Transportation Solution Guide

10 practical use cases to understand transportation challenges for today and tomorrow

Alcatel·Lucent

eBook

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All transportation infrastructures are mission-critical as they affect the lives and safety of citizens, passengers and the economy. People and businesses are always on the move, and transportation systems, whether it's air, rail, roads or ports need to keep them moving in a safe, secure and efficient manner.

This eBook addresses mission-critical communications and networks infrastructures for transportation. It presents 10 major challenges facing the industry and provides innovative solutions to address them.

Overview

Alcatel-Lucent provides the digital infrastructure to deliver the communications and network subsystems that connect transportation applications and processes.

With this foundation, our customers can:

- Transform the passenger experience
- Increase safety and security
- Improve operations while decreasing costs

The transportation environment is complex. It includes several subsystems involving different functional blocks. It is critical that these environments be supported with communications and network solutions that can interconnect all the functional blocks seamlessly and securely. Alcatel-Lucent solutions are equipped with a set of APIs to allow integration into all transportation subsystems.

Mission-critical architectures

Transportation projects, whether new construction or improvements to existing infrastructure, can take years to complete and cause major service disruptions. It is imperative that these projects address not only the immediate requirements, but also the requirements for the next 10 to 20 years.

Network solutions

- Mission-critical AI-powered and automated networks that automatically and securely connect people, processes, applications and objects.
- Secure and efficient onboarding of IoT devices using segmentation techniques that minimize the risk of having the entire network being compromised.
- Workflow automation that enhances productivity and enables new revenue streams.

Communications and collaboration solutions

- Highly available and scalable Alcatel-Lucent OmniPCX Enterprise Communication Server
- Multi-device compliant: IP, SIP, WLAN, IP-DECT, DECT, digital, analog
- On-premises, hybrid or cloud connectivity with Rainbow™ by Alcatel-Lucent Enterprise for collaboration features
- Contact center solution with intelligent voice call routing and 360° view of omnichannel interactions
- Encryption of communications and hardened software against cyberattacks
- Virtualized multi-instance architecture for private cloud
- Complementary solutions such as recording, notification server, API gateway and emergency server

Professional Services

At every step of the solution deployment, our Professional Services accompany transport customers and complement our Business Partners or System Integrators. A range of services are available off-the-shelf or tailored to specific needs, delivered on premises or remotely to better integrate our solutions and decrease risks.

Alcatel-Lucent solutions can be deployed for multi-purpose applications including:

Trackside or roadside

Connected assets are essential in the railway and Intelligent Transportation System (ITS) sectors for the management of daily operations and security incidents such as:

- Monitoring and guaranteeing Emergency Help Point (EHP) availability
- Reducing repair time and map faults
- Notification over multiple devices when any EHP fails
- Daily report generation
- SCADA integration

Rail and road tunnels

Tunnel operation is a critical activity as it involves working in potentially dangerous zones. Close collaboration between the Operations Control Center (OCC) and maintenance staff in the field is vital to:

- Ensure efficient maintenance operations
- Keep tunnel workers safe and secure
- Address issues and emergency incidents quickly

In most tunnels, especially longer ones, radio is the only viable way to communicate. Therefore, any communications system deployed in the OCC must be able to integrate or interwork with the radio communications system.

Connected stations and airports

Train stations and airports host numerous businesses that deliver a wide range of services across multiple operational areas. These businesses often have diverse connectivity requirements and user profiles, including customer service teams, control centers, ground handling staff, security contractors, commercial agencies, back-office personnel and many others.

Multi-service and multi-tenant services meet the specific needs of each entity. They may include operations management, radio communication interconnection, end-user kiosk integration, CCTV monitoring and emergency help point supervision. Security requirements—such as alarm notifications, emergency request and recording systems—can also be effectively addressed.

Connected ports and logistics

Ports comprise a large area—including warehouses, terminals and maintenance zones—where connected equipment must be controlled or remotely managed, 24/7, in all weather conditions. The combination of Wi-Fi and Private 5G interconnection helps ports, shipyards and logistics operators maximize ROI and reduce complexity.

Commercial services at terminals

From physical locations or through virtual platforms, customer-facing functions must provide efficient communication with passengers. The contact center and automated attendant play a key role in enhancing the passenger welcome and overall service experience, contributing to business success and strengthening the brand image.

