Ethernet. As part of this move a modern rail network now typically operates sub-systems off an access backbone network within the core network. The sub-systems usually consist of Communications systems (e.g. voice, radio and public networks), Security systems (CCTV, access control, Operations centre day-to-day and crisis operations), Electro-mechanical & BMS (Scada), Information systems (public address, information, commercial messages) and Business applications (ticketing, CRM and retail).

These sub-systems use technologies enabled by the Internet of Things (IoT) and in some cases with sensors across the train and track-side feeding a stream of information on everything from anomalies in speed, temperature and mechanical defects on railways, to the number of rail cars waiting at a station. The tech that ALE supplies to railways around the world ensures this critical information is processed and acted on to maximize passenger safety. These sub-systems can reduce congestion and energy use, and improve operational performance, for example, Power over Ethernet simplifies device and sensor installation by eliminating the need for wiring in hard-to-reach and sometimes dangerous places.

IoT devices enable a diverse set of applications but they are all linked by a common thread, connectivity to a network infrastructure. However, while sub-systems connected within an IoT network offer a host of positives, it can also create potential problems.

All rail sub-systems are vulnerable. In a poorly designed network, a compromised IoT device can provide a gateway to the rest of the network and other sub-systems. Attacks on non-critical



Editorial credit: / Shutterstock.com

networks like passenger Wi-Fi may seem, at the time, like an inconvenience rather than a major problem but can leave the entire network exposed to cyber criminals. With systems now having 100,000's+ of connected devices that could be vulnerable, the need for security has never been more relevant. The hack of the San Francisco public transport system's ticketing machines in 2016, and the WannaCry ransomware, have highlighted this. But a properly designed network, as deployed and built by ALE with appropriate security measures, will reduce the risk of successful cyberattacks.

ALE minimizes risks by using IoT containment to separate and secure specific devices or a group of devices on a network. Each key system, for example ticketing or video surveillance, are in different virtual network containers for a business-critical network, so should one be compromised the whole network doesn't fall victim.

This approach is essential to maintaining security. ALE offers a physical network but with multiple virtual networks. As a result, there are no back doors. We recommend a separate safety-critical network for signalling, using the same containment approach to secure a virtual backup network.





## ABOUT DANIEL FAURLIN

Daniel is responsible for positioning, communicating and educating internal and external clients, on the value propositions of ALE network solutions. He has worked in start-ups and small to large enterprise businesses, in a variety of leadership roles. Daniel is an Electrical Engineering graduate of Ryerson University in Toronto, Canada.

**“THE FOCUS FROM THE TEAM AT ALE IS TO SIMPLIFY IT FOR RAIL AND METRO WITH A SINGLE NETWORK MANAGEMENT SYSTEM. AND THIS SIMPLIFICATION OF DESIGN HAS BENEFITS BEYOND JUST KEEPING THE NETWORK SAFE AND SECURE.”**

The focus from the team at ALE is to simplify IT for rail and metro with a single network management system. And this simplification of design has benefits beyond just keeping the network safe and secure. In our conversations with rail and metro operators, a key concern over major investments is its ability to keep pace with often rapid technological change and avoid obsolescence. There have been several recent examples where an upgrade of a system has cost more than the original equipment purchase.

ALE is keenly aware of this potential barrier, and ensure that the networks are scalable and are easily able to absorb new devices as they grow and evolve. Hardened gigabit ethernet switches designed for outdoor deployment feature Power over Ethernet (PoE) to ensure scalability and simplify device and sensor installation.

Similar to overcoming operators' concerns about adopting a digital network, ALE user-centric solutions ensure that staff are up and running quickly with the new technology. And the award-winning Intelligent Fabric (iFab) technology helps get teams operational, faster, with self-healing and automated device discovery abilities.

With ALE networks often operating outside, trackside and in harsh conditions, robustness is another key requirement. ALE switches and sensors are within a hardened equipment solution with a ruggedized design. They are designed based on the needs of transportation customers. Because of the tough environment found at the track-side, these devices need to be hardened to support extreme temperatures, fan-less because it's a dusty environment and in addition, cope with temperature, vibration, shock and humidity. And we provide the only rugged switch that supports Shortest Path Bridging (SPB), a computer networking technology that helps build better bridged networks and significantly reduces re-convergence times, avoiding the high price of Multiprotocol Label Switching (MPLS) and limitations of Spanning Tree Protocol (STP).

The ALE approach offers a physical network with multiple virtual networks, along with a comprehensive layered approach to provide network security to minimize risks from cyberattacks. This focus also ensures that costs are lower than conventional networks, roll out is easier and expanding and amending the network in the future is straightforward. ALE is proud to deliver networks to a growing number of rail and metro operations around the world and provide both improved safety and efficiency. ■



# ALE

Where  
Everything  
Connects

# Your rail system... secured

At ALE, we provide the building blocks to make everything connect and enable you to improve:

- The passenger experience
- Safety & security
- Operational efficiency

Our converged mission critical architecture provides many operational benefits. It keeps travelers connected, secures IoT devices up to the trackside with a hardened access layer, and leverages our best of breed communication and collaboration solution to enhance your emergency control center capabilities.

With our intelligent rail solutions, we optimize your network infrastructure to simplify the command and control of your rail system.

We connect transportation subsystems, with technology that works for your people, your passengers, and your services.

For more information about our rail solutions visit us at  
[www.al-enterprise.com/en/industries/transportation/rail](http://www.al-enterprise.com/en/industries/transportation/rail)  
or contact your local ALE account representative





# RAIL SAFETY: STAY ON TRACK IN THE 21ST CENTURY

1

## STATION/PLATFORM

Whether travellers are booking tickets or looking for directions, cloud-based collaboration and LBS help ensure they get where they need to be. Innovative communications such as AI, cognitive communications, chatbots, and applications provide new opportunities to engage passengers on their journey.

3

## TRACK-SIDE

Ruggedized Ethernet switches that withstand harsh conditions provide track-side technology. They support subsystems such as passenger information, emergency telephony, video surveillance, and Wi-Fi.

On-track sensors deliver real-time information, to help identify problems before they cause issues.

2

## ONBOARD

Use voice, web and mobile applications to make the journey easier and more enjoyable. Proactively provide information. Integrate chat, voice and video to deliver a personalized multimedia experience. In the event of an incident, passengers can request assistance directly from their app.

4

## OPERATIONS CONTROL CENTER (OCC)

Integrating private and secure cloud-based applications and a management platform into the control center simplifies day-to-day operations. A converged mission-critical architecture reduces the number of networks that require support and management.

