FAST FORWARD

EDITION 2, 2024

RAILWAYS | ITS | AIRPORTS | PORTS AND LOGISTICS

TAKE THE JOURNEY TO DIGITAL TRANSFORMATION

WHAT'S INSIDE?

SUSTAINABILITY

CYBERSECURITY

ARTIFICIAL INTELLIGENCE AND MUCH MORE

Alcatel·Lucent Enterprise

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PERSPECTIVE

Welcome to the second edition of *Fast Forward* magazine, in which leading edge industry experts share insights from their areas of expertise.

In the last five years, the transport sector has faced many challenges. For one, the public health crisis dramatically impacted both traveler behavior and — due to the rise in remote working — traveler predictability. As well, transport operators struggle to attract and retain talent who can master new ways of working, such as creating innovative customer and traveler services. Finally, as the transportation industry accounts for up to 25% of all greenhouse gas emissions, stricter environmental regulations have been started to drive sustainability initiatives.

Innovation and technology are central to addressing these challenges. Digitalization has brought more automation to all subsegments of transport, helping to reduce human error and accelerate processes. As well, the rise of electric vehicles, autonomous driving technology and massive IoT deployments have proven to be game changers. Indeed, these kinds of technological innovations enhance service delivery and increase safety while transforming the cost structure — all of which are critical as we transport more people and goods.

There is also a digital revolution in Operational Technology (OT). Entire OT processes are being digitalized and transforming the way people work and interact. This requires much more connectivity and convergence with IT, and very high reliability to ensure the network never goes down. These processes also create an exceptionally large amount of data that must be judiciously managed, as these systems become increasingly more vulnerable to new cybersecurity threats.

The need for real time data to support automation adds to the burden carried by the IT team and increases pressure on the network infrastructure architecture. While regulatory efforts have focused on data privacy, Artificial Intelligence and Machine Learning technologies are consuming massive amounts of data — uncovering new meaning within that data to drive greater service innovation and value creation. But this is only worthwhile if organizations can establish clear frameworks and ensure data quality to create real value.

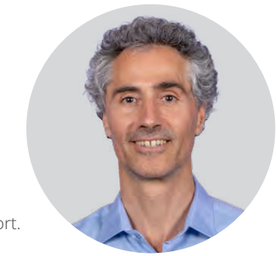
Finally, an Environmental, Social and Governance (ESG) assessment and plan is the first step in a long journey to reduce the effects of pollution and ensure the wellbeing of employees and customers. This is in sync with the changing political agenda, which seeks to reduce the planet's carbon footprint and greenhouse gas emissions. Developing innovative green transport solutions offers a significant contribution to these efforts.

We cover these topics and more in this latest edition of *Fast Forward* magazine. I hope you will enjoy and find inspiration from these articles, which offer insight into how the world's transportation industry is taking the journey to digital transformation. ■

"AS THE TRANSPORTATION INDUSTRY ACCOUNTS FOR UP TO 25% OF ALL GREENHOUSE GAS EMISSIONS, STRICTER ENVIRONMENTAL REGULATIONS HAVE BEEN STARTED TO DRIVE SUSTAINABILITY INITIATIVES. "

ABOUT ROCH MURAINE

Roch leads the Transportation, Energy and Utilities sector for Alcatel-Lucent Enterprise worldwide. Roch has the honor of serving the International Organization for Public Transport (UITP) as Chairman for the Information and Telecommunications Technologies Committee (ITT). Roch has been working in the transportation sector for 10 years with a strong focus on Public Transport.



TECHNOLOGY FOR SUSTAINABLE TRANSPORT

Transportation is a key industry where technology can make a difference to a sustainable future. By delivering secured connectivity and communications, Alcatel-Lucent Enterprise's technology supports mission-critical operations, enhances resilience, and fosters agility and collaboration among stakeholders as we tackle pressing global issues.

By **Katerina Cerny,** Marketing Director - France, **Alcatel-Lucent Enterprise**

Indeed, the Opening Remarks at United Nations Global Sustainable Transport Forum 2023 pointed to how "Transport is central to modern living, shaping the way we work, live, learn and do business." However, this is a double-edged sword as "Transport accounts for half of global oil demand and is responsible for a quarter of direct CO2 emissions from fossil fuel combustion worldwide," according to the Forum remarks. With emissions from transport on the rise, ALE recognized that more could be done.

In 2023, we elevated our commitment to sustainability by transitioning from a Corporate Social Responsibility (CSR) program to a dynamic Environmental, Social and Governance (ESG) strategy. This shift reflects both Alcatel-Lucent Enterprise's commitment to long-term sustainability and to creating value for all stakeholders, including shareholders, employees, partners, customers and the global community.

We have built our ESG program under the Technology for Good umbrella, as we believe our technology can have a positive social and environmental impact. Some of the programs we have implemented include:

- **Environmental sustainability:** Climate Change Mitigation; Product Environmental Adaptation
- **Social responsibility**: Human Rights; Labor Practices and Employee Development; Diversity, Equity and Inclusion
- **Corporate governance:** Business Ethics, Transparency and Compliance; Privacy and Data Security; Strategy and Risk Management

We are also focused on initiatives that can help our customers and partners in their own ESG planning. Below are some of the key aspects of the ALE ESG strategy.

"IT IS PARAMOUNT FOR US TO ENSURE THAT OUR SUITE OF SOLUTIONS AND SERVICES EMPOWERS OUR CLIENTS TO EFFECTIVELY MEET THEIR ENVIRONMENTAL OBJECTIVES."

ENVIRONMENTAL SUSTAINABILITY: GREEN FROM THE GROUND UP

At ALE, we are committed to environmental sustainability across our entire value chain, from suppliers and distributors to our customers. We aim not only to minimize our ecological footprint but also to improve product and operation traceability and empower our clients with sustainable solutions.

We recognize the urgent need for transport operators not only to minimize their environmental impact but also adapt to the rapidly changing climate. It is paramount for us to ensure that our suite of solutions and services empowers our clients to effectively meet their environmental objectives.

We are committed to developing and providing innovative solutions that enable clients to reduce their carbon footprint, optimize energy efficiency and implement sustainable operational practices. Our goal is to support our clients in their journey towards sustainability, helping them not only comply with environmental regulations but also to lead in their respective industries by setting new standards for environmental responsibility.

Understanding the critical challenges posed by climate change, we also focus on enhancing the resilience of our clients' operations against climate-related disruptions. Our solutions and services are designed to provide robust and adaptable solutions that ensure business continuity and agility in the face of climate unpredictability.

Some examples of concrete actions taken by ALE:

- Create energy-conscious product designs that require less power and reduce heat dissipation
- Optimize architectures and product life cycles for maximum longevity to reduce waste
- Use eco-friendly packaging materials reduced in volume and weight and easily recycled, through initiatives such as an eco-design program called MakCCIng Durable
- Refurbish boards and shelf items (for example, the Crystal refurbishment program and associated buyback plan)
- Reuse existing analog or digital wires to deploy IP communications (such as the Single-Pair Ethernet (SPE) project)
- Use recycled plastics or content to manufacture our products (for example, desk phones, chassis frames and covers)

CORPORATE GOVERNANCE: SECURE BY DESIGN SOLUTIONS

Data security and privacy are core priorities as a technology provider. In an era where information is both a powerful asset and a potential vulnerability, we strive to be a model for delivering highly secure solutions and services. This includes safeguarding our customers' interests and ensuring their data is protected.

- ALE has a strong cybersecurity culture. We follow the recommendations of several local authorities in many countries (NIST, BSI, ANSSI, ENS), which demonstrates our strong commitment to protect our clients' data. In 2024, ALE is working to be fully NIS2 compliant.
- The Rainbow™ by Alcatel-Lucent Enterprise collaboration solution also ensures data privacy through sovereignty, which reassures clients of the security and confidentiality of their data. This is demonstrated by the presence of our solution in several datacenters worldwide, where we respect all local regulations.
- The Rainbow EDGE solution provides customers with full control of their data. Security and confidentiality are the same as in our Rainbow UCaaS solution but are completely protected from the internet.

By integrating these strategies, ALE is not just addressing ESG challenges but also empowering our customers and communities to champion a sustainable future. Our ESG journey is relentless, and we are passionately committed to implementing practices that contribute positively to transforming our planet and society. ■

To know more about ALE environmental, social and governance practices, read our 2023 ESG report.

COMMITMENT AND AWARDS

UNGC

Alcatel-Lucent Enterprise stands proudly as a participant in the United Nations Global Compact (UNGC), joining hands with more than 8,700 organizations worldwide who are committed to promoting sustainability standards in human and labor rights, environmental sustainability and anti-corruption measures.

ECOVADIS

EcoVadis is a global sustainability rating and intelligence platform that assesses the environmental and social performance of companies. It provides businesses with a standardized framework for evaluating the sustainability practices of their suppliers and partners, considering various factors such as environmental impact, labor and human rights, ethics and supply chain practices.

TECH CARES

ALE has earned the Tech Cares award for demonstrating a strong commitment to corporate social responsibility. The awards, given by Austin-based TrustRadius, recognize organizations for impactful CSR initiatives in categories such as volunteerism; diversity, equity and inclusion programs; charitable donations; support for employees; and environmental sustainability efforts.

ABOUT KATERINA CERNY

Katerina leads marketing and communications activities for the France Region. She is part of the ALE ESG Development Committee in charge of ESG strategy execution worldwide.

Alcatel·Lucent
Enterprise

Your airport network… **secured**

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

- The passenger experience
- Safety and security
- Operational efficiency

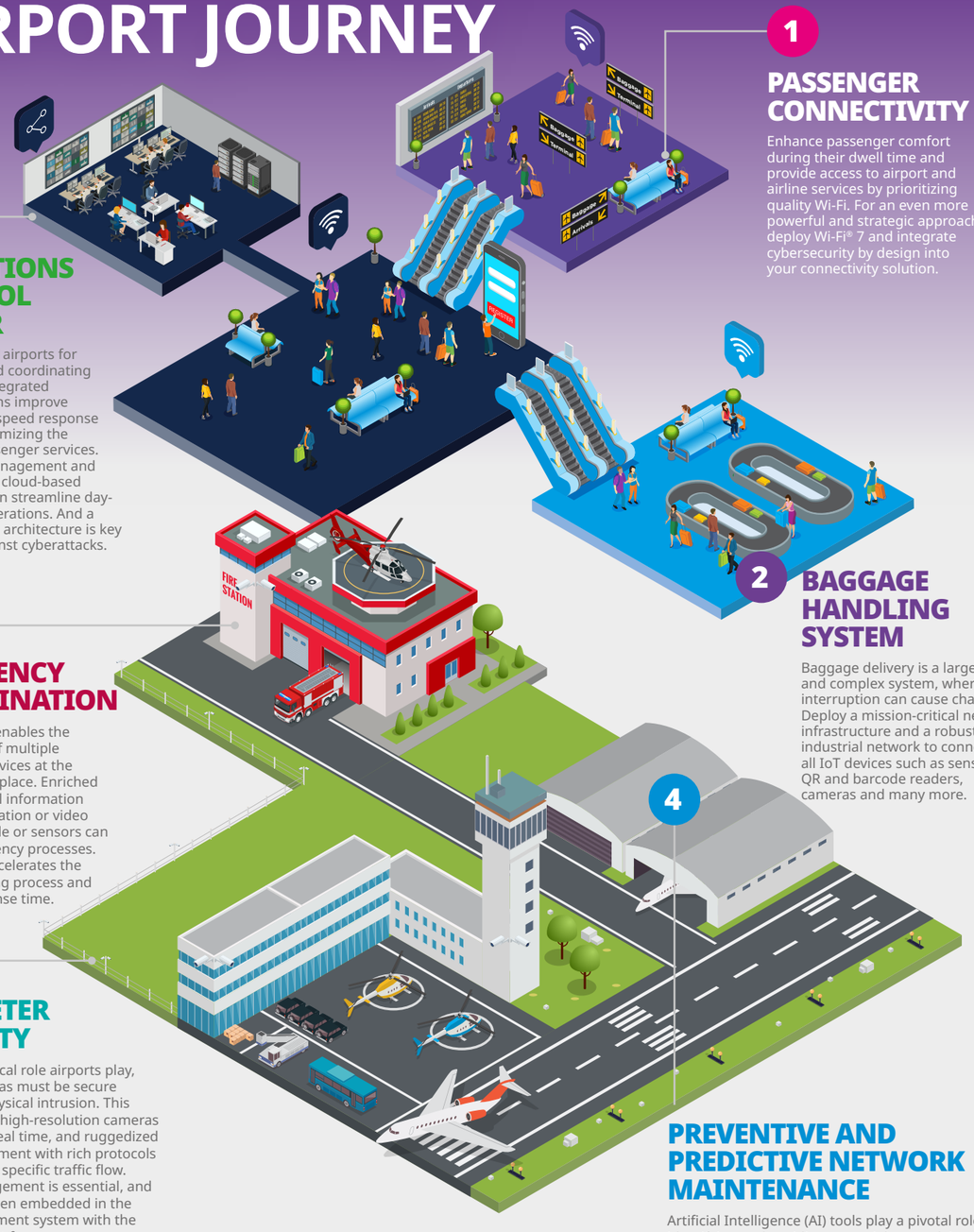
Our intelligent LAN and Wi-Fi network secures your IoT, keeps travelers connected indoors and outdoors with a hardened access layer, and leverages our best-of-breed communications and collaboration solution – on premises or in the cloud.