Solution 1

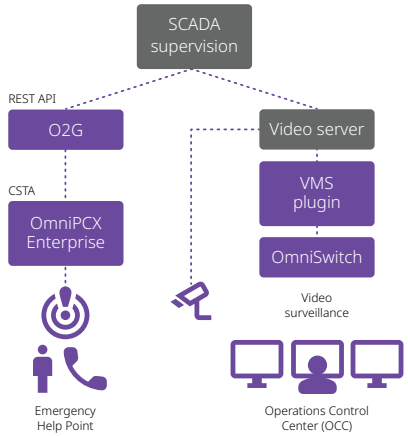
Synchronise video surveillance with EHPs

Improve control center efficiency and passenger security with synchronized video surveillance and emergency voice calls

Overview

In rail and metro stations, Emergency Help Points (EHPs) are installed on each platform to provide two-way voice communication between passengers requesting help and the control center. Visual coverage of the area surrounding an EHP enables control center agents to better assess and respond to emergencies.

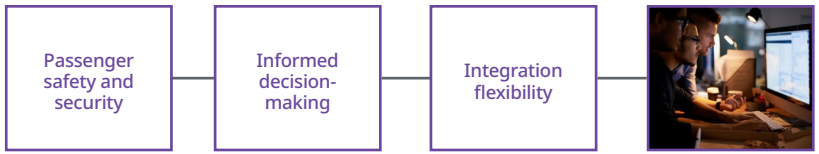
EHPs and video surveillance systems must be synchronized to enable operators to see and reassure the passengers with whom they are communicating. Cameras around the incident area must be controlled to get a clear, first-hand view of the emergency.



To ensure continuous availability of the video surveillance service, the operations team needs to quickly detect camera malfunctions and restore service.

The solution

The **OmniPCX® Open Gateway (O2G)** simplifies the integration between EHPs and video surveillance systems. The O2G monitors all phones in real-time and uses RESTful APIs to notify the video surveillance system and SCADA system when an emergency call occurs.



The video image from the corresponding area is displayed and recorded, regardless of the phone's technology.

With server-to-server integration, the video display is synchronized with the control center operator handling the call, even in call-forward or overflow cases. Our Professional Services can also develop protocol adaptation to provide information in the format and protocol expected by the SCADA system.

The **OmniSwitch® Milestone VMS Plugin** has been developed by Alcatel-Lucent to connect the Video Management System (VMS) with the switching infrastructure. This integration plugin makes it easier to monitor camera connectivity and status, diagnose faults and accelerate camera recovery, reducing troubleshooting time and limiting the need for field interventions.

Key differentiators

- Compatible with any emergency phone (analog or SIP)
- Ease of integration through RESTful API
- Optional protocol adaptation
- Faster camera troubleshooting and service recovery

What to order

OmniPCX Open Gateway with advanced telephony RESTful API

Professional Services for API coaching or protocol adaptation

OmniSwitch Milestone VMS Plugin

Solution 2

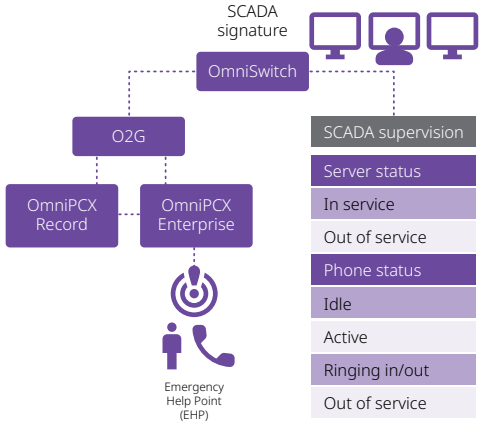
Integrate the telephony subsystem within the SCADA platform

Provide 24/7 EHPs by integrating the telephony subsystem with the supervision platform