5

## TUNNELS

Today's rail tunnels are modern engineering wonders. However, challenges still exist including:

- Connecting thousands of data points in extreme conditions
- Ensuring stable communications when accidents happen
- Providing a network monitoring and control system
- Guaranteeing safety for maintenance teams

# SECURITY IS THE TOP PRIORITY IN ATI AVIATION SERVICES

The airline industry will continue to grow for the foreseeable future. Experts predict that travel demand will double over the next 20 years. International Air Transport Association (IATA) figures indicate that everyday more than 100,000 commercial aviation flights take off and land, transporting on average 1 million people over 54,000 routes.

By **Enrique Bolivar**, Transportation Solutions Manager  
**Alcatel-Lucent Enterprise.**

Moreover, airports have large areas, multiple buildings, a constant flow of people, continuous air traffic and storage for goods. Airlines adopt and implement new technologies to improve their operations by connecting internal staff and enhancing the passenger experience. These technology evolutions, however, also open new vulnerabilities alongside the benefits. Airports and airlines are attractive targets for terrorist organizations, cyber-attacks, insider threats, urban crime, trafficking, illegal immigration in addition to other threats such as natural disasters and industrial accidents.

ALE communication solutions provide the building blocks that help reduce the risk of threats. They can notify the different stakeholders, provide the right and relevant information and improve the detection and reaction process.

These solutions offer:

- **Secure and reliable** communications based on a highly available architecture to ensure no service interruption.
- **Situational security awareness** to deliver the right information, at the right time, at the right location to improve the decision-making process.
- **Information sharing** to coordinate actions between different stakeholders such as airport staff, security forces, government agencies and airline staff, for better crisis management.
- **Integration and interoperability** with the airport's OCC, based on API integration to enhance security operations.

The airline and airport industry are embracing new technologies such as IoT to help reduce costs, improve maintenance operations and enhance surveillance systems.

Essentially, wayfinding or geo-fencing applications, CCTV cameras, intrusion detection systems and any other security device connected over internet can be integrated into the authorities' applications through the *Communications Platform as a Service (CPaaS)*, leveraging BOT, AI (Artificial Intelligence) and Information Systems Databases; creating new services



**“TODAY, SECURITY AND EMERGENCY MANAGEMENT ARE AND WILL REMAIN TOP PRIORITIES FOR THE INDUSTRY. THREATS EMERGE QUICKLY AND EVOLVE FAST. IT IS ESSENTIAL TO HAVE RELEVANT SOLUTIONS THAT CAN PREVENT, DETECT AND REACT IN THE RIGHT WAY AND IN A TIMELY MANNER.”**



to alert the security team, as well as enabling passengers to inform about potential threats (e.g. abandoned baggage, suspect incidents).

According to the European Aviation Safety Agency (EASA), the industry currently receives more than 1,000 cyber-attacks per month. Cyber-attacks may result in a network being taken off line, they can affect the ground communications, a company's image, cause business interruptions among other impacts.

The ALE cyber security strategy provides a layered approach to protect different aspects of the network and assets. Cyber security follows rigorous improvement, testing, evaluation and deployment of new defense strategies.

A properly designed and up-to-date communications network with appropriate security measures will reduce the risk of successful cyber-attacks. The ALE cyber security strategy is built on three pillars:

- **Built-in security** system such as technology watching, hardened software, and authentication.
- **Confidentiality** such as binaries signatures, voice and signaling encryption and secure management sessions.
- **Best practices** such as call barring, alarms and monitoring, and external authentication.

Today, security and emergency management are and will remain top priorities for the industry. Threats emerge quickly and evolve fast. It is essential to have relevant solutions that can prevent, detect and react in the right way and in a timely manner. ■



“INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) FIGURES INDICATE THAT EVERYDAY MORE THAN 100,000 COMMERCIAL AVIATION FLIGHTS TAKE OFF AND LAND, TRANSPORTING ON AVERAGE 1 MILLION PEOPLE OVER 54,000 ROUTES.”

#### ABOUT ENRIQUE BOLIVAR



Enrique is responsible for the creation of solutions, value propositions and content that address the different transportation sectors such as Railway, ATI, ITS and Ports and Logistics. He has more than 15 years of experience in the telecommunication industry working in the enterprise market. Enrique was part of the International Central Presales team and has a strong background in end-to-end solutions, network VoIP design, UCC and UCaaS solutions.



“ACCORDING TO IATA’S ANNUAL  
GLOBAL PASSENGER SURVEY,  
PASSENGERS WANT TO MAXIMIZE  
PERSONAL CONTROL OVER THEIR  
AIRPORT EXPERIENCE WITH 74% OF  
PASSENGERS USING AN ELECTRONIC  
BOARDING PASS ON A SMARTPHONE  
IN THE PAST 12 MONTHS, AND 72%  
PREFERRING SELF-BOARDING.”



#### **ABOUT KELLY ALLEN**

Kelly joined ALE in 2017 as Director of Vertical Sales, Transportation and Hospitality. With more than 20 years of experience in the IT & Telecom industries, and a specialization in Transportation, Kelly is spearheading the ALE vertical strategy for sector specific networking and communications solutions. The Alcatel-Lucent Enterprise technology portfolio of hardened, IoT-ready network components provides the solutions transportation operators require as they transition to Intelligent Transportation Systems.



# DIGITAL ENGAGEMENT TAKES THE PASSENGER JOURNEY TO THE NEXT LEVEL

Digital transformation is creating new opportunities through ‘service innovation’, in organizations, business processes, technology, culture, and operations.

By **Kelly Allen**, Director, Vertical Sales Transportation and Hospitality, EUNO and **Enrique Bolivar**, Transportation Solutions Manager, Alcatel-Lucent Enterprise.

In the transportation industry, the passenger journey is a vital process that links the traveler with airports and airlines from booking travel, to arrival at the final destination. This journey covers travel to the airport, navigation through the airport, security check, boarding the plane, baggage claim, and may continue even after arrival. The passenger journey is embracing digital transformation to move from a ‘disconnected’ to a ‘connected’ passenger experience to satisfy new expectations at each step of the trip.

## AUTONOMY IS KEY

The passenger experience is driven by a desire for independence. Self-service applications such as booking, check-in, baggage-tagging, baggage-drop-off, boarding and baggage-tracking provide autonomy. Reducing wait times at all stages of the journey, from check in through to the baggage claim after arriving at the destination, improves the passenger experience.

According to IATA’s annual Global Passenger survey, passengers want to maximize personal control over their airport experience with 74% of passengers using an electronic boarding pass on a smartphone in the past 12 months, and 72% preferring self-boarding.<sup>1</sup>

The mobile applications for self-service options, as well as the use of multiple mobile devices (smartphones, tablets, laptops) represent a key opportunity for airports and airlines to offer new services and improve their business. Passengers who use a mobile phone or self-service kiosk to handle travel tasks across the journey can expedite their experience, compared to those who choose face-to-face interactions.