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
or contact your local ALE account representative

#WhereEverythingConnects

THE OPERATIONAL AIRPORT JOURNEY



1 PASSENGER CONNECTIVITY

Enhance passenger comfort during their dwell time and provide access to airport and airline services by prioritizing quality Wi-Fi. For an even more powerful and strategic approach, deploy Wi-Fi® 7 and integrate cybersecurity by design into your connectivity solution.

2 BAGGAGE HANDLING SYSTEM

Baggage delivery is a large and complex system, where any interruption can cause chaos. Deploy a mission-critical network infrastructure and a robust industrial network to connect all IoT devices such as sensors, QR and barcode readers, cameras and many more.

3 OPERATIONS CONTROL CENTER

The brain of all airports for monitoring and coordinating operations. Integrated communications improve collaboration, speed response times and minimizing the impact on passenger services. Centralized management and private, secure cloud-based applications can streamline day-to-day OCC operations. And a mission-critical architecture is key to protect against cyberattacks.

4 PREVENTIVE AND PREDICTIVE NETWORK MAINTENANCE

Artificial Intelligence (AI) tools play a pivotal role in identifying and avoiding potential network issues, enhancing security and managing hardware risks. They ensure the efficient functioning and longevity of airport LAN and WLAN infrastructures. Potential issues can be identified and rectified before they become major problems, minimizing downtime and maximizing overall airport performance.

5 EMERGENCY COORDINATION

Collaboration enables the coordination of multiple emergency services at the right time and place. Enriched with contextual information such as geolocation or video cameras, people or sensors can trigger emergency processes. Automation accelerates the decision-making process and reduces response time.

6 PERIMETER SECURITY

Due to the critical role airports play, all outdoor areas must be secure against any physical intrusion. This requires many high-resolution cameras monitored in real time, and ruggedized network equipment with rich protocols to support this specific traffic flow. Remote management is essential, and even better when embedded in the video management system with the ability to reboot frozen cameras.

LEARN MORE ABOUT ALE TECHNOLOGIES FOR AIRPORTS

TOP 10 WAYS TO PREVENT AIRPORT CYBERATTACKS

In today's interconnected world, airports rely heavily on Local Area Network (LAN) and Wireless LAN (WLAN) systems to ensure smooth operations, enhance passenger experience and improve overall airport security. Their very dependence on digital networks makes them more vulnerable to cyberthreats. Indeed, aviation cyberattacks saw a 530% year-on-year rise in 2020, according to Eurocontrol[1], which means a robust cybersecurity strategy is more vital than ever.

By **Henrique Amaro,** Business Line Manager, Transportation, Energy and Utilities, **Alcatel-Lucent Enterprise**

Airport LANs play a crucial role in facilitating operations such as baggage handling, passenger check-ins, flight monitoring and security systems. IoT-awareness is also critical to seamlessly connect sensors, cameras, signage and traffic control systems. These interconnected systems enable real time communications and data exchange between different departments and stakeholders. They also open airports to countless cyberthreats such as ransomware, phishing, spoofing, fraud, social engineering; attacks on payment systems, web and mobile applications; misconfiguration of the public cloud; exposure to the dark web; and leaks from code repositories.

Given that any breach in LAN security can have severe consequences – disrupting airport operations and compromising passenger safety – fast, reliable and secure connections are crucial. Network security is vitally important to protect data and network integrity.

A MULTI-LAYERED APPROACH

There are multiple ways to prevent cybersecurity attacks in airports. Here are the top 10, which can be adopted within a multi-layered approach.

1. **Network segmentation:** Divide the network into multiple segments or Virtual LANs (VLANs) to isolate critical systems and restrict unauthorized access. This helps contain cyberattacks and prevents lateral movement within the network.
2. **Firewall implementation:** Deploy firewalls at network ingress and egress points to filter and monitor incoming and outgoing traffic. This blocks malicious activities, unauthorized access attempts and potential malware infections.
3. **Intrusion Detection and Prevention Systems (IDPS):** Install IDPS technologies that can monitor network traffic and alert administrators to potential intrusions or cyberthreats. This enables early detection and prevention of attacks.
4. **Network Access Control (NAC):** Implement NAC systems that enforce security policies and ensure that only authorized devices and users can connect to the network.
5. **VPNs and encryption:** Utilize Virtual Private Networks (VPNs) to establish secure and encrypted connections for remote devices and networks. Implement encryption mechanisms like Wi-Fi Protected Access (WPA2/WPA3) to prevent eavesdropping and unauthorized access. Sensitive data should also be encrypted at rest and in transit. Even if an attacker gains access, the data remains unreadable without the proper encryption keys.
6. **Authentication:** Implement strong authentication mechanisms like multi-factor authentication (MFA) to mitigate the risk of compromised credentials and unauthorized access to critical systems and resources.
7. **Regular patching and updates:** Maintain a strong patch management process to keep all network devices — including routers, switches and access points — current with the latest security patches to reduce the risk of known vulnerabilities being exploited.
8. **Continuous monitoring and logging:** Implement robust AI-based monitoring tools and techniques to continuously monitor network traffic, system logs and security events for quick identification of and response to potential threats.
9. **Incident response plan:** Develop and maintain an incident response plan that outlines the cyberattack plan of action to ensure a coordinated and effective response that minimizes an attack's impact.
10. **Airport staff awareness and training:** Conduct regular cybersecurity awareness and training programs to educate about the risks associated with using public Wi-Fi networks, the importance of strong passwords and the dangers of clicking on suspicious links or opening email attachments from unknown sources.

By adopting a zero trust network approach that encompasses both technical and non-technical aspects of cybersecurity, airports can create a robust defense against cyberthreats. But it doesn't stop there. Continual evaluation, improvements and adaptations to the evolving threat landscape are essential to maintain a secure and resilient network infrastructure in airports. Regular vulnerability assessments, risk analysis and updates are crucial to adapt effectively to evolving threats and secure airport networks. ■

1- Aviation under attack from a wave of cybercrime

ADDITIONAL FACTORS TO CONSIDER

Here are some further considerations for airports to heighten their cybersecurity strategy:

Vendor management: Scrutinize the cybersecurity practices of third-party vendors and suppliers. Ensure these partners adhere to strict security standards and protocols to maintain overall security.

Incident response drills: Regularly conduct incident response drills and simulations to help identify potential weaknesses in the response plan. Airport staff can practice their roles and responsibilities, ensuring a coordinated and efficient response during a real incident.

Regulatory compliance: Comply with relevant industry regulations and standards, such as the Payment Card Industry Data Security Standard (PCI DSS) and the General Data Protection Regulation (GDPR).

Regular security audits: Conduct regular security audits and assessments. These audits can be performed internally or by third-party experts to ensure an unbiased evaluation of the airport's security measures.

Cloud security: Ensure proper security measures for cloud environments. This includes implementing strong access controls, encryption and monitoring mechanisms.

Physical security: Don't overlook physical security measures for sensitive technical areas to prevent physical breaches that could lead to cyber vulnerabilities.

Collaboration and information sharing: Participate in industry forums, and share information and best practices with other airports. Collaboration fosters a collective defense approach and strengthens the overall cybersecurity ecosystem.

Learn more about ALE technologies for airports.

"CONTINUAL EVALUATION, IMPROVEMENTS AND ADAPTATIONS TO THE EVOLVING THREAT LANDSCAPE ARE ESSENTIAL TO MAINTAIN A SECURE AND RESILIENT NETWORK INFRASTRUCTURE IN AIRPORTS."

ABOUT HENRIQUE AMARO

Henrique is responsible for creating solutions, value propositions and content for the Transportation, Energy and Utilities sectors, supporting the global ALE sales team. With over 25 years of experience in the telecommunications industry, specializing in the data networking enterprise market, Henrique was part of the ALE International Solution Architect team, providing extensive support to sales and presales teams worldwide. His expertise includes end-to-end solutions, network design, network management and switching.

ELEVATE THE AIRPORT EXPERIENCE FOR PASSENGERS WITH DISABILITIES

It is a fundamental right for any passenger to travel in a way that is safe, reliable and dignified — everyone should be able to travel by air, regardless of disability or impairment. Now, with connectivity, communications and collaboration solutions, it is possible to take passenger assistance services to the next level. Technology can help airports and service providers assist passengers with reduced mobility (PRMs) while considering the best interests of those travelers, relevant safety regulations and operational constraints.

By **Valérie Puygauthier,** Marketing Program Manager, Transportation, Healthcare, Energy and Utilities, **Alcatel-Lucent Enterprise**

In the Air Travel Accessibility for Passengers with Disabilities report, the International Air Transport Association (IATA) has estimated that more than 1.3 billion people live with some form of disability — approximately one in six people in the world. Furthermore, as the population ages, the proportion of people with disabilities grows.

Additionally, post-pandemic, PRMs have returned to the skies at a faster rate than total passenger traffic, according to data published in the International Airport Review.

To both prepare for increased passenger traffic and improve the PRM experience, airports and service providers must have sufficient qualified staff and implement measures to improve the coordination and collaboration with airlines related to assistance services. This will provide people with disabilities a comfortable and worry-free experience, helping them to avoid flight delays while reducing additional airline costs caused by service inefficiency.

PRM service delivery is a complex system involving several stakeholders such as the airlines, the airport operators, the service providers, disability rights organizations and the passenger.

What is standing in the way of providing successful PRM services? Challenges include on-time delivery, quality of service and unpredictable schedule changes. There is also the need to assess the passenger's request and align the required resources.

The PRM service is quite important because the plane's turn-around time depends on efficiency. A plane cannot be cleaned, loaded, or reboarded until PRM disembarkment. As a result, the plane's planned schedule will be at risk, impacting the airport and the airline's global schedule.

Therefore, close collaboration between stakeholders is fundamental to providing successful PRM services. Though complex, when done well, each of the stakeholders benefits.

COORDINATION DELIVERS CONSISTENT END-TO-END SERVICE

Airports and service providers are now embracing innovative technologies that optimize service quality and improve the operational efficiencies of the PRM service process. These technologies are intended to improve the operation efficiencies of the PRM service process. A set of solutions enabling real time multi-channel communications, collaboration and connectivity can be integrated into the overall PRM service at all stages of travel. This allows the stakeholders to:

- **Anticipate individual needs**
  Before travel, passengers with reduced mobility are encouraged to request assistance through an online dedicated service. The passenger can provide details about their mobility difficulties and if they intend to take their own mobility devices. Sometimes, they wish to chat with an expert to clarify some points. Assistance services need to qualify the requests and deliver clear and comprehensive information about accessibility features, schedules and routes to enable individuals to plan their trips effectively.

  Through CPaaS integration, some communications features such as chat, file sharing, voice and video over any device can be integrated in the booking environment to enrich the PRM services. Advanced features can be added such as Artificial Intelligence (AI), chatbots, system databases and analytics to automate and simplify operational processes and create new services.

- **Coordinate on-site passenger assistance**
  At the airport, passengers with reduced mobility often need human assistance on their arrival, during connections or on their departure — resources that can sometimes be difficult to find.