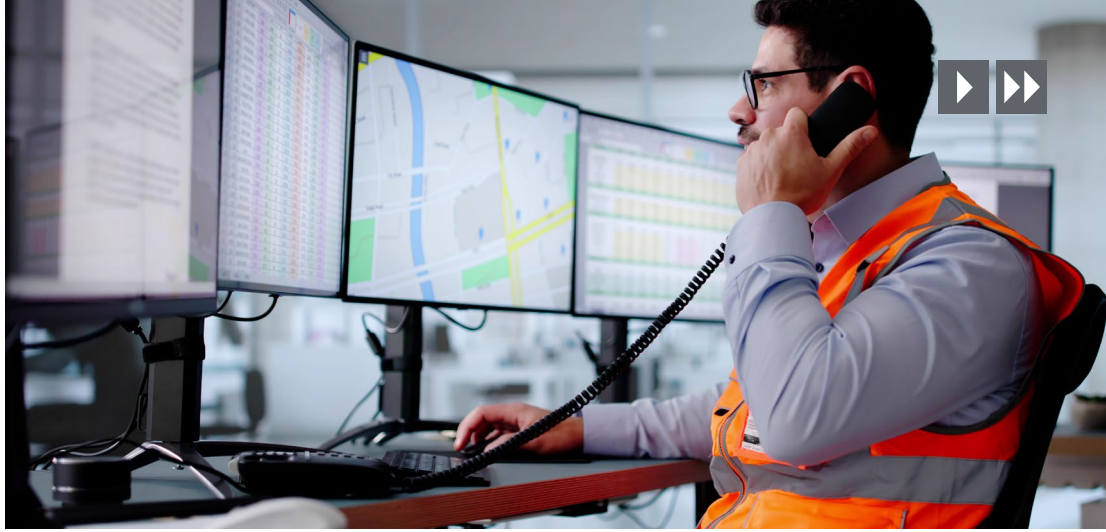
Overview

In transportation networks, the availability of EHPs is a key quality of service (QoS) metric and must be ensured 24/7. The control center must immediately be notified of any incidents in order to quickly plan maintenance operations and implement corrective actions.

The telephony subsystem must transmit the real-time status of all phones and servers to the SCADA system that supervises the overall transportation network subsystems.



To maintain reliable SCADA communications with the proper prioritization, the network infrastructure must be designed to recognize SCADA traffic and apply the appropriate policies, ensuring continuity and preventing operational disruptions.



The solution

The **OmniPCX Open Gateway (O2G)** provides the status of all EHPs, phones and servers from a single interface based on RESTful APIs.

Additional development can enhance O2G, including:

- Automatic testing of analog lines through periodic routines
- Phone status reporting via Simple Network Management Protocol (SNMP) for third-party devices (e.g., hardware status of SIP emergency phones including microphones and loudspeakers)
- Protocol adaptation to simplify the integration with SCADA or other supervision platforms

The **OmniSwitch 6860** can detect SCADA traffic using signature-based traffic recognition and automatically enforce the appropriate rules and policies.

Key differentiators

- Single interface for telephony and interphone subsystem
- Compatible with any phone: SIP, analog phones and Alcatel-Lucent phones*
- Optional protocol adaptation
- Signature-based SCADA traffic recognition with automatic policy enforcement (QoS)

(*level of service depends on phone type)

What to order

OmniPCX Open Gateway with advanced telephony RESTful API users

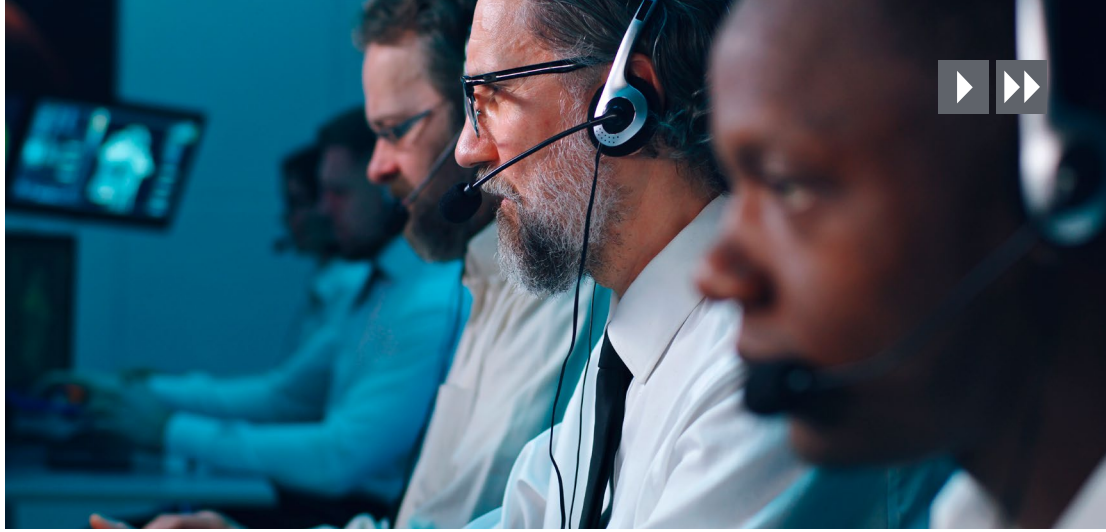
Professional Services for API coaching or protocol adaptation