Based on a SITA survey in 2017, 57% of passengers would use airport wayfinding, and 74% would use alerts regarding flights and gate information, if the alerts were pushed to their mobile device.<sup>2</sup>

## TRAVERSING THE AIRPORT

A central part of the whole passenger journey is the airport experience, so it is essential to ensure that it is positive. Communication is vital. Keeping passengers connected and informed enhances the journey. Applications that provide guidance/wayfinding assist in locating retail outlets,

departure gates and can even locate your car. Location-based services and up-to-date information such as flight status and locating gate and baggage collections are now seen as essential to enhancing the passenger journey and making the airport experience positive. From an airport perspective this improves the passenger touch point and enables the experience to be tailored to the individual passenger. The ability to request assistance in real-time adds tremendous value to the passenger experience.

## TECHNOLOGY ENABLES ENGAGEMENT

Alcatel-Lucent Enterprise solutions, based on Unified Communications as a Service (UCaaS) and *Communications Platform as a Service (CPaaS)*, provide collaboration services embedded in business applications. API deployment enables transportation authorities to provide real-time communications capabilities such as messaging, voice, collaboration and video. It also allows them to deliver scheduling updates, re-book flights in case of delay or service disruptions, provide travel information and real-time interaction with the staff, as well as dispatch emergency notifications. All of this can be delivered through a single phone app, simplifying and enhancing the traveler experience.

At the same time CPaaS solutions can leverage AI (Artificial Intelligence) solutions such as, Bot, Chatbot and Information Systems Databases to enrich the environment, and offer innovative and up-to-date services.

## A PARTNER THAT MAKES THE DIFFERENCE

Alcatel-Lucent Enterprise solutions provide the building blocks to ensure a successful passenger experience. At the heart of changing the passenger journey is technology. ALE is the strategic partner for airports, airlines and ground handlers to align objectives, differentiate from competitors and deliver an optimal passenger experience. ■

1 <http://www.iata.org/pressroom/pr/Pages/2017-01-18-03.aspx>

2 <https://www.sita.aero/resources/type/surveys-reports/passenger-it-trends-survey-2017>

# BETTER SECURITY, BETTER TRAVEL, BETTER EXPERIENCE



## Location-based services deliver next level travel experience

By **Mauro Buratti**, Sales Manager, **Alcatel-Lucent Enterprise**.

As anyone who travels regularly knows, there's a lot going on in the airport industry, both in front of and behind the scenes. As the number of travelers increase, providing a great end-to-end experience means keeping everyone secure, streamlining processes to reduce wait times and ultimately, keeping folks happy.

### AT THE HEART OF IT ALL

Understanding where people are and helping them get to where they want to be, as efficiently as possible, can help smooth their journey, enter – location-based services (LBS). LBS can help improve the traveler experience by providing information about wait times for check-in and security, as well as information about gates, restaurants and retail locations. And, in an industry where one of the biggest complaints from travelers is how long wait times are at check-in and security – well, LBS can go a long way to improving customer satisfaction where it matters.

In addition to ensuring customer expectations are met, airport authorities also have to navigate revenue challenges. Today, roughly 50% of airport revenues come from parking and retail. Employing LBS to connect with customers can help optimize the traveler experience and offer airport authorities an opportunity to benefit from traveler engagement.

### A WIN-WIN

Alcatel-Lucent *OmniAccess® Stellar LBS*, integrated with an airport app, can help reduce the time it takes to park a car, check-in and find a gate. With all of the necessities taken care of travelers can sit back, get a bite to eat and even shop the airport mall. In addition, airports can take advantage of this extra traveler time by using proximity marketing to suggest duty-free offers, food and drink discounts, and in-store specials to travelers who are no longer in a hurry just to get checked-in.

**“LOCATION-BASED SERVICES PROVIDE AIRPORT AUTHORITIES WITH THE TOOLS THEY NEED TO ADDRESS TODAY’S MANY SECURITY AND OPERATIONAL CHALLENGES, AND THEY OFFER PASSENGERS AN IMPROVED TRAVEL EXPERIENCE FROM THE MOMENT THEY LEAVE HOME UNTIL THEY ARRIVE AT THEIR DESTINATION.”**

### LET'S LOOK AT A SCENARIO THAT COULD BE YOU, THE NEXT TIME YOU TRAVEL:

1. Before you leave home locate and book your parking spot.
2. You arrive at the airport parking lot, the Smart Park feature notes your location.
3. When you enter the airport, you receive a notification about your departure gate and boarding time.
4. You open the airport app and you can see where you are in the terminal and can find the nearest check-in and security line with the least amount of people.
5. Once through security, you can get directions to the gate. You are also provided with an estimate of how long it will take to get there.
6. As you pass the duty-free shop, restaurants or other retailers, promotional coupons or notifications are available to you.
7. Based on all the information you have, it looks like you have plenty of time to grab some food before you have to board. You browse the map. Click on POI (Point of Interest) to get directions, then see restaurant locations on the map.
8. Want friends and colleagues to know where you are? Share your location with Facebook, Webchat or LinkedIn community.
9. Just back from your trip, you locate your baggage and then use the Smart Park feature to find your car.

Hope you enjoyed your trip!



### SECURE AND EFFICIENT

Security and efficiency are high ranking priorities for any airport authority. Knowing where employees are at all times, enables authorities to rapidly mobilize staff and security to quickly respond to incidents, big or small. With LBS, airport authorities can improve 'behind the scenes' intelligence and optimize work flows. Keeping people moving efficiently means more people on the move and that's good for business.

Location-based services provide airport authorities with the tools they need to address today's many security and operational challenges, and they offer passengers an improved travel experience from the moment they leave home until they arrive at their destination. ■

With Alcatel-Lucent OmniAccess Stellar LBS, airport authorities can increase security and profitability, while improving the traveler experience, by enabling:

- **Faster check-in/security access:** guide travelers to the queues with the shortest wait times
- **Find my gate:** show the location and estimated time of arrival; complete with directions
- **Find family, friends and colleagues:** quickly locate contacts on arrival
- **Locate restaurants and retail:** help travelers navigate the vastness of transportation facilities



### ABOUT MAURO BURATTI

Throughout his career Mauro's solid technical background have led him to opportunities in marketing, business development and sales. In 2000 he moved to sales full time where he enjoys working with customers to understand their needs and provide ALE solutions to solve their challenges.





ALE | Where  
Everything  
Connects

# Your airport network... secured

At ALE, we provide the building blocks to make everything connect and enable you to improve:

- The passenger experience
- Safety & security
- Operational efficiency

Our intelligent LAN and Wi-Fi network secures your IoT, keeps travelers connected indoors and outdoors, with a hardened access layer, and leverages our best of breed communication and collaboration solution, on premises, or in the cloud.

We connect airport subsystems, with technology that works for your people, your passengers, and your services.