  In addition to assistance phone numbers, help points equipped with specific telephony features can be installed in car parks, designated drop-off points and bus, train and subway stations. By simply using the push button or telephone, the travelers can talk to the assistance team who can locate them and send attendants to help.

  Collaboration tools can also enhance assistance coordination, enabling supervisors to contact the nearest PRM agents, escalate any issues to the appropriate service provider, and provide real time information to the passenger.

- **Secure PRM mobility equipment**
  Airports must secure their own mobility equipment, such as wheelchairs, used to assist passengers with disabilities or impairments. However, they must also care for the mobility devices these passengers check as baggage — essential equipment that may be highly sophisticated and expensive.

  An asset tracking solution using Wi-Fi infrastructure and Bluetooth Low Energy (BLE) technology can help the PRM services locate in real time the mobility assets across the airport areas. This application also sends automated alerts and geo-notifications in case of events (such as area entries/exits and emergency and assistance requests). All these features reduce the time required to find resources and prevent lost, damaged or stolen devices.

Airports and service providers must continue to improve their IT solutions, infrastructure, processes and procedures to improve their PRM services. Through communications, collaboration and connectivity, they can equip their teams with the relevant tools to optimize their assistance services and ensure the best possible travel experience for passengers with disabilities. ■

ABOUT VALÉRIE PUYGAUTHIER

Valerie has broad experience in digital marketing and leads global marketing programs for the Transportation, Healthcare, Energy and Utilities sectors at Alcatel-Lucent Enterprise. For 25 years, she has traveled by air, rail, road and sea with her family and a wheelchair.

Special thanks to Enrique Bolivar for his contribution to this article.

AIRPORTS AND SERVICE PROVIDERS ARE EMBRACING INNOVATIVE TECHNOLOGIES THAT OPTIMIZE SERVICE QUALITY, THEREBY REDUCING THE WAIT TIME FOR PASSENGERS WITH REDUCED MOBILITY AND ASSURING ON-TIME BOARDING AND FLIGHT DEPARTURES.

Alcatel·Lucent
Enterprise

Your rail system... **secured**

At ALE, we provide the building blocks to make everything connect and enable you to improve:
- The passenger experience
- Safety and security
- Operational efficiency

Our converged mission-critical architecture provides many operational benefits. Keep travelers connected, secure IoT devices up to trackside with a hardened access layer, and leverage our best-of-breed communications and collaboration solution to enhance your emergency control center capabilities.

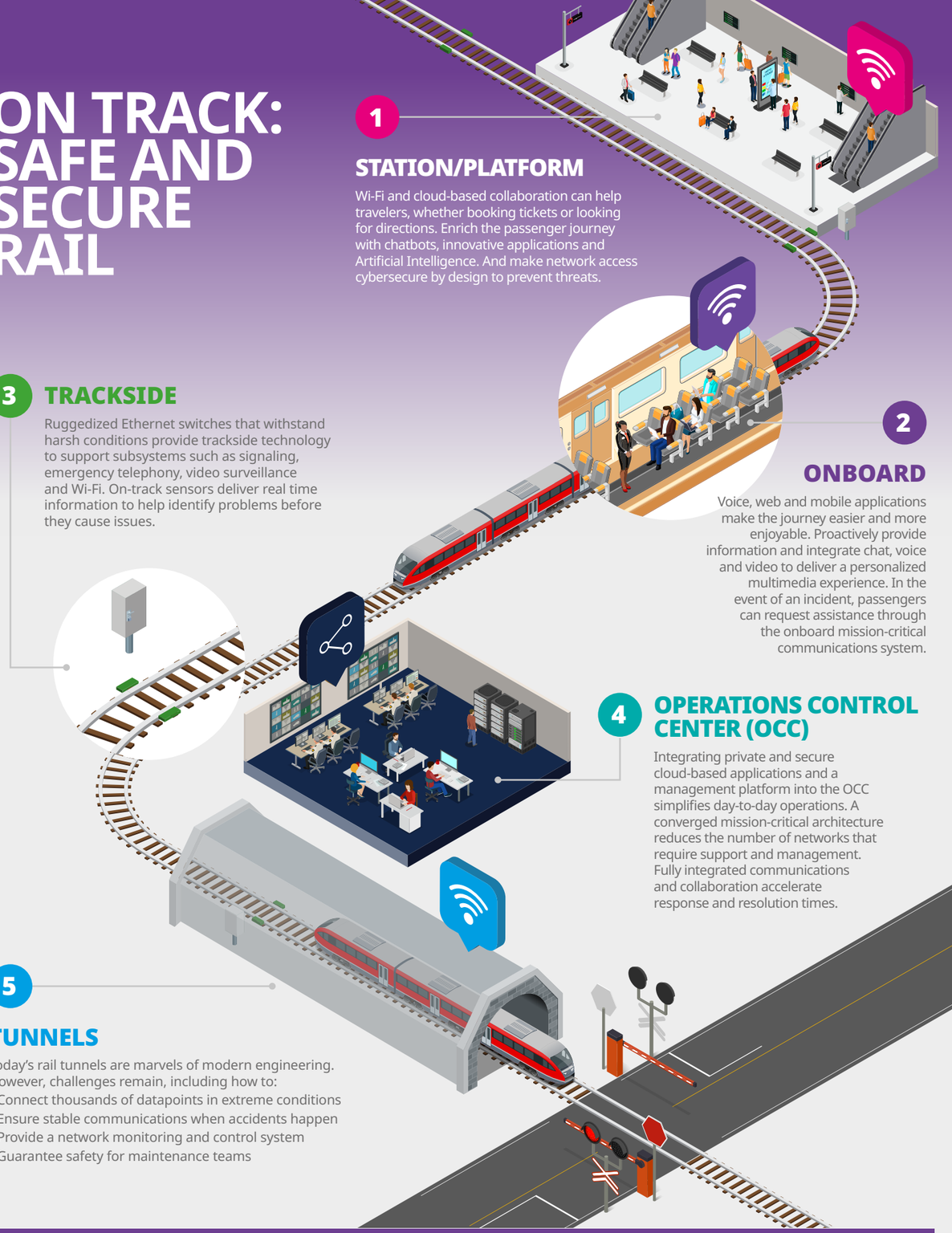
With our intelligent rail solutions, we optimize your network infrastructure to simplify the command and control of your rail system.

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 or contact your local ALE account representative

#WhereEverythingConnects

ON TRACK: SAFE AND SECURE RAIL



1 STATION/PLATFORM

Wi-Fi and cloud-based collaboration can help travelers, whether booking tickets or looking for directions. Enrich the passenger journey with chatbots, innovative applications and Artificial Intelligence. And make network access cybersecure by design to prevent threats.

2 ONBOARD

Voice, web and mobile applications make the journey easier and more enjoyable. Proactively provide information and integrate chat, voice and video to deliver a personalized multimedia experience. In the event of an incident, passengers can request assistance through the onboard mission-critical communications system.

3 TRACKSIDE

Ruggedized Ethernet switches that withstand harsh conditions provide trackside technology to support subsystems such as signaling, emergency telephony, video surveillance and Wi-Fi. On-track sensors deliver real time information to help identify problems before they cause issues.

4 OPERATIONS CONTROL CENTER (OCC)

Integrating private and secure cloud-based applications and a management platform into the OCC simplifies day-to-day operations. A converged mission-critical architecture reduces the number of networks that require support and management. Fully integrated communications and collaboration accelerate response and resolution times.

5 TUNNELS

Today's rail tunnels are marvels of modern engineering. However, challenges remain, including how to:
- Connect thousands of datapoints in extreme conditions
- Ensure stable communications when accidents happen
- Provide a network monitoring and control system
- Guarantee safety for maintenance teams

LEARN MORE ABOUT ALE TECHNOLOGIES FOR RAILWAYS

COMMUNICATIONS: THE HEART OF AN OPERATIONS CONTROL CENTER

The Operations Control Center (OCC) is the brain that manages the day-to-day activities of transport operators. It's here that the magic happens to ensure that everything runs smoothly.

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

On trains, planes or any other mass transit systems, passenger service can be disrupted when incidents occur such as technical failures in the transport system, weather conditions, traffic incidents, labor strikes and accidents. These disruptions can cause unacceptable delays and resource shortages. The OCC must be able to provide a coordinated, timely response to reduce and recover from operational interruptions and minimize the impact on passenger service.

Some of the main functions of the OCC include:
- **Monitoring** operations
- **Anticipating** problems
- **Managing** the planned operations schedule
- **Minimizing** service disruption

At the same time, the OCC is tasked with maintaining performance and providing quality of service, as well as lowering operational costs. In other words, the OCC is responsible for the execution of a daily schedule, as planned, without busting the budget.

Efficient OCC operation depends on having the right solution, as well as coordinated and collaborative work among stakeholders from different core business units.

A complex ecosystem of solutions converges in the OCC where they are often challenged to deliver new services that require new applications. This means everything must be integrated to have effective control of operations.

The modules that make up the solution must be open and able to integrate with others. APIs provide the key elements for interconnection between ecosystem components. With open APIs, operators can create new services, integrate applications and meet new requirements. Additionally, APIs create opportunities to innovate.

In the railway sector, service disruption during the morning rush hour on a weekday presents a massive inconvenience to passengers. A clear view of the problem, agile collaboration between stakeholders and effective coordination are needed to take the right actions at the OCC: for example, rescheduling the train traffic and establishing a recovery plan is essential to reduce downtime and allow passengers to complete their trip in a reasonable timeframe.

Multimedia communications services are the cornerstone of an efficient OCC. They make interaction with everyone possible. These vital services enable the collaborative coordination of various stakeholders in the OCC, mitigating any incident. They can improve visibility of incoming information, and they can reduce recovery time.

Communications are mission-critical for the OCC to ensure operations and user security. If there is no communication, there is no service. Consequently, a foundation based on reliable/secure communications can:
- Support complementary services such as call taking/dispatch
- Enable coordination and collaboration between stakeholders
- Improve information awareness
- Offer openness to easily integrate with different functional blocks at the OCC

Alcatel-Lucent Enterprise offers a broad communications portfolio that covers telephony services:
- Visual Notification Assistant (VNA) for incident and emergency management
- Voice recording to monitor, record and analyze all OCC interactions
- Dispatch Console to deal with high volumes of call taking/dispatching and enhance collaboration
- Remote Visual Assistance (RVA) to streamline on-site interventions by improving interactions between field workers and OCC experts

These communications services are integrated and interconnected with OCC functional blocks (such as radio and video surveillance systems) through standard protocols and APIs. Additionally, a dedicated API server increases integration capabilities, providing a set of RESTful APIs to host ALE and customer applications such as:
- Telephony services
- Management capabilities
- Analytics

Collaboration is vital for OCC task coordination and information awareness. Integrating business processes and communications solutions is key to enabling efficient operations. The Rainbow™ by Alcatel-Lucent Enterprise CPaaS solution integrates with the customer environment to provide communications services such as chat, file sharing, voice and video over any device. At the same time, Rainbow leverages Artificial Intelligence (AI), chatbots, system databases and analytics to automate and simplify operational processes and create new services.
The evolution to a collaborative operational environment is the next step for many OCCs. Integrating different functional blocks is the key driver to enable interaction between the stakeholders, increased communications, improved situational awareness and enhanced decision-making.

Today and in the near future, the OCC needs resilience, safety, connectivity, collaboration, data analytics and adaptiveness to accelerate the decision-making process and reduce the operational risk and the time to return to service.

NEXT-GENERATION OCC

Today's OCC must be prepared to support more automated operations and embrace technology innovation. Digital transformation is at the heart of this next-generation OCC. Integration of new components will add value to complex OCC environments, moving them from standardized operations to predictive capabilities, process automation and seamless collaboration between stakeholders.