OmniSwitch 6860 Layer 3 Multi-Gigabit Switch

Solution 3

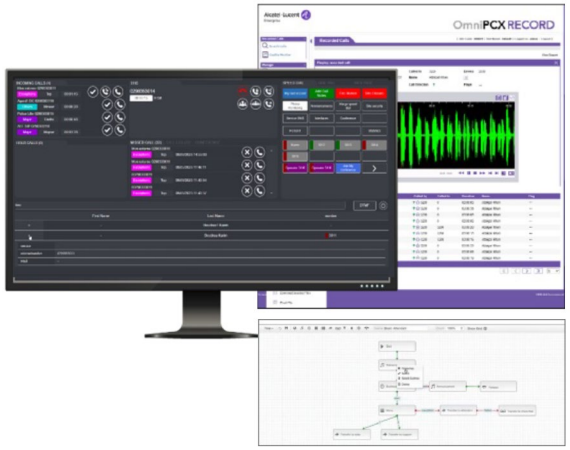
Enhance the emergency response at the OCC

Improve call management, process automation and regulation compliance



Overview

Modern OCCs must optimize communications to coordinate during crises, respond faster and make accurate decisions. Efficient call management, combined with reliable recording, is essential for service quality and regulatory compliance. Automated workflows are also key for processing event triggers, applying appropriate scripts and simplifying integration with other systems.



Solution

The **Dispatch Console** streamlines call management through a user-friendly graphical interface with a visual call queue, call prioritization, call pickup, conference setup and flexible routing options.

The **Visual Notification Assistant** orchestrates notifications for emergency and non-emergency incidents, collecting triggers and inputs from phones, alarms, IoT devices, HTTP requests or instant messages. Scripts defining triggers, rules and actions, are created via an intuitive interface without the need for programming skills. Notifications are delivered through broadcasts, conference calls, emails, SMS or HTTP interactions with other applications.

The **OmniPCX Record** supports risk management by recording and supervising incoming and outgoing calls, enabling review during incident investigations.
It ensures regulatory compliance and data protection through strict security policies, while quality monitoring helps identify improvement areas and enhance employee performance.

Agile emergency response

Ecosystem integration through open APIs

Regulatory compliance and data protection

Efficient incident management via process automation

Key differentiators

- Seamless integration into existing environments
- Highly customizable suite of applications
- High availability solutions for mission-critical communications
- Web interface accessible from PC

What to order

Dispatch Console

Visual Notification Assistant

OmniPCX Record

Professional Services for on-demand customization

Solution 4

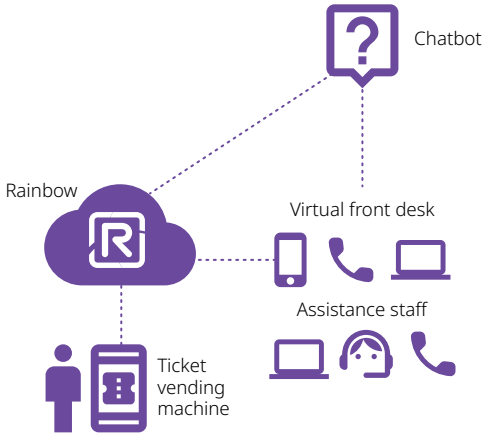
Enhance assistance at ticket vending machines and kiosks

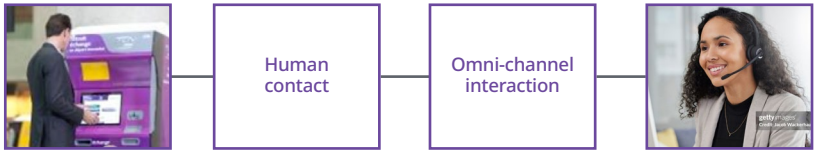
Improve passenger experience through real-time communications

Overview

Passengers increasingly value independence through their journey, whether buying a ticket, requesting itinerary information or booking a service. They use transport operator websites and mobile applications as well as ticket vending machines (TVM) and kiosks.