For more information about our airport solutions visit us at  
[www.al-enterprise.com/en/industries/transportation/air](http://www.al-enterprise.com/en/industries/transportation/air)  
or contact your local ALE account representative

# 5 DIGITAL STEPS TAKE TRAVELERS TO NEW HEIGHTS

1

## PLANNING & BOOKING

Start your journey even before arriving at the airport, with a suite of solutions that work alongside the airport and airlines' contact center and reservation systems. Maximize automation and AI with chatbots to complement the real human experience.

2

## ARRIVAL AT THE AIRPORT

Navigate the airport efficiently with personalized information that is communicated to travelers, including queue information and walk-time to gates. Use multimedia to request human assistance for passengers with reduced mobility.

3

## CHECK-IN

Customized bots provide real-time interaction and let travelers know which documents to have ready and when, in the language of their choice. With bots, communications are automatic, fast and secure, with a personal touch.

## POST-TRAVEL

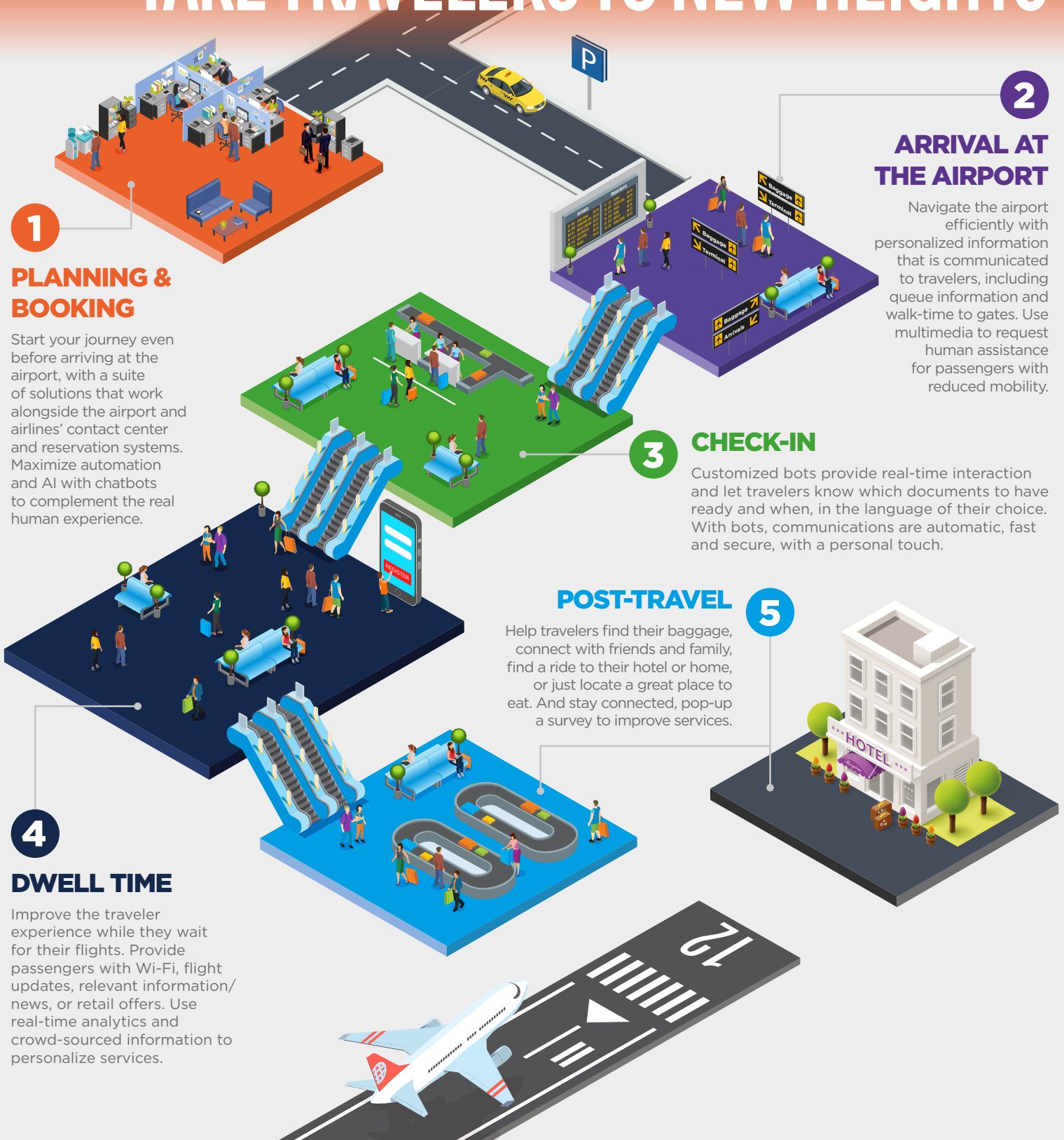
Help travelers find their baggage, connect with friends and family, find a ride to their hotel or home, or just locate a great place to eat. And stay connected, pop-up a survey to improve services.

5

4

## DWELL TIME

Improve the traveler experience while they wait for their flights. Provide passengers with Wi-Fi, flight updates, relevant information/news, or retail offers. Use real-time analytics and crowd-sourced information to personalize services.





# BUILDING INTELLIGENT TRANSPORTATION SYSTEMS FOR TODAY AND TOMORROW

The Intelligent Transportation Systems (ITS) space is experiencing a step change. The change is driven by the proliferation of connected devices, and before we know it, connected vehicles.

By **Kevin Jennings**, Director of Sales - State and Local Government, Transportation and Utilities, **Alcatel-Lucent Enterprise**.

It is also driven by the changing expectations of today's tech-savvy travelers, and it's facilitated by the widespread availability of IP connectivity. While there's little doubt that ITS technologies are poised to transform the entire transportation industry, the network infrastructure of transport systems must evolve to meet the needs of today's connected travelers and their sophisticated vehicles. ALE offers a portfolio of enterprise-grade, networking solutions for hardened Ethernet/IP environments that enable transportation authorities to meet today's ITS requirements, while scaling for tomorrow.

## ADDRESSING DIGITAL TRANSFORMATION CHALLENGES AND OPPORTUNITIES

The effects of digital transformation are sweeping through virtually every industry, bringing with them a set of innovations that promise to rapidly change nearly every business process. These technologies are creating a world where everything connects, and roadways, bridges, intersections, and commuter systems are no exception. Digital technologies are already rapidly changing the transportation industry, enabling vehicles to become smarter and more autonomous, and transforming the way vehicles operate and drivers communicate. Smart vehicles will require smart roads. A burgeoning increase in the sheer number of connected devices (sensors, cameras, vehicles, and personal technologies) is challenging networks to keep pace. And, the growing number of vehicles is causing congestion on roads and making daily travel hard or impossible, negatively impacting the environment, and degrading the traveler experience.