This evolution is based on three main pillars:
1. SIP technology at the core of the communications solution to support/offer advanced telephony features and help pave the way for a smooth migration to the next generation
2. A cloud platform to connect to the OCC. WebRTC services offer borderless communications and collaboration between customers and employees through integration with mobile apps and multimedia self-service interfaces, and commercial apps using the Rainbow connector.
3. Hybrid private/public cloud solutions to deliver new services and increase reliability

The evolution to a next-generation OCC gives transportation companies significant advantages including:
- Implementation of a fast recovery plan through a high resilience infrastructure
- Enriched OCC interaction by connecting Internet of Things (IoT) and AI solutions to automate processes and enable predictive capabilities to reduce threats and improve recovery time
- Enhanced contextual information that qualifies incidents, improves efficiency and empowers staff to collaborate and make decisions

A SMARTER OPERATIONS CONTROL CENTER

Multimedia communications services are the cornerstone of an efficient OCC, supporting interaction and collaboration between various stakeholders in the OCC to avoid incidents, accelerate responses to service disruptions and ensure safety for all. ■

"DIGITAL TRANSFORMATION IS AT THE HEART OF THE NEXT GENERATION OCC. INTEGRATION OF NEW COMPONENTS WILL ADD VALUE TO COMPLEX OCC ENVIRONMENTS, MOVING THEM FROM STANDARDIZED OPERATIONS TO PREDICTIVE CAPABILITIES, PROCESS AUTOMATION AND SEAMLESS COLLABORATION BETWEEN STAKEHOLDERS."

ABOUT ENRIQUE BOLIVAR

Enrique is responsible for the creation of solutions, value propositions and content that address transportation sectors such as Railway, ATI, ITS, Ports and Logistics. He has more than 15 years of experience in the telecommunications 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.

ONBOARD TELEPHONY: THE ESSENTIAL TRAIN ATTENDANT IN METRO AUTOMATION

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The railway sector, specifically Metro and Light Rail Transit (LRT), are rapidly progressing towards full automation, resulting in completely unmanned, driverless trains. In automated trains, onboard telephony becomes an essential train "assistant".

By **Laurence Delattre,** Sales Key Account Director, France, **Alcatel-Lucent Enterprise**

According to a UITP survey "by 2028 there will be over 3,800km of automated metro lines in operation worldwide" and "[most] of this growth corresponds to the expected opening of 87 new lines, or extensions of existing lines."

There are five Grades of Automation (GoA) for trains, ranging from driver train control (GoA0) to fully automated train operation without on-train staff and with remote monitoring (GoA4).

Many of the challenges that transport operators face today are leading them to embrace this transformation, including the following:

- Urban population growth
- Safety and security reinforcement
- Operational costs control
- Passenger experience improvement
- Sustainable operations
- Regulations and laws compliance

According to an Alstom survey, train automation has the potential to help operators address these concerns. Automation contributes to up to 45% less energy consumption, provides 30% more passenger capacity and reduces journey time by three minutes. Forward-thinking operators can use digital transformation to improve the travel experience while increasing passenger safety and security and enhancing their operations.

"IN THE AUTOMATED TRAIN, ONBOARD TELEPHONY BECOMES AN ESSENTIAL TRAIN "ASSISTANT". REAL TIME TRAIN-TO-GROUND COMMUNICATIONS PROVIDE SUPPORT AND SECURITY TO PASSENGERS IN EMERGENCY SITUATIONS."

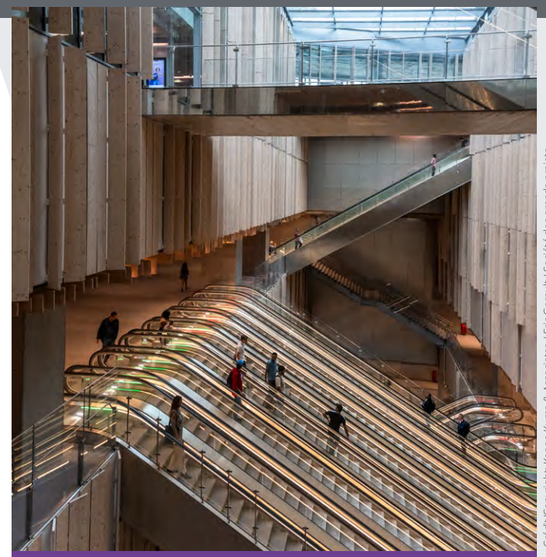
To implement a successful automated train system, however, operators must pay close attention to some key communications capabilities. Communications among control center staff, train technicians and passengers are mission-critical and demand a high level of security, resilience and availability. In the automated train, onboard telephony becomes an essential train "assistant". Real time train-to-ground communications provide support and security to passengers in emergency situations. For example, if an accident occurs on an unattended train in operation, any passenger can place a call through an on-board Emergency Help Point (EHP) to request assistance from the security team.

Operational telephony is not only intended for emergency situations and passenger security, but also benefits daily operations activities. For example, when technicians perform regular maintenance routines, they need to communicate in real time from the onboard console at the driver's cabin to the Operations Control Center (OCC) staff. Onboard communications provide this link during maintenance activities, enhancing operational efficiency.

The onboard communications solution must be reliable and robust to guarantee always-on service. A recording capability is key to register all communications between the train and the control center as part of basic operational rules and security measures. If the communications link between the train and the OCC is cut, the onboard telephony system delivers a voice message to the passenger to remain on the call while the system recovers the link. In addition, an open platform is vital for integration with the entire control system embedded in the train.

ALE recognizes that each railway operator has unique needs. Our Professional Services team has the experience and expertise required to provide tailored solutions that meet our customers' expectations. We are equipped to design a new solution, adapt the current communications solution and enable interworking with third party functional blocks to deliver the right solution for every customer. ALE offers a comprehensive set of technologies to help railway operators embrace the opportunity for autonomous trains by deploying onboard telephony as an essential service for passenger safety and security and improved day-to-day operations. ■

Learn more about ALE technologies for railways.



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GRAND PARIS EXPRESS

The Grand Paris Express is currently the largest infrastructure project in Europe. The future Grand Paris subway includes 200 kilometers of new rail that will create four new lines around Paris (lines 15, 16, 17 and 18) and extend the existing line 14. In addition, 68 new subway stations will be built, helping to create new, sustainable urban centers in these locations.

Tomorrow's Grand Paris will see the emergence of pleasant neighborhoods, accessible to all and respectful of human and natural resources.

Alcatel-Lucent Enterprise is supplying the distribution equipment for a multiservice IP/MPLS broadband network to meet all the operation and maintenance requirements of the Grand Paris Express. The Alcatel-Lucent OmniSwitch® range is being deployed in stations and in remotely located industrial environments. This equipment makes possible the management of video surveillance and air quality control via Internet of Things (IoT). Secure telephony/intercom solutions are being deployed within an ecosystem of technology partners in stations and installed in the trains of the future line 18.

ABOUT LAURENCE DELATTRE

With over 25 years of expertise in sales, marketing and business development, Laurence is passionate about digital transformation and sustainability. Customer-centricity lies at the core of her approach, complemented by a profound understanding of the challenges in the healthcare, finance and transportation sectors.

CYBERSECURE COMMUNICATIONS FOR DRIVERLESS TRAINS

As driverless trains and metros become more prevalent, ensuring cybersecurity has grown more paramount due to concerns about takeovers or disruptions within the rail environment. Roch Muraine, Worldwide Sales Director for Transportation at Alcatel-Lucent Enterprise and chair of the IT & Telecommunications committee at UITP, a global public transport organization, discusses the importance of securing these connections.

By **Emma Dailey,** Editor, Railtech.com and RailTech.be

With rail and metro systems transitioning to fully driverless operations, attention has shifted to the importance of communications, particularly in emergencies. Communications must not only reach the Operations Control Center, which may be located remotely and potentially far away, but also the emergency services. "The supervision of the train's environment is becoming more challenging, so cybersecurity is a growing concern," says ALE's Roch Muraine.

Emergency communications between trains and the ground, as well as between trains themselves, has always been crucial in rail systems. However, there is now a heightened focus on ensuring mission-critical communications, particularly in scenarios involving network loss or cyberthreats. Muraine stresses the importance of uninterrupted communications within trains, even during network disruptions, allowing trains to function normally.

This emphasis on mission-critical communications to address these challenges prompts the implementation of robust authentication, secure connections and encryption measures. Muraine highlights the diverse range of communications methods and protocols utilized, ensuring resilient connectivity both now and in the future.

SECURING COMMUNICATIONS FOR NEW PROJECTS

"Driverless trains are akin to moving enterprises, with complex networks and interconnected systems. Cybersecurity measures must match those of highly secure environments like submarines or critical enterprises," explains Muraine. "This isn't just theoretical; it's a response to the needs of public transport operators and train suppliers. Our insights stem from real-world deployments, including our involvement in the ongoing Grand Paris project."

Greenfield projects entail deploying technologies for the long term, often over a decade or more. "In a greenfield development, you are looking ahead, while when you are refurbishing, you have a foot in the past and a foot in the future and try to take both into account," adds Muraine.

Thus, Greenfield projects allow for forward-looking solutions, especially in enhancing security measures, says Muraine. "Our focus on recording and analyzing data, as well as integrating various systems, reflects this forward-thinking approach."

A PARADIGM SHIFT

"In today's evolving landscape of security, particularly in cybersecurity, there is a paradigm shift. From enhanced onboard recording systems within trains and communications hubs to the integration of advanced technologies like GSM and mobile solutions, every aspect is meticulously captured and monitored," explains Muraine. Gone are the days of isolated systems; now, a complex network of subsystems and applications ensures a seamless flow of information, with data intricately logged for analysis. What sets this apart is not just the automation or technological advancements, but the recognition that human involvement remains paramount. Amidst the sophistication of Artificial Intelligence and Machine Learning, it's the real people, actively engaged both on board and in control centers, who remain the linchpin of this intricate ecosystem.

RECORDING AND PROTECTING DATA

In addition to securing communications, recording information also contributes to increasing safety on board, according to Muraine: "We record and analyze various communications and events, similar to flight data recorders. This comprehensive approach helps reconstruct incidents accurately and aids in improving safety and security measures." With these new flows of information, the data records also require increased protection.

"We can now adopt a comprehensive recording approach akin to emergency services like 911, capturing pre-, during, and post-event conversations for varied purposes," says Muraine.

This discreet monitoring extends to synchronized CCTV footage, providing a multi-dimensional perspective on incidents. By integrating various recording methods, including geolocation and video, the project ensures a nuanced understanding of events, enhancing response capabilities in an increasingly critical security landscape. As such, "Data protection is as vital as other aspects of the system," says Muraine. "Redundant systems, virtualization and rigorous backups must be employed to safeguard critical data, acknowledging the potential life-threatening implications of any breach."

Backup control also underscores the project's unwavering commitment to the safety and well-being of its passengers, recognizing the potential real-life implications of any security breach.

"DATA PROTECTION IS AS VITAL AS OTHER ASPECTS OF THE SYSTEM. REDUNDANT SYSTEMS, VIRTUALIZATION AND RIGOROUS BACKUPS MUST BE EMPLOYED TO SAFEGUARD CRITICAL DATA, ACKNOWLEDGING THE POTENTIAL LIFE-THREATENING IMPLICATIONS OF ANY BREACH."

LOOKING FORWARD

"Until recently, our involvement in onboard communication was minimal, given the simplicity of intercom systems. However, as communication needs evolve, so do our collaborations with rail industry leaders and system integrators," states Muraine. The emphasis on communications as a cornerstone of rail operations, coupled with the looming threat of cyberattacks, necessitates a strategic shift. "Previously, isolation was seen as a security measure, but the demand for remote monitoring and connectivity renders this approach obsolete," he stresses.

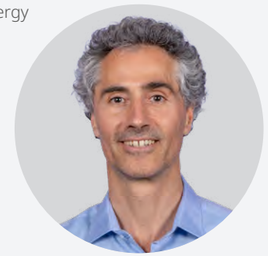
Balancing connectivity with cybersecurity is paramount, mitigating risks while harnessing the benefits of interconnected systems. "As communication requirements grow, collaboration between stakeholders will be crucial. Cybersecurity will remain a central concern, requiring ongoing innovation and cooperation to stay ahead of emerging threats," continues Muraine.

The preemptive anticipation and addressing of potential threats is crucial as the industry moves toward a future where robust communications infrastructure is essential. "General contractors, operators and public transport authorities should pay attention to this topic," says Muraine. "Understanding and investing in these technologies is essential for future-proofing transport systems." ■

ABOUT EMMA DAILEY

Emma is an editor at RailTech.com and RailTech.be. This article was first published in the March 2024 issue of RailTech magazine and is republished here with the kind permission of Emma Dailey, Editor RailTech.