However, when problems happen, timely support through real-time interactions with transport operator staff can significantly improve the passenger experience.





The solution

A virtual desk enables passengers to connect with the assistance team or contact center agents through various media channels.

Rainbow by Alcatel-Lucent Enterprise provides a cloud Communication Platform as a Service (CPaaS), enabling the integration of communication services such as video and voice sessions, chatbots, document sharing and chat messaging into the TVM or kiosk applications. This integration streamlines the assistance process by eliminating communication barriers between passengers and staff.

ALE Connect empowers customer relationship management staff to handle a large volume of interactions across multiple channels—email, live web chat, social media and phone—while maintaining the quality and efficiency passengers expect.

Key differentiators

- End-user independence
- Remote assistance enabling a problem-free journey
- Contactless interaction
- Multimedia session assistance over any staff device (desktop, desk phone and smartphone) and any digital channel

How to engage

Rainbow Cloud Communication Platform

Rainbow CPaaS

ALE Connect

Professional Services for on-demand customization

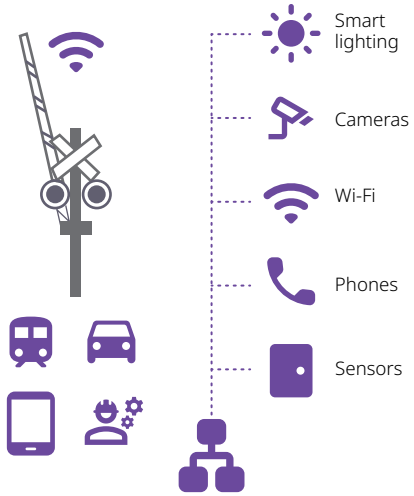
Solution 5

Ensure safety at rail and road crossings

Provide high availability, mission-critical network and communications infrastructure supporting multiple systems

Overview

Rail and road crossings are a major safety concern for train operators, ITS and local municipalities. Smart lighting, warning bells, traffic measurement sensors, signage, radar systems, emergency call systems and cameras are among the components that must remain connected 24/7.



Connecting all these systems requires a network infrastructure capable of delivering high-power Power over Ethernet (PoE) and supporting dry contacts for secure door locking of rail- and roadside cabinets. The infrastructure must also withstand extreme outdoor temperatures (both high and low) and provide centralized remote management and control.

The solution

Robust communications and network infrastructure provide mission-critical connectivity along railway tracks or roadsides, supporting the components required for around-the-clock monitoring.

The solution consists of a LAN and WLAN deployment at each rail or road crossing, with the following requirements:

- PoE and LAN connectivity for Wi-Fi, cameras and sensors
- Wi-Fi Access Points (APs)
- Emergency phones
- Dry contacts for alarm relay
- Geographical redundant communication infrastructure

Key differentiators

- Ruggedized Ethernet equipment
- Long-term support (10+ years)
- IEEE 802.3bt PoE (up to 60W)
- Alarm relay connectivity
- MACsec support
- Centralized communication system and management tool