For transportation departments, these trends are resulting in a variety of challenges. Transportation departments are tasked with responding to the ever-changing demands of an increasingly connected public. They expect to stream music while they're driving, use web or GPS applications for navigation, and allow their children to watch movies online. These are the readily visible applications that are complemented by a not-as-well-recognized plethora of emerging applications that are "under the hood" so to speak. What's not visible is even more important than what is because it has to do with predictability and safety. Just as lives depend on sophisticated safety features in vehicles and on roadways, they are more and more relying on the reliable transmission of information by the roads



The Nevada Department of Transportation (NDOT) recently made a strategic investment in ALE technology to build a hardened ITS network for delivering real-time road, traffic, and weather information to the travelers on their 5,400 miles of highway. The ALE design and engineering team delivered a comprehensive solution consisting of the OmniSwitch 6860E and OmniSwitch 6900 Stackable LAN Switches in the core and distribution layers of the network. The OmniSwitch 6865 Hardened LAN Switch was configured on the edge, which offered the benefits of a hardened switch while supporting end-to-end SPB, a key requirement for NDOT. These hundreds of switches formed the backbone of the NDOT network, enabling them to support future technologies, remotely manage the network, and provide up-to-date information for travelers.

and by the automobiles themselves. Transportation leaders struggle to implement wired and wireless networks that can support the communications and data that they will need to act upon to reduce vehicle congestion, monitor and respond to incidents, and otherwise ensure smooth and efficient operations. Many ITS organizations are having to quickly reeducate themselves and shift from a traditional signaling and signage orientation to an ever-increasingly IT-based approach. They are struggling to choose the products and technologies that will accommodate the explosion of IoT devices and the advent of connected vehicles.

## NETWORK INFRASTRUCTURE FOR DEMANDING ITS APPLICATIONS

As the requirements and capabilities of ITS networks continue to expand and grow in complexity, entry-level networking products that were considered “good enough” are quickly becoming insufficient to carry us into the future. ALE provides a range of products for building a hardened, scalable, and secure Ethernet/IP infrastructure with the capacity and features to handle the most demanding ITS applications.

These solutions offer a number of key customer benefits:

- **Increased safety and security:** Technology that speeds the delivery of insight into traffic flows, road conditions, incidents, construction, and sudden weather changes helps authorities make smarter decisions and quickly relay useful information to travelers so they can prepare for the conditions ahead.
- **Enhanced traveler experience:** Finding fast, simple, and secure ways to connect IoT devices to the network enables transportation authorities to focus on more efficiently managing network bandwidth, distribute updates to mobile apps and social media platforms in real-time, and meet the expectations of modern travelers.
- **Improved operational performance:** Centralized provisioning and automated deployment enable operational personnel to deploy and manage networks more quickly, while Power over Ethernet (PoE) securely connects devices in harsh environments and in hard-to-reach areas.
- **Reduced congestion and energy use:** An optimal network infrastructure allows transportation departments to scale resources according to demand, so they can continue to operate efficiently even during peak times, like rush hour.

The ALE hardened switch portfolio brings together a unique mix of intelligent network components and sophisticated capabilities in a ruggedized form factor that can be deployed in a variety of applications and use cases. The backbone of the portfolio is the Alcatel-Lucent *OmniSwitch® 6865 Hardened Ethernet Switch*, an industrial-grade, highly secure, intelligent switch that delivers superior performance for mission-critical applications running in harsh environments and extreme temperatures. With an optimized feature set that offers high security, reliability, performance, and easy management, the switch also comes in a stackable, half-rack form factor which optimizes space. It is also the only switch in the world that is both environmentally hardened and supports industry-standard IEEE 802.1aq Shortest Path Bridging (SPB). The Alcatel-Lucent *OmniSwitch 6860E* and *OmniSwitch 6900*

Stackable LAN Switches are compact, high-density switch products designed to evolve existing networks to handle video and new applications supporting IoT from access to the core. All ALE switches also incorporate an end-to-end, multi-layered security strategy that is built right into the equipment as well as the code.

## ALE IS LEADING THE CHARGE TO THE ITS SYSTEMS OF TOMORROW

At ALE, we pride ourselves on having a finger on the pulse of today's transportation industry. Our industry expertise bolsters the end-to-end enterprise portfolio of network switching products, which include hardened switches for edge environments, as well as switches suitable for both the distribution layer and the core layer of the network architecture. All of which include integrated management platforms for cohesive and seamless management. Our years of experience consulting with innovators in various roles within ITS organizations and our track record of success building custom solutions to suit specific needs means our customer engagements have evolved into true partnerships. ALE differentiated products and solutions deliver increased customer value by offering a unique feature set, including SPB, High PoE, and Precision Time Protocol (PTP), which increase the performance, resilience, and use of the customer network.

As digital technologies continue to reshape the transportation landscape, it's clear that entry-level infrastructure solutions that may have been sufficient up until now will not be sustainable in the future. ALE is providing network components that are helping transportation customers connect transportation subsystems with technology that works, enabling all users of public transportation, public roads, and services to discover the transformative power of ITS into the future. ■

**“ALE OFFERS A PORTFOLIO OF ENTERPRISE-GRADE, NETWORKING SOLUTIONS FOR HARDENED ETHERNET/IP ENVIRONMENTS THAT ENABLE TRANSPORTATION AUTHORITIES TO MEET TODAY'S ITS REQUIREMENTS, WHILE SCALING FOR TOMORROW.”**



### ABOUT KEVIN JENNINGS

Kevin Jennings is an Account Director in the North American Transportation Sales team. Kevin holds an MBA in international business and has dedicated himself to becoming a more compassionate person, sensitive to the needs of others.





# DIGITAL TRANSFORMATION DRIVES ROAD TRANSPORTATION INTO THE FUTURE

Research into the Intelligent Transportation Systems (ITS) market estimates the connected roadways segment will reach a value of *more than \$21 billion* USD this year. Connected devices are becoming cheaper, smaller and easier to deploy as the ITS concept matures, allowing highway agencies to play catch-up with other industries on digital transformation.

By **Chris Lee**, Direct Touch Sales, Taiwan Country Manager  
**Alcatel-Lucent Enterprise.**

Recent developments in mobility and IoT are enabling road operators to implement systems such as automated signalling and digital signage, which rail and airport operators have had for years. The fundamental goals for smart road networks are similar and include: increasing capacity to ensure efficient traffic flow and enhance the end user experience, improving safety and decreasing cost and risk. Considering that transportation networks are distributed across large areas, and the need to support large volumes of both private vehicles and public transportation, an extensive and resilient digital infrastructure is critical.

## BRINGING PEOPLE AND PROCESSES CLOSER TOGETHER

In a smart city, stakeholders in the transportation network, such as highways agencies or public transport operators, government bodies and businesses, all need a high degree of connectivity to improve efficiency and interoperability for day-to-day collaboration and operations. This can be achieved with borderless communications and collaboration tools for immediate file and information sharing, workflow co-ordination and interactions.