ABOUT ROCH MURAINE



Roch leads the Transportation, Energy and Utilities sector for Alcatel-Lucent Enterprise worldwide. Roch has the honor of serving the International Organization for Public Transport (UITP) as Chairman for the Information and Telecommunications Technologies Committee (ITT). Roch has been working in the transportation sector for 10 years with a strong focus on Public Transport.

Alcatel·Lucent
Enterprise

Intelligent Transportation Systems… **connecting 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 provides the innovation needed to better manage transportation subsystems 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
or contact your local ALE account representative.

#WhereEverythingConnects

TRAVEL SMART WITH INTELLIGENT TRANSPORT SYSTEMS

OPERATIONS CONTROL CENTER

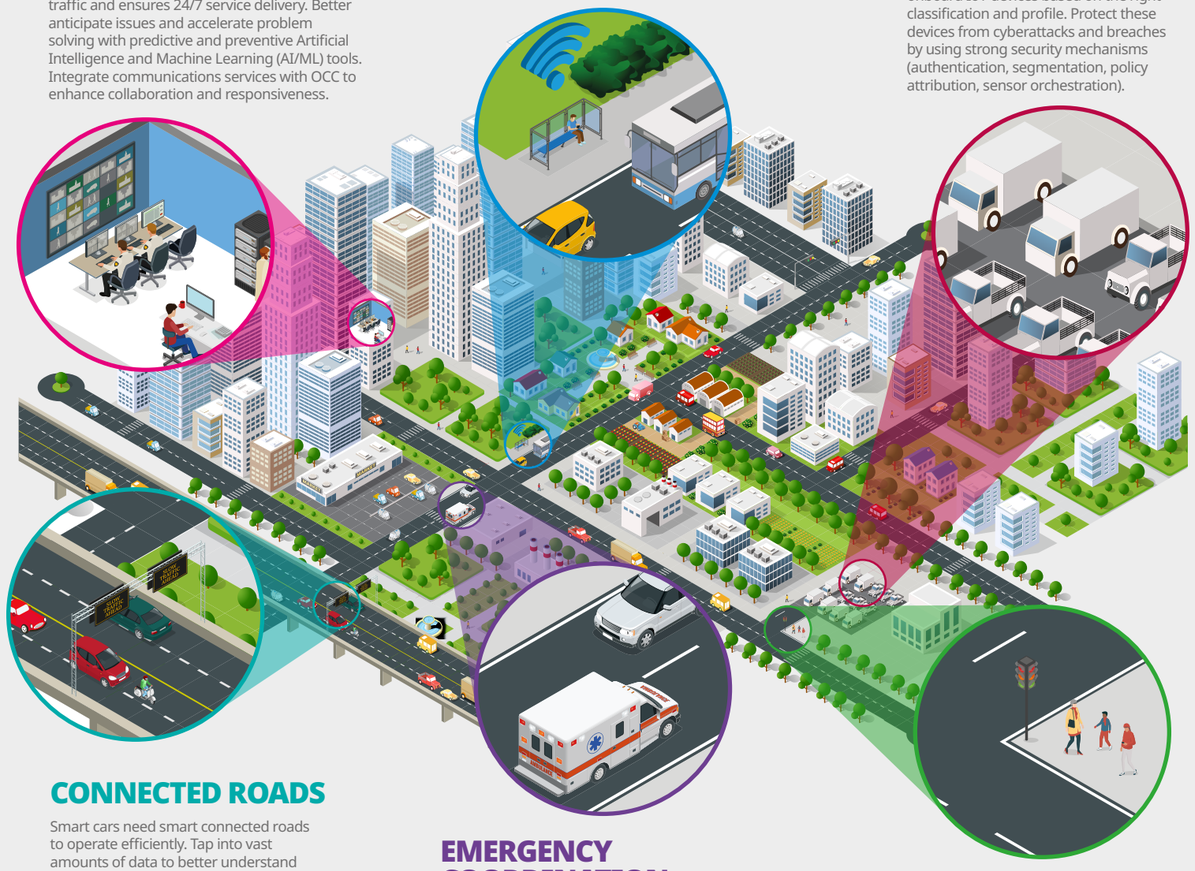
As the main hub for all data from IoT-enabled devices – such as CCTV cameras, sensors and smart displays – the OCC coordinates emergency vehicles and road services, monitors traffic and ensures 24/7 service delivery. Better anticipate issues and accelerate problem solving with predictive and preventive Artificial Intelligence and Machine Learning (AI/ML) tools. Integrate communications services with OCC to enhance collaboration and responsiveness.

CONNECTED BUS STOPS

Transit passengers require the most up-to-date schedule information as well as traffic and road condition data to ensure a safe and timely arrival. Dynamically push travel information to commuters. Use intelligent security cameras to easily detect and assist single or vulnerable riders.

IOT SENSORS FOR CAR PARKS

Mobile apps help find parking spots, but sensors and cameras are game changers. They help monitor air quality, vehicle emissions and safety incidents such as fire, flood, theft and vandalism. Automatically onboard IoT devices based on the right classification and profile. Protect these devices from cyberattacks and breaches by using strong security mechanisms (authentication, segmentation, policy attribution, sensor orchestration).



CONNECTED ROADS

Smart cars need smart connected roads to operate efficiently. Tap into vast amounts of data to better understand road environments, traffic flows and driver behavior. Use that knowledge to quickly notify authorities of incident information and communicate approaching road conditions to drivers.

EMERGENCY COORDINATION

When a critical incident occurs, decision-making and coordination are crucial. Deliver the right information at the right time to the right team with a mission-critical communications system, connecting all systems together. Better coordinate emergency response amongst security, ambulance, fire, police and maintenance staff using specific communications tools that enhance safety operations.

CAMERA-EQUIPPED TRAFFIC LIGHTS

With traffic volumes on the rise, digitized and connected traffic lights enforce traffic rules, monitor volume and help alleviate congestion. In the event of an accident, data from camera-equipped traffic lights help the OCC quickly alert assistance services. Camera synchronization and remote management are simplified through Internet Protocol (IP) connectivity.

LEARN MORE ABOUT ALE TECHNOLOGIES FOR SMART ROADS AND SERVICES

AN AI-POWERED COMPANION FOR PREVENTIVE AND PREDICTIVE MAINTENANCE IN HIGHWAY NETWORKS

With Local Area Networks (LAN) and Wireless LANs (WLAN) now integral to road operations, sustaining the efficiency and security of these networks is crucial to ensure uninterrupted productivity and protect sensitive data.

By **Henrique Amaro,** Business Line Manager, Transportation, Energy and Utilities, **Alcatel-Lucent Enterprise**

LAN and Wi-Fi are crucial to highway networks as they ensure seamless connectivity of systems in all environments and guarantee stable and reliable data transmission — even in challenging conditions such as extreme weather or high levels of interference. By utilizing a robust infrastructure, highway networks can efficiently integrate various devices and systems, enabling effective communications and coordination for tasks such as traffic management and surveillance. This strategy contributes to the overall performance and reliability of highway LANs/WLANs, ensuring that critical operations, management and maintenance run smoothly and efficiently.

This is where preventive and predictive maintenance, coupled with advanced Artificial Intelligence (AI) tools, can play a pivotal role. These techniques can identify and rectify potential issues before they become major problems, minimizing downtime and maximizing overall system performance. They are essential strategies to enhance security, manage hardware risks and ensure the efficient functioning and longevity of highway LAN and WLAN investitures.

UNDERSTANDING PREVENTIVE AND PREDICTIVE MAINTENANCE

Preventive maintenance involves proactive routine check-ups, assessments and other maintenance activities to preserve the optimal functioning of the network. By regularly monitoring and analyzing network components, administrators can identify and address potential weak points before they escalate into major problems.

Within highway LAN and WLAN infrastructure, regular checks on cables, switches, routers, access points and other network components need to be performed to detect any signs of deterioration, loose connections or overheating. Highway maintenance technicians also need to update software and firmware to the latest versions to mitigate vulnerabilities and enhance system security. Preventive maintenance proactively and promptly addresses potential disruptions, which reduces the chances of expensive repairs or replacements and minimizes the impact on productivity and connectivity.

Predictive maintenance, on the other hand, leverages technological advancements to foresee potential network disruptions by collecting and analyzing data from LAN and WLAN infrastructure components. Administrators can employ AI tools to predict and prevent network failures, ensuring uninterrupted operations and minimal downtime. Predictive maintenance techniques reduce costs associated with emergency repairs and improve overall network reliability.

Using data analysis and condition-monitoring techniques, this strategy can be used to predict when maintenance is required and to optimize resource allocation. Real time monitoring systems continuously collect data from the network infrastructure and analyze variables such as temperature, bandwidth usage, signal strength and network traffic patterns. By detecting anomalies or patterns indicating potential failures, highway maintenance teams can take preemptive actions to avoid unexpected downtime or interruptions. The use of predictive maintenance ensures that resources are allocated efficiently, as maintenance efforts are focused only on those components or areas that require attention.

HOW AI TOOLS AUGMENT PREVENTIVE AND PREDICTIVE MAINTENANCE

AI tools have revolutionized the way preventive and predictive maintenance is performed in LAN and WLAN environments. Machine Learning algorithms and data analytics (such as from logs or telemetry) offer actionable insights into network health and enable administrators to take proactive measures. Intelligent AI systems, which continuously monitor and analyze LAN and WLAN performance, can detect anomalies and patterns that may indicate impending issues.

AI tools can perform auto-remediation actions based on pre-set rules, minimizing human intervention and enhancing response time. As AI continuously learns from network data, it becomes more adept at identifying potential risks, saving time and resources in the long run.

MITIGATING SECURITY RISKS

An additional concern with LAN and WLAN networks is their vulnerability to various security threats such as unauthorized access, data breaches and malware attacks. Implementing preventive and predictive maintenance strategies alongside AI tools significantly mitigates these risks.

AI-powered intrusion detection systems can detect and isolate suspicious network activities in real time and prevent potential security breaches. As AI tools monitor and learn from historical patterns, they can detect anomalies and potential security risks not visible to traditional security systems.

AS AI CONTINUOUSLY LEARNS FROM NETWORK DATA, IT BECOMES MORE ADEPT AT IDENTIFYING POTENTIAL RISKS, SAVING TIME AND RESOURCES IN THE LONG RUN.

MANAGING HARDWARE RISKS

LAN and WLAN networks are comprised of numerous hardware components, making it crucial to mitigate hardware-related risks in a timely manner. Preventive maintenance techniques such as regular inspections, upgrades and replacement of outdated equipment can help prevent hardware failures that could disrupt the network. In addition, AI-powered asset management systems aid in effectively tracking and monitoring hardware components. By continuously analyzing historical data and predicting future requirements, these systems notify administrators of potential hardware risks, ensuring timely replacements or repairs.

THE BOTTOM LINE

When it comes to maintaining the efficiency, security and reliability of highway LANs and WLANs, preventive and predictive maintenance, along with advanced AI tools, are indispensable. The integration of AI tools facilitates early anomaly detection, secures against security threats and efficiently manages hardware risks, ultimately providing businesses and individuals with a seamless networking experience.

With regular inspections, servicing and predictive analysis, potential issues can be addressed before they become critical failures, improving the performance, security and overall lifespan of the infrastructure. Preventive and predictive maintenance strategies not only reduce costs associated with repairs and replacements but also enhance user experience by minimizing downtime and ensuring uninterrupted connectivity, contributing to efficient highway management and enhanced communications systems. ■

Learn more about Alcatel-Lucent Enterprise solutions:
- **Intelligent Transportation Systems (ITS)**
- **OmniVista® Network Advisor**

ABOUT HENRIQUE AMARO

Henrique is responsible for creating solutions, value propositions and content for the Transportation, Energy and Utilities sectors, supporting the global ALE sales team. With over 25 years of experience in the telecommunications industry, specializing in the data networking enterprise market, Henrique was part of the ALE International Solution Architect team, providing extensive support to sales and presales teams worldwide. His expertise includes end-to-end solutions, network design, network management and switching.