This heightened level of interconnectivity is continuing to be refined and ALE is at the heart of it. ALE has already developed a proof of concept for the EU's eCall system, which receives detailed information from 'connected cars' in the event

of a crash and transmits it to the communications platform of the most appropriate emergency services. With developments such as this, ITS projects are raising the bar for technology-ensured road safety, *with the EU projecting* that eCall will potentially save hundreds of lives every year.

At the traveller level, information and notifications about the transportation network can be pushed out in real-time to travel apps, social media channels and mobile devices, helping to notify travellers of planned maintenance, delays or even adverse weather conditions. Dedicated mobile applications, powered by the underlying network's communications platform, will put this real-time traffic and travel information in the palm of their hands.

## SMARTER VEHICLES NEED SMARTER ROADS

Vehicles are also becoming smarter and increasingly connected – think about the connected cars and autonomous “big rig” convoys that are being trialled on public roads. At the same time, travellers expect digitized services, from traffic push notifications to electronic toll payments. Highway agencies are looking to ITS to help converge, digitize and adapt traditional road communication infrastructures to handle these technology developments, particularly for the many devices that are already IP-capable, or soon will be.

With ITS, highway agencies can better handle rising traffic volumes, tackle road congestion through advanced transportation management systems (ATMS) and promote greater road safety. ITS projects offer huge potential to roll out new services, such as digital road signs, IP cameras and embedded road sensors to monitor traffic flow and conditions, sensors to monitor bridge integrity or variable speed limits to improve road safety. These devices can be deployed anywhere along the road network – by the roadside, suspended from light poles or even embedded in the road surface itself.

As intelligent road networks spread out beyond urban population centers, more network infrastructure resources are needed to effectively connect, secure, monitor and manage them, and this is placing a greater burden on the edge of the network.

## AVOIDING ROADBLOCKS ON THE DIGITIZATION JOURNEY

A primary challenge for the Department of Transport is how to best gather and transmit continuous data flows generated from these devices and applications – and then make them actionable. Can critical and non-critical data be distinguished? Is there a ‘single pane of glass’ view to monitor status and performance of dispersed network hardware? Is there spare bandwidth that can be allocated in the event of emergencies?

**“CONNECTED DEVICES ARE BECOMING CHEAPER, SMALLER AND EASIER TO DEPLOY AS THE ITS CONCEPT MATURES, ALLOWING HIGHWAY AGENCIES TO PLAY CATCH-UP WITH OTHER INDUSTRIES ON DIGITAL TRANSFORMATION.”**

The answer to these questions comes from the intelligent network which must provide a suitable and secure foundation from edge to core, and support the deployment of large numbers of connected devices and sensors. Data can be harnessed and actioned through transportation-specific APIs, leveraging data from various stakeholders in real-time, for use in travel planning, ticketing and maintenance notifications.

## SMART ROADS MEAN A NEW APPROACH TO CYBER SECURITY

There are clear dangers to rolling out large numbers of unsecured “headless” IoT devices. Networks have been compromised through cyber security lapses as trivial as *poorly-secured fish tanks*. So, although IoT deployments in ITS projects offer widespread benefits, such as real-time visibility of operational and customer-facing assets and efficient maintenance and repair, they also come with a string of potential cyber security concerns. Interconnected subsystems running on a single infrastructure have to be properly safeguarded from external threats. Any compromised device can be a backdoor into the network, so while *exploits of poorly secured electronic highway signs* can seem innocuous, they can pose a wider threat.

Introducing IoT containment to create virtual, isolated environments on a single converged, network infrastructure can reduce the threat of a single device on the IP network edge that may compromise an entire transportation network. These virtual containers allow the Department of Transport and authorized third-party contractors to safely and securely access designated areas of the network without exposing the entire infrastructure.

IoT containment also allows policy enforcement of IoT devices. This means traffic monitoring cameras positioned on the network edge could be configured to only transmit IP video data back to the core network, and only allow access and commands from the surveillance teams in the operations center. The time and management burden caused by the mass on-boarding of devices such as IP cameras and traffic monitoring sensors can be eased by automatically fingerprinting and profiling device types.

## GREEN LIGHT FOR ITS ROLLOUT

Digital transformation of the transportation sector is now in full swing. However, each mode of transportation brings unique requirements and challenges that must be addressed before value can be extracted from digitalization. The rising availability of IoT devices coupled with the ability to bring all communications stakeholders together to address cyber security, capacity and interoperability means that the day of trailing behind air and rail transportation are gone. ■



### ABOUT CHRIS LEE

Chris brings to ALE more than 24 years of sales, marketing and engineering experience. As Taiwan Country Manager for ALE, Chris is responsible for key account management and channel partner development for network and telecom products. Chris is a graduate of TANG-KUNG University with a degree in Computer Science.





# ALE

Where  
Everything  
Connects

# Intelligent Transportation Systems... connecting travelers and vehicles to smart roads and services

ITS is transforming traditional roads into a dynamic component of smart cities. At ALE, our ITS solutions allow you to:

- Connect roads with smart infrastructure to enhance real-time communications and safety
- Connect travelers for the best experience on the road
- Connect IoT and staff to automate processes securely and efficiently

As traffic volumes continue to grow, ALE can provide the innovation needed to better manage transportation sub systems and maintain ITS infrastructures. With our global reach and local focus we offer networking and communications built for transport systems to deliver mobility, security and safety.

For more information about our ITS solutions visit us at:  
[www.al-enterprise.com/en/industries/transportation/its](http://www.al-enterprise.com/en/industries/transportation/its)  
or contact your local ALE account representative.





# TAKE THE INTELLIGENT JOURNEY WITH ITS

## PASSENGERS AND THE CONNECTED BUS SHELTERS

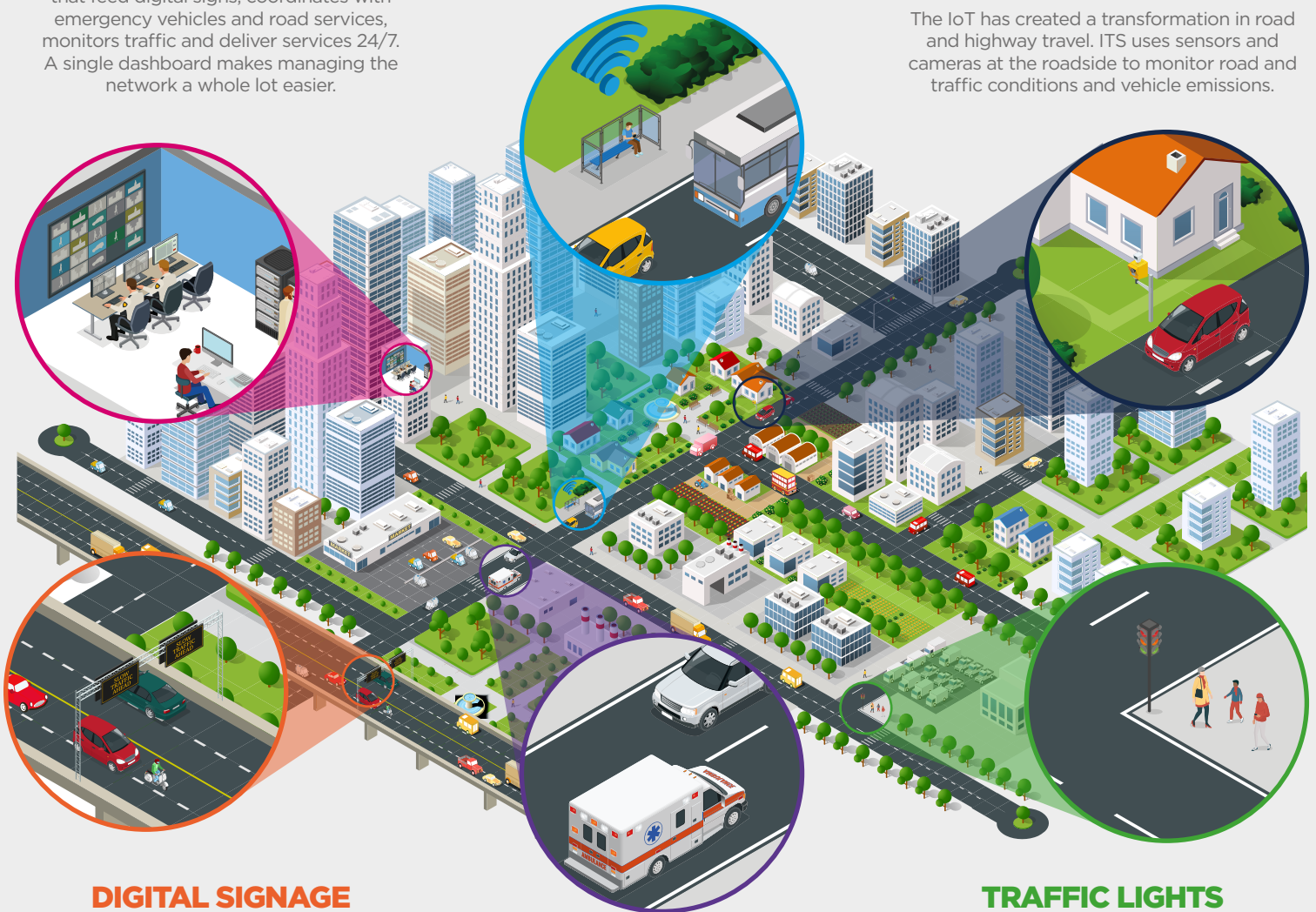
Travelers expect Internet access while in transit. They want to stream music, watch movies and use their favorite apps. And they want up-to-date information about traffic and road conditions so they can safely complete their journeys.

## OPERATIONS CONTROL CENTER

The control center must handle the stream of information from IoT-enabled technologies that feed digital signs, coordinates with emergency vehicles and road services, monitors traffic and deliver services 24/7. A single dashboard makes managing the network a whole lot easier.

## IOT: SENSORS AND CAMERAS

The IoT has created a transformation in road and highway travel. ITS uses sensors and cameras at the roadside to monitor road and traffic conditions and vehicle emissions.



## DIGITAL SIGNAGE

Technology that provides information about traffic flow, road conditions, and incidents, helps authorities and drivers. It's key to communicate the information quickly so drivers can prepare for the conditions ahead.

## EMERGENCY COORDINATION

Extending the network with mobile routers in first response vehicles and buses, lets vehicles connect to the ITS network and to each other. Each vehicle has its own Wi-Fi network and a redundant 4G or LTE connection to instantly share.

## TRAFFIC LIGHTS WITH CAMERAS

Traffic volumes are on the rise. Technology-enabled traffic lights can enforce traffic rules, monitor volume and help alleviate congestion. As well, in the event of an accident, traffic lights with cameras can provide information to the control center to quickly expedite assistance.

# BORDERLESS COLLABORATION: CONNECTING THE PORTS AND LOGISTICS INDUSTRY

The shipment of cargo from its place of origin to its final destination requires the interaction of a number of stakeholders. From local transportation companies, to warehouses, to inland transport, to the port and shipping company, many hands will touch the goods along the journey. End-to-end collaboration between all of the key logistics providers is vital to significantly improve the quality of service to the end customer.

By **Enrique Bolivar**, Transportation Solutions Manager, **Alcatel-Lucent Enterprise**.

Today, collaboration beyond the enterprise premises and between logistics companies is constantly evolving. However, the challenge that transportation companies often face is that they each have their own communication tools, which can differ from business to business, and there are no compatibility guarantees. A common cloud-based application that's easy to adopt, easy to use and which guarantees secure communication between the hand-offs can provide the answer.

## COLLABORATION IS KEY

*Alcatel-Lucent Rainbow™* is a cloud-based collaboration application that connects objects, such as the Internet of Things (IoT) devices and sensors, people and systems to provide communication services. Rainbow provides borderless collaboration that enables businesses across the ports and logistics industry to engage efficiently and effectively. Communications services such as Instant Messaging (IM), voice, video and file sharing are essential to support industry collaboration requirements. Improved collaboration means improved operations and enhanced customer satisfaction, and that's good for everyone.

Rainbow is available in two formats:

- **Communications Platform as a Service (CPaaS):** APIs can be integrated with 3rd party applications, processes and IoT, for example.
- **Unified Communications as a Service (UCaaS):** Comes with its own client developed by Alcatel-Lucent Enterprise. UCaaS provides support for mobility, borderless collaboration and connected collaboration. These include:
  - Mobile collaboration: The Rainbow client is available on multiple platforms such as: smartphones, PC Windows, Mac and as a web-based client with compatible browsers supporting open-sourced, standard WebRTC.

- Borderless collaboration: Rainbow offers multi-media-meeting capabilities managed within the Rainbow client. External invited guests can join from any phone. Connected collaboration: Employees can reach personal contacts, colleagues from the corporate directory, or contacts from federated companies, such as suppliers or business partners.

Port authorities responsible for transportation and logistics need to stay connected with partners and customers. Requirements that include bringing on new partners, adding new facilities, providing mobility for all employees, extending the wireless network, and enhancing network management will drive the evolution of transparent communications between all of the stakeholders and enable a seamless journey for their goods. ■

**“THE CHALLENGE THAT TRANSPORTATION COMPANIES OFTEN FACE IS THAT THEY EACH HAVE THEIR OWN COMMUNICATION TOOLS, WHICH CAN DIFFER FROM BUSINESS TO BUSINESS, AND THERE ARE NO COMPATIBILITY GUARANTEES.”**





#### **ABOUT ENRIQUE BOLIVAR**

Enrique is responsible for the creation of solutions, value propositions and content that address the transportation industry including Rail, ATI, ITS and Ports and Logistics sectors. He has more than 15 years of experience in the telecommunication industry working in the enterprise market. Previously, Enrique worked with the International Central Presales team and has a strong background in end-to-end solutions, network VoIP design, UCC and UCaaS solutions.