FUTURE MOBILITY PARK AND ALE TEAM TO DELIVER NETWORK INFRASTRUCTURE FOR AUTONOMOUS MOBILITY

Future Mobility Park (FMP) is the first one-stop-shop testing service for autonomous vehicles in the Netherlands. This is the playground for testing sustainable and innovative mobility solutions, with a wide range of progressive and inspiring use cases underway.

By **Esli Coenraad,** Data Presales Consultant, **Alcatel-Lucent Enterprise**

"SINCE WE WANT TO RECREATE THE SITUATION AS CLOSE TO REALITY AS POSSIBLE AT THE FUTURE MOBILITY PARK TEST SITE, IT IS IMPERATIVE THAT THE ENTIRE INFRASTRUCTURE IS FUNCTIONING AS A BACKBONE AND THE DATA IS HANDLED EXTREMELY SECURELY."

LUCIEN LINDERS, CEO, FMP

BUILDING A SAFE AND SUSTAINABLE URBAN CENTER

Next-generation Intelligent Transportation Systems (ITS) can reduce congestion and pollution and help people and goods get safely to their destination. Transportation departments struggle with their mission to provide safe, economical and effective transportation in the face of increasing traffic. The good news is that new technology such as the Internet of Things (IoT), Artificial Intelligence (AI), advanced proactive traffic management and emergency communications enriched with contextual information can alleviate congestion, reduce accidents and increase safety.

In the Future Mobility Park, tested applications include autonomous shuttles, buses, ferries, drones and a delivery robot, a Hyperloop train and AI camera testing to optimize road safety for all kinds of vehicles. Smart technology monitored remotely from a control center means the FMP team can simulate live scenarios to test new technologies and address anomalies, well in advance of introducing these autonomous vehicles onto public roads. For FMP and the Future Mobility Network (FMN) it is imperative to engage 'as a society' in smart mobility developments. A future where both humans and fully autonomous vehicles co-exist in urban centers will make the world more sustainable, safe, livable and simplified.

A MISSION-CRITICAL NETWORK FOR AUTONOMOUS VEHICLES

Alcatel-Lucent Enterprise is proud to collaborate with FMP and contribute to the future of ITS by providing the mission-critical infrastructure that supports smart services.

With connectivity between the control center and smart mobility services so crucial, ALE contributed LAN/WLAN and SD-WAN infrastructure solutions that are highly secure and fully redundant. This ensures a continuous stream of data from the autonomous vehicles, which best simulates a real-world environment with no tolerance for downtime as the Future Mobility Park test center must simulate real-life scenarios to identify and address issues.

Hardened Ethernet switches help FMP accomplish their mission because they are designed to run in harsh environments and provide cost-effective, worry-free setup and management, especially for challenging network edge environments in all transportation sectors. High-performance switches can securely connect cameras, sensors, Wi-Fi access points and more without headaches.

SECURITY OPTIMIZED FOR DATA TRANSMISSION

Future Mobility Park partnered with ALE to ensure the integration of all smart technology in the network. The backbone network ensures proper transmission of all data and provides optimal security when onboarding IoT. Redundancy ensures a seamless user experience, maintaining network connectivity even in the event of a problem.

To build the connected roads on the Future Mobility Park, several switches, access points and SD-WANs were deployed, providing a comprehensive and secure network backbone. Divided into several hermetic containers (Virtual LANs or VLANs), the network separates functions such as Lidar sensors, traffic lights, control room, network management, employee Wi-Fi and guest Wi-Fi based on macro- and micro-segmentation to improve performance and increase security.

Cybersecurity protection is also vitally important to preserve FMP data and integrity. The ALE solution uses secure, diversified code to improve network strength and provide added security against cyberattacks. Protecting networks from intrinsic vulnerabilities, code exploits, malware and potential backdoors is required when running mission-critical operations. ALE also provides IoT fingerprinting to identify each device, sensor and camera and ensure they do not pose security threats to the transport operator's network.

THE BENEFITS OF A SUBSCRIPTION MODEL

Future Mobility Park requires agility and flexibility to grow without high infrastructure investments and without shutting down the network for implementation.

Configuration provisioning is seamless and ongoing operational overhead is minimized by an extremely sophisticated monitoring and configuration tool, which enables the management of both ALE switches and third-party SNMP devices.

FMP is the first partner in the Netherlands to deploy its entire network using the 'Network as a Service' (NaaS) model. Based on an innovative subscription plan, NaaS enables the customer to increase or decrease the number of users in its network. The cloud management tool helps deploy and instantly scale the network in response to business needs.

To summarize, the overall solution includes the following components:

- An Ethernet Ring Protocol (ERP v2) ensures full redundancy of the network. In the event of a component failure, the network automatically reconfigures in less than 50 ms — a level of connectivity that will be mandatory for autonomous vehicles on public roads.
- Layer 2 and Layer 3 industrial, ruggedized switches are hardened for outdoor situations and harsh environments. They are configured in a virtual chassis, which enables smart integration with the traffic lights and guards' cabinet access using alarms and notifications.
- All IoT devices are automatically onboarded and classified through Universal Network Profile (UNP) features and a Unified Policy Authentication Management (UPAM) platform
- A zero trust network approach safeguards infrastructure against cyberattacks and breaches

The FMN and FMP team are working on innovations in autonomous mobility so it was imperative to provide the best possible infrastructure. The feedback we have received from the joint brainstorms is that we have been able to provide a solution that is as close to reality as possible and future-proof. ■

Learn more about ALE technologies for Intelligent Transport Systems (ITS).

ABOUT FUTURE MOBILITY PARK

Known as the place in the Netherlands for inspiration, meeting, testing and research of innovative mobility. An initiative of the Future Mobility Network (FMN), an organization concerned with how we will transport people and goods in the coming decades. Intended for governments, education and knowledge institutions and businesses.

Testing projects include:

- Control room for remote operations and monitoring
- Acoustic signaling at smart intersections for the blind
- Self-driving minibus called Haga Shuttle
- Hyperloop train transporting people and goods through a vacuum tube

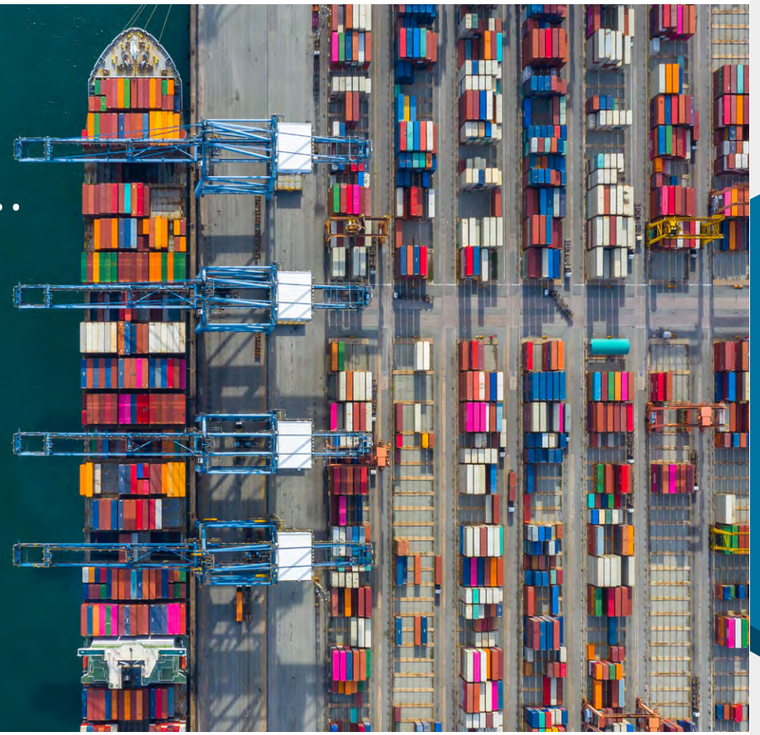
Visit **www.futuremobilitypark.nl/** for more information.

ABOUT ESLI COENRAAD

Esli brings to projects more than 15 years of experience in the Dutch market. He has worked with several vendors and has managed many installations and projects. Esli joined ALE in 2021 as a Presales consultant for Networking Solutions to support partners and advise customers on their solution choices.

Alcatel·Lucent
Enterprise

Your ports and logistics… **secured**



As ports modernize and become multimodal — linking sea, river, road, rail and smart cities — Alcatel-Lucent Enterprise provides the building blocks to connect everything, to improve:

- The safety and security of people and goods
- Operational efficiency
- The customer experience

The ALE intelligent LAN and Wi-Fi network secures your IoT, keeps employees and field workers connected indoors and outdoors with a hardened access layer, and leverages our best-of-breed communications and collaboration solutions — on premises or in the cloud.

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

For more information about our ports and logistics solutions visit us at www.al-enterprise.com/en/industries/transportation/ports or contact your local ALE account representative

#WhereEverythingConnects

SMART PORTS AND LOGISTICS

PASSENGER TERMINALS

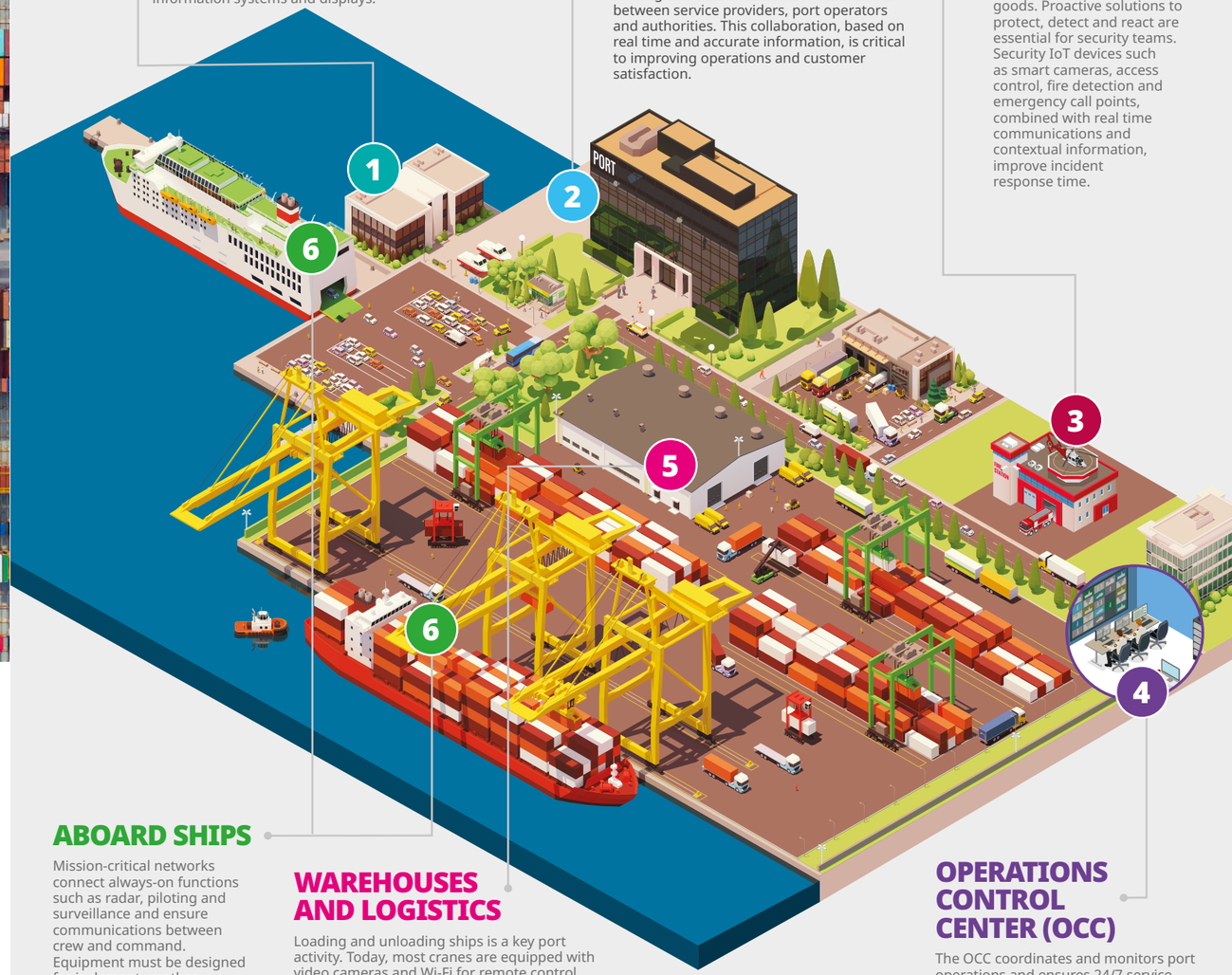
When embarking and disembarking at terminals, cruise passengers are eager for good Wi-Fi and connectivity. At the same time, staff and ship data must also be downloaded. A cybersecure way to differentiate between the two traffic types is critical. In addition, cruise ships can enhance the passenger experience with real time access to traveler information systems and displays.