# TRANSPORTATION 4.0: PROVIDING DOOR-TO-DOOR TRAVEL IN A MULTIMODAL SYSTEM

Whether it's keeping up with work while on the move, staying in touch with coworkers and friends, or just looking for some entertainment, travelers want to stay connected. Now, this demand is spreading to the transportation systems.

By **Roch Muraine**, Worldwide Sales Director,  
Vertical Market - Transportation, **Alcatel-Lucent Enterprise**

Trends in the transportation industry are set to disrupt the way we travel forever, while new technology moves us toward a multimodal transportation system that will create a fully connected experience for passengers.

The technology to create seamless or connected multimodal transportation exists, but the majority of services are still being delivered to the end customer in a disconnected, piecemeal way. For example, a journey from A to B might involve switching from a bus to a train and then a ferry, with tickets purchased for each separate stage from the different operators providing the transportation. In order to improve services and keep up with the huge growth in numbers of people traveling throughout the world, we need to look at new ways to streamline services for travelers and simplify the provision of services for operators.

## TRANSPORTATION 4.0 EXPLAINED

All things point to a future that lies in multimodal transportation, where different forms of transportation are integrated into a single passenger interaction to arrange complete door-to-door travel. Imagine buying one ticket to get you on a train, to the airport and straight to the hotel – where your luggage will be waiting for you. The aim is to make travel experiences more efficient, safer, greener, with less hassle, while optimizing journey times, and minimizing costs for travelers. We are just now starting to see how this future might develop, and with it, the potential to completely transform travel as we know it.

## THE CONNECTED EXPERIENCE – ALREADY ON OUR WAY

The multimodal experience starts at home or on your smartphone. There are already travel planning apps and websites that show different modes of transportation, times and costs to help get passengers from A to B, but even these are done through separate providers and intermodal systems. In the future, we will see services that will enable you to book your whole itinerary through a single app, with one search and one payment.

Smart-ticketing and e-ticketing are essentially already here. From boarding passes on smartphones to contactless card machines on buses, the next step will be to offer one ticket for all forms of travel. While simplifying travel for passengers, these ticketing systems are also useful to transportation operators, as the information gathered by smart systems can be analyzed to offer even better services.

Single token travel is the next development in multimodal travel. It would use a passenger's biometrics and travel data to create a digital record and provide secure authentication. The technology has the potential to create a seamless journey for passengers by reducing the time taken for security checks, check-in and boarding at airports and stations.

**“MASS DATA IS GATHERED EVERY SECOND FROM TRAFFIC MANAGEMENT SYSTEMS, CCTV CAMERAS, VEHICLE DETECTORS AND MANY MORE DEVICES, SUCH AS IOT. THIS WILL ONLY INCREASE IN THE FUTURE AS TRANSPORTATION GETS SMARTER.”**

In order to achieve multimodal travel, transportation systems need to be connected both physically and operationally. This means having the right infrastructure supported by high-quality, real-time information systems for connecting routes, schedules and fares.

### **KEEPING PASSENGERS CONNECTED**

Communication is an important factor in the passenger journey. Keeping passengers connected and informed improves their experience. Smartphones, laptops and tablet devices are ubiquitous for travelers now, as is public Wi-Fi. The same needs to be true for real-time data and communications for transportation operators. In addition, there are applications that provide guidance and wayfinding to help find retail outlets, departure gates or even locating a car, but this is not enough. The ability to request assistance in real-time will be a game changer for the passenger experience.

Collaboration services embedded in applications through a Communications Platform as a Service (CPaaS) model allow transportation authorities to provide real-time communications, such as messaging, voice and video, to provide scheduling updates, travel information, real-time interaction with staff and passengers, as well as emergency notifications. All of this can be delivered through a single app, simplifying and enhancing the traveler experience.

### **LAYING THE GROUNDWORK WITH OPEN DATA AND APIs**

Mass data is gathered every second from traffic management systems, CCTV cameras, vehicle detectors and many more devices, such as IoT. This will only increase in the future as transportation gets smarter. But collecting data is just one challenge. The real value comes from sharing data and developing operational processes to create truly connected transportation systems.

Infrastructure based on open data and APIs will be important to drive forward future transportation innovations and mobility solutions into the future. Multimodal transportation involves different operators coming together to provide better travel, which they can't do without knowing what's going on around them. London Gatwick Airport, for example, has already reaped the rewards of closer collaboration with low-cost airlines, by sharing live data to provide real-time updates and instructions for passengers on the airline's mobile app.

### **SAFEGUARDING THE NETWORK**

Despite these benefits, security remains a challenge. The growth in the Internet of Things (IoT) and the increase in connected devices used by transportation operators in expanding networks will only increase the number of vulnerable points for unauthorized access – unless properly secured on the network. Cyber-attacks and data



breaches are a top concern for IT departments right now, and it will be of vital importance that operators secure this data or risk losing passenger trust and the benefits of streamlined travel.

One solution to this problem is IoT containment, as part of an overall layered security approach. By 'containing' connected IoT-devices into separate virtualized environments on the same network, businesses can greatly decrease the chances of a broad network breach, as the threat is confined and cannot spread to wider business operations. Using this segmented approach allows IoT devices to be managed and operated only by the authorized personnel that use them, simplifying IoT management.

Another security approach focuses on mission-critical communications, which has an important role to play in passenger security and operational safety. A consistent cyber security strategy is key to keep the communication platform safe from cyber-attacks and ensure service continuity, supported by embedded protection in the system and smart best practices rules.

### **A GLIMPSE INTO THE FUTURE**

Multimodal transportation will completely transform the way we travel. The technology is already here, enabled by open APIs that offer a single mobile application providing "Mobility as a Service" rather than having to purchase tickets across different modes of transportation. Indoor location-based applications are being deployed that collect intelligence on user behaviors giving way to a new level of precise contextual awareness to enable personalized services. And finally, modern multimedia communication, that mix bots with people can match the richness of passenger needs and maintain the much needed personal touch. But the groundwork of network and systems that connect it all together must be installed now if we are to take full advantage of seamless travel. This means having a secure and reliable network that keeps passengers and operators connected no matter what mode of transportation they choose. ■



#### **ABOUT ROCH MURAINÉ**

Roch Muraine leads the ALE global transportation business practice responsible for sales across transport. He has more than 20 years' global operational experience in IT, network and telecom marketing and holds an engineering degree in Computer Science and a Masters in Telecommunication.





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