CUSTOMS AND PORT AUTHORITIES

Customs ensures that goods comply with legal and regulatory requirements, while port authorities oversee port operations and logistics. Communications services such as Instant Messaging (IM), voice, video and file sharing can enable effective collaborations between service providers, port operators and authorities. This collaboration, based on real time and accurate information, is critical to improving operations and customer satisfaction.

PERIMETER SECURITY AND EMERGENCY

Ports are targets for illegal activities, including theft and vandalism, which disrupt operations and cause loss of goods. Proactive solutions to protect, detect and react are essential for security teams. Security IoT devices such as smart cameras, access control, fire detection and emergency call points, combined with real time communications and contextual information, improve incident response time.



ABOARD SHIPS

Mission-critical networks connect always-on functions such as radar, piloting and surveillance and ensure communications between crew and command. Equipment must be designed for inclement weather conditions, such as humidity and salt, and comply with DNV certification. The shipyard's environment requires high connectivity and efficient communications and collaboration tools to support industrial activities such as construction, maintenance and repair.

WAREHOUSES AND LOGISTICS

Loading and unloading ships is a key port activity. Today, most cranes are equipped with video cameras and Wi-Fi for remote control. Containers and materials are stored indoors and outdoors. The port is the hub where a constant flow of vehicles transports them to various destinations. In the warehouses, Isolated Worker Protection and Remote Visual Assistance services help field workers stay connected and protected from hazards. Collaboration tools can assist logistics companies with the complex process of service and transport bookings, which strengthens their customer relationships.

OPERATIONS CONTROL CENTER (OCC)

The OCC coordinates and monitors port operations and ensures 24/7 service delivery. Integrated communications improve collaboration and speed response times. A mission-critical architecture is key to protect against cyberattacks. Video is a valuable tool to enable the OCC to more effectively oversee all operations, improving efficiency, safety and security.

LEARN MORE ABOUT ALE TECHNOLOGIES FOR PORTS AND LOGISTICS

HOW COMMUNICATIONS AND COLLABORATION EMPOWER FIELD WORKERS IN PORTS AND LOGISTICS

Worker safety and security are major concerns in any industry and important elements of operational efficiency. The ports and logistics industry, in particular, can at times expose workers to high-risk, physical tasks or hazardous environments. As such, smart ports that leverage digitalization and process automation can reduce commonplace accidents and ensure efficient operations.

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

According to a 2021 Port Skills and Safety report, the top two most common port accidents in the UK from 2014-2020 were slips, trips, and falls at 37.8% and collisions with moving objects at 24.4%.

In fact, field workers regularly face challenges that put them at risk. The pressure to maintain service quality and operational efficiency, as well as long shifts without sufficient rest, may undermine the safety of operational tasks. This is exacerbated by the nature of solitary work in potentially remote or demanding conditions without real time communications and collaboration tools.

A CHALLENGING MISSION

In the ports and logistics industry, off-site workers are exposed to many kinds of tasks that put them at risk of slips, trips, and falls, fatigue, dangers associated with heavy machine operation, and exposure to chemical toxic agents. These tasks include:

- Load and unload ships, move heavy objects at warehouses, and work in extreme weather conditions, through night and day shifts, at great heights, and under suspended loads
- Work in confined spaces dealing with toxic, flammable and explosive gases, and potentially criminal acts such as trafficking

The isolated nature of remote work may lead field workers to feel demotivated or disconnected from their organization. This may also undercut their ability to properly deal with deadline pressures, which may increase the opportunity to take unnecessary risks.

PROTECT ISOLATED WORKERS

Real time communications solutions based on Isolated Worker Protection (IWP) capabilities and cloud-based applications designed for mobile devices are crucial to helping field service management minimize these risks. Based on a DECT infrastructure, the IWP capabilities are intended for both indoor and outdoor campus sites. The DECT handset enables constant monitoring of the field worker, triggers alarms when help is needed, as well as provides services for field-worker security risk management such as the man-down, red button, pull cord and explosion-proof capabilities for hazardous environments. Compliant with DGUV 112-139 lone worker certification, the DECT handset has features such as device switch-off prevention and alarm prioritization over other communications. In a scenario where a port worker perhaps fell unconscious after being hit by a heavy object, the DECT handset will detect lack of movement in either a horizontal or vertical position and trigger a man-down alarm that alerts control center staff to react.

ENABLE COLLABORATION AND REMOTE ASSISTANCE

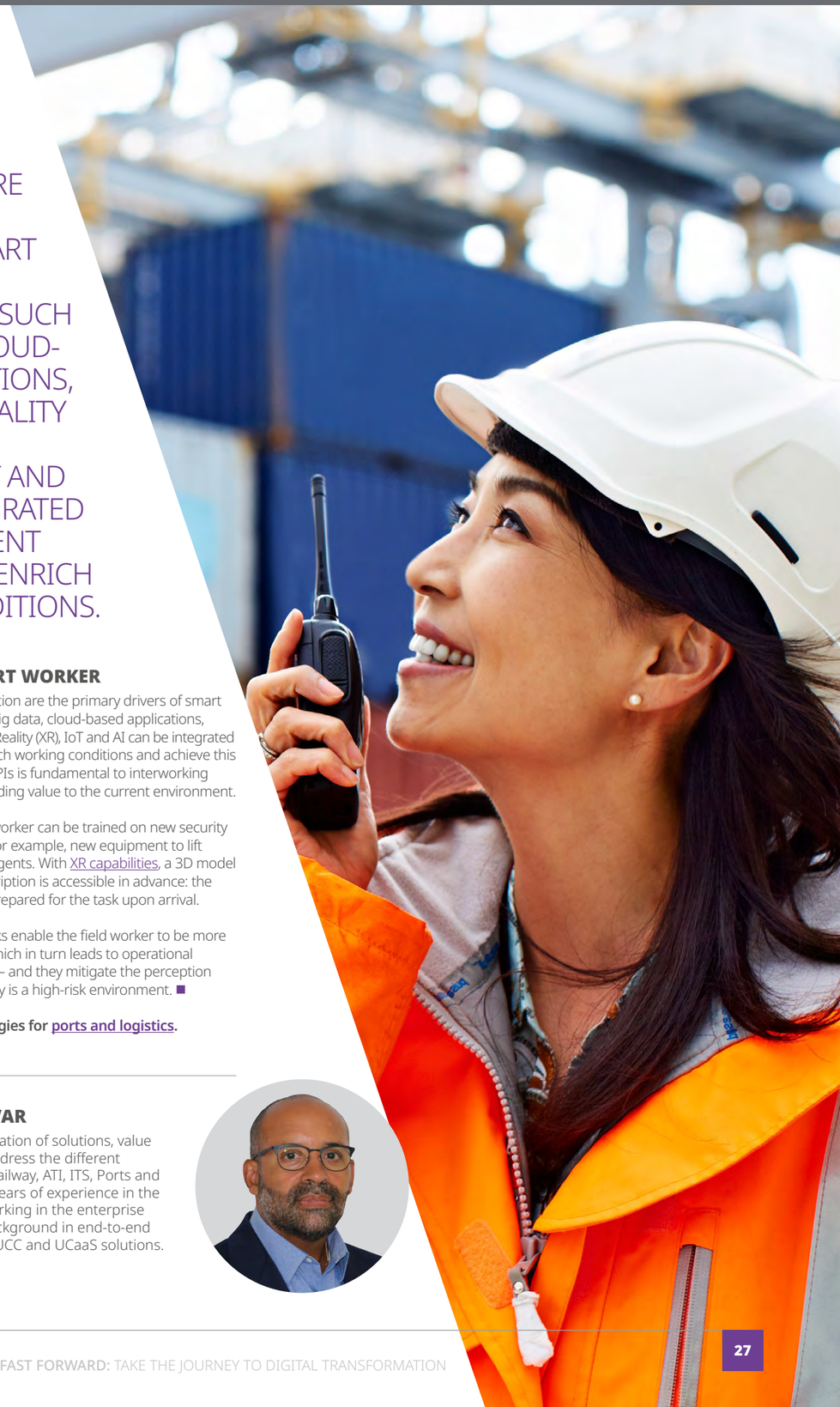
In the case of hazardous conditions or complex tasks — for example tasks in confined spaces with flammable or toxic gases or low oxygen conditions — the field technician may require real time assistance from a control center expert. With the cloud-based Remote Visual Assistance (RVA) and Rainbow™ Alert solutions, the expert can "see what the field technician sees" through a multimedia video session and provide instructions to safely complete the task. Staff can also share files, take pictures and record video offline to be uploaded to the server for tracking and training purposes. To prevent accidents in the case of a chemical leak, Rainbow Alert and interaction with IoT devices can promptly inform field workers. The OCC staff can trigger an urgent alert message when the sensors or IoT devices detect the risk and execute the evacuation or isolation plan.

IMPROVE TRAINING AND KNOWLEDGE SHARING

Preventing accidents and ensuring worker safety at all times are central to achieving the high levels of operational efficiency sought by the ports and logistics industry. Training is key as it will ensure the knowledge transfer needed to improve the expertise and efficiency of port workers.

Rainbow ClassRoom is a digital training and knowledge sharing tool that equips experts to deliver training through virtual and multimedia sessions. Rainbow ClassRoom keeps the field worker team up to date with new technologies, safety standards and recommendations, and provides access to concrete scenario examples they will deal with every day.

DIGITALIZATION AND PROCESS AUTOMATION ARE THE PRIMARY DRIVERS OF SMART PORTS. NEW TECHNOLOGIES SUCH AS BIG DATA, CLOUD-BASED APPLICATIONS, AUGMENTED REALITY (AR), EXTENDED REALITY (XR), IOT AND AI CAN BE INTEGRATED INTO THE CURRENT ECOSYSTEM TO ENRICH WORKING CONDITIONS.



THE FUTURE OF THE PORT WORKER

Digitalization and process automation are the primary drivers of smart ports. New technologies such as big data, cloud-based applications, Augmented Reality (AR), Extended Reality (XR), IoT and AI can be integrated into the current ecosystem to enrich working conditions and achieve this goal. The openness provided by APIs is fundamental to interworking between different systems and adding value to the current environment.

Imagine a scenario where a field worker can be trained on new security standards and rules concerning, for example, new equipment to lift containers or deal with chemical agents. With XR capabilities, a 3D model of the equipment or process description is accessible in advance: the worker can review it and be fully prepared for the task upon arrival.

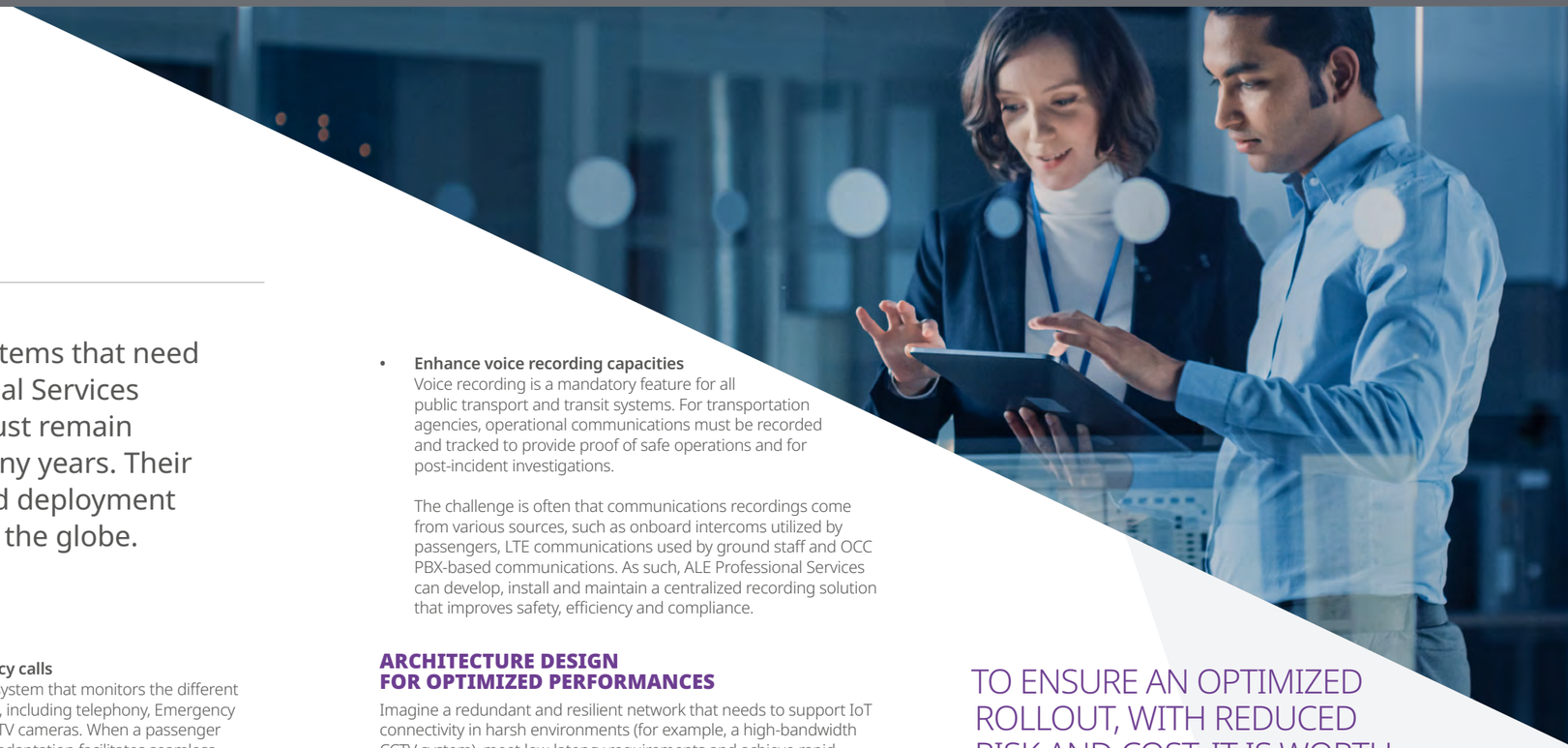
All these technology building blocks enable the field worker to be more efficient, productive and safe — which in turn leads to operational efficiency and corporate success — and they mitigate the perception that the ports and logistics industry is a high-risk environment. ■

Learn more about ALE technologies for ports and logistics.

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, Ports and Logistics. He has more than 15 years of experience in the telecommunications industry working in the enterprise market. Enrique has a strong background in end-to-end solutions, network VoIP design, UCC and UCaaS solutions.

ALE PROFESSIONAL SERVICES SECURE KEY TRANSPORTATION PROJECTS



Transport projects are complex, with many systems and subsystems that need to work perfectly together. Alcatel-Lucent Enterprise Professional Services understand this environment and design infrastructure that must remain fully operational in harsh and mission-critical conditions for many years. Their knowledge and experience enable them to mitigate risks, speed deployment processes and deliver successful transportation projects across the globe.

By **Frédéric Vogel,** Services Offer Manager, **Alcatel-Lucent Enterprise**

General contractors rely on different technology building blocks from different vendors to deliver turnkey solutions to the customer. To ensure an optimized rollout, with reduced risk and cost, it is worth engaging the supplier's Professional Services teams who have the skills and expertise to collaborate effectively with both the general contractor and the customer.

Professional Services span from design to implementation, including solution deployment, customer ecosystem integration, new application development or customization and long-term support. General contractors should select suppliers based on technology as well as proven field experience.

ALE Professional Services have this proven field experience. Below are some examples of where the ALE team has shown their expertise across application customizations and design architectures.

APPLICATION CUSTOMIZATION FOR SAFE AND EFFICIENT SOLUTIONS

Tailoring solutions involves teams of developers, user interface designers and technical coordinators who possess expertise in products, APIs and transport ecosystems. On top of that, transportation projects require hardware and software to remain operational for long periods of time — typically more than 15 years.

Through long-term support, ALE Professional Services are committed to ensuring the longevity of the solution, by maintaining the skills of the supporting teams with the appropriate expertise. Here are several examples where the ALE Professional Services deployed this approach.

- **Empower OCC communications**
  Transport operators rely on their OCC to ensure passenger safety. They seek to enhance the call handling efficiency at the OCC level, especially during emergencies. ALE Professional Services can implement a Dispatch Console to bring robust features including visual call handling, call queue management, conference setup and efficient call pick-up for OCC agents.

- **Accurately locate emergency calls**
  The OCC uses a supervision system that monitors the different communications subsystems, including telephony, Emergency Help Point intercoms and CCTV cameras. When a passenger needs assistance, a protocol adaptation facilitates seamless interconnections between all systems and provides the relevant location information that improves emergency response.

- **Quickly deploy emergency evacuation plan**
  A mass notification solution is a key asset for executing an evacuation plan. In the event of an emergency, the plan is activated from the OCC and actions are synchronized with an engagement dashboard, which allows for call prioritization and real time monitoring.

  ALE Professional Services can script the evacuation scenario and customize the web interface dashboard to give users full visibility and control during emergency situations.

- **Secure onboard communications for driverless trains**
  Unmanned trains require secure and robust mission-critical communications. ALE Professional Services provide the onboard telephony equipment to manage operational communications such as calls and text messages between the OCC and onboard intercom, as well as recordings of these communications. Security and robustness are based on built-in redundancy, allowing automatic switchover of SIP intercom communications.

  Such a solution was provided for Le Grand Paris initiative, with strong project coordination to reduce risk and secure the customer communications infrastructure.

- **Enhance voice recording capacities**
  Voice recording is a mandatory feature for all public transport and transit systems. For transportation agencies, operational communications must be recorded and tracked to provide proof of safe operations and for post-incident investigations.

  The challenge is often that communications recordings come from various sources, such as onboard intercoms utilized by passengers, LTE communications used by ground staff and OCC PBX-based communications. As such, ALE Professional Services can develop, install and maintain a centralized recording solution that improves safety, efficiency and compliance.

ARCHITECTURE DESIGN FOR OPTIMIZED PERFORMANCES

Imagine a redundant and resilient network that needs to support IoT connectivity in harsh environments (for example, a high-bandwidth CCTV system), meet low-latency requirements and achieve rapid convergence time. This network must accommodate specific requirements for rail signaling, security and operational technology networks (such as baggage handling systems) – all of which leads to heterogeneous traffic using multiple protocols.

Architecture design significantly influences the safety and reliability of a mission-critical system. It can mitigate risks while integrating the operational ecosystem and incorporating built-in redundancy and rapid network convergence.

ALE Professional Services network architects first analyze the applications running on the network and the criticality of their operations. Then they provide not only comprehensive solution designs but also recommendations and an implementation plan – such as provided to SBB, the national Swiss railway operator, for example.

Given how complex and mission critical these transportation network and communications architectures are, the ALE Professional Services team's expertise can bring greater confidence to general contractors around risk, schedule and budget.

At the same time, systems integrators benefit from the best technological building blocks well integrated into ecosystems, which maximizes solution usage. In the long run, the transport operator is supported throughout the lifetime of its transport system.

Overall, the ALE Professional Services team is focused on ensuring the smoothest project deployment for optimized operations. ■

Learn more about ALE Services.

TO ENSURE AN OPTIMIZED ROLLOUT, WITH REDUCED RISK AND COST, IT IS WORTH ENGAGING THE SUPPLIER'S PROFESSIONAL SERVICES TEAMS WHO HAVE THE SKILLS AND EXPERTISE TO COLLABORATE EFFECTIVELY WITH BOTH THE GENERAL CONTRACTOR AND THE CUSTOMER.

ABOUT FRÉDÉRIC VOGEL

Frédéric is responsible for creating service offerings to meet the business needs of different industry sectors such as railways in the build and operation of their network and communications infrastructure. He has held various positions in the telecommunications industry, in engineering and design, product management and training. Frédéric has a master's degree in electrical engineering.

THE GO TO MARKET
DON'T WASTE TIME DOING "THINGS" — FOCUS ON "THE RIGHT THING"

Vendors often struggle to take a position as a reference, but buyers often have trouble finding appropriate and reliable vendors. Products and solutions are important, but what do buyers really need to know to help make their decision?

By **Mauro Buratti,** Channel Sales Manager, Western Europe, **Alcatel-Lucent Enterprise**

When I was young(er), I used to face what I call "surgery job interviews": that type of grilling (which today seems terribly outdated and old-fashioned), in which, after loads of questions and answers, the interviewer asks "Why should we hire YOU?". Both interviewer and interviewee froze in that moment, because both sides knew that the whole outcome could change based on the answer to just one question.

That question was tricky at that time in job interviews, and it is tricky today too, but in a different context: selecting the right vendor partner for a transportation project. "Wait, what are you saying, Mauro? What do these two very different situations have in common?" Easy: it's me! I was there at that time, and I'm often engaged in transportation projects now (together with a multitude of colleagues, of course).

The same tricky question I faced years ago in interviews is often raised to a vendor by different actors (or buyers, if you like) from transport authorities and civil contractors to signaling companies, system integrators and design and engineering companies — and several more. But why is the situation so complex? And how should the vendor answer? Let's clarify a few other things before jumping to a conclusion.

WHY LARGE TRANSPORTATION PROJECTS ARE SO COMPLEX

Large transportation projects (the ones we all love to deal with) are a capital-intensive business. They need a lot of money to happen — and, sometimes because a large civil infrastructure is also planned, other times because the non-civil part is still huge by itself — the larger the project, the bigger the bag of money.

Here's a fun fact about those projects: they take ages to happen. As an example, the project I'm working on now was designed in 2020. (That wasn't even the first design, but let's simplify it.) We started working on the project in November 2023, and the first passenger won't buy their ticket before 2028. Why such a long time? Another easy one: because those projects impact the land and the citizens of a city, a region or a nation (when not international, which adds another layer of complexity). That causes a lot of interaction with local government, which slows progress.

The huge timespan is, obviously, not all spent on a single activity: there are companies that prepare a project feasibility study, companies that design the project, other companies that refine the design and finally companies that prepare the bid. Then come the bidders, and the party really kicks into gear!

Finally, to have the complete picture, all those companies often split their work into sub packages to ease the pain. For every package, they go to market for the most appropriate vendor. More time!

What do you think is the smallest package (in amount of money) of the whole project? It's the telecom package, exactly the one in which ALE tries to play an important role. Still good so far? Everything clear? Excellent!

Now that we understand the complexity, let's jump back to the second part of my initial question: "How should the vendor answer that loaded question?"

HERE'S HOW TO ANSWER

To be considered the right choice in this kind of market, a vendor must (not "should", not "could", not "shall", but MUST) be aware of its role, which is indeed critical but not the most important in terms of money. A vendor must be also aware that most large transportation projects happen in an international context. (Ironically, my current project is happening in Italy but was designed by a non-Italian company.)

Being as international as projects are is a big advantage for a vendor. It also helps to have open solutions and to leverage API openness to remain attractive for the largest number of projects. Certainly, it doesn't hurt to have a large Professional Services team able to customize solutions according to project needs. Many other "technical" advantages can also swing decisions in favor of a particular vendor, but again... In one sentence, to have success in this market, a vendor must learn the language, do the homework and be adaptable to its rules (however crazy they seem sometimes).

So, what answer am I suggesting vendors must give? Say it again and again: "We are flexible." ■

TO HAVE SUCCESS IN THIS MARKET, A VENDOR MUST LEARN THE LANGUAGE, DO THE HOMEWORK AND BE ADAPTABLE TO ITS RULES (HOWEVER CRAZY THEY SEEM SOMETIMES).

ABOUT MAURO BURATTI

Mauro has a multifaceted background with expertise in sales, marketing, business development and technology. He brings a strong ability to understand customers' "language" and feels most at home when connecting with different business cultures. Mauro loves working in businesses like Transportation, Energy and Contracting on anything that isn't mainstream.

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