What to order

OmniSwitch 6465 Compact Hardened Ethernet Switch

OmniSwitch 6575 Precision Industrial Hardened Ethernet Switch

OmniAccess Stellar AP1360

OmniVista 2500 Network Management System

OmniPCX Enterprise Communication Server

OmniVista 8770 Network Management System

Solution 6

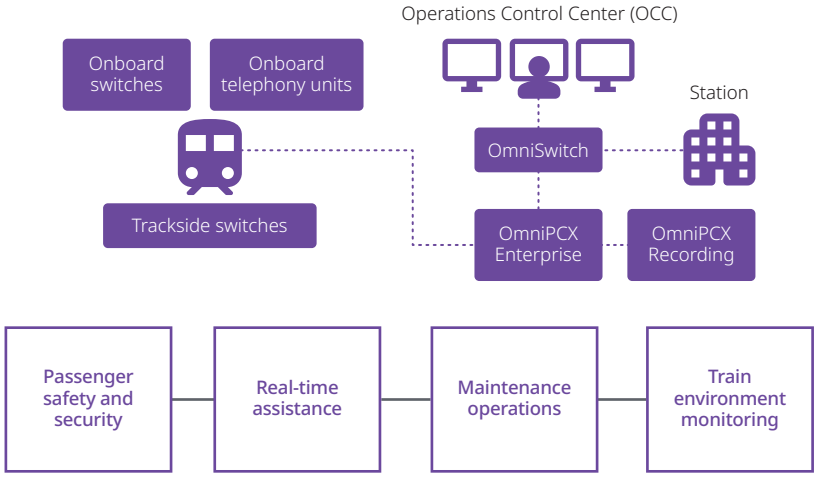
Secure onboard communications for driverless trains

Provide the essential assistant for safe and efficient automated operations

Overview

The railway sector continues to advance rapidly toward a fully automated future, also called driverless or unmanned trains—but ensuring safety remains a top priority for railway operators.

Enhancing operational efficiency and passenger safety is essential in scenarios where trains operate without onboard drivers and where real-time assistance is consistently required. Onboard telephony becomes a critical component, supporting maintenance activities, operational coordination and emergency response.



The solution

The communications architecture is divided into two parts:

- On the ground — **OmniPCX Enterprise** manages communications across the entire metro stations and operations control center. The **OmniPCX Record** captures communications both onboard and at the stations, including secret listening onboard.
- Onboard — **Embarked telephony units**, based on a SIP server, interconnect the EHPs and driver cabin telephony features and record calls if the link between the train and OCC is interrupted. A server orchestrator coordinates the telephony units, EHPs and interconnection with the hypervisor.

This architecture ensures seamless communication, call recording and operational control across both onboard and ground systems.

Key differentiators

- Always-on onboard telephony
- Reliable call recording
- Robust voice infrastructure

What to order

OmniPCX Enterprise Communication Server

OmniPCX Record

Professional Services for on-demand customization

Solution 7

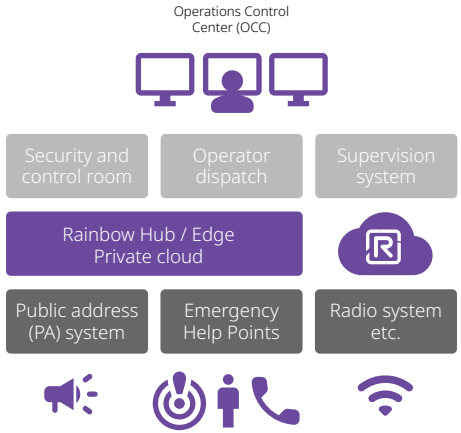
Integrate communications into the OCC ecosystem

Enable open, transparent interworking across heterogeneous third-party environments for efficient operations

Overview

The main challenge for general contractors is delivering a turnkey solution to end customers, composed of multiple functional blocks that must work together seamlessly. The OCC is a critical service unit where several applications are interconnected to manage operational activities and security incidents.

The solution must offer open capabilities to enable seamless integration within a heterogeneous OCC ecosystem while addressing security requirements, including emergency calls from passenger assistance and routine operational activities.



The solution

Rainbow Hub and Rainbow Edge are all-in-one platforms that provide operational communications and collaboration services, including video conferencing, file sharing, chat, group creation and CPaaS capabilities.

The private cloud deployment model (Rainbow Edge) enables customers to leverage cloud technology services while maintaining on-premises security.

This solution handles all operational and security communications systems, such as EHPs, Public Announcements (PAs) and onboard communication assistance. In addition, it includes call recording and seamless integration with monitoring and supervision applications, providing a complete end-to-end operational communication solution.

Key differentiators

- Flexible implementation cloud model
- Openness capabilities enabling easy integration in the OCC ecosystem
- Interconnection to third party systems

What to order

Rainbow Hub

Rainbow Edge Private Cloud

Solution 8

Enable private 5G for ports and logistics

Enable seamless connectivity for critical operations with Private 5G

Overview

Ports and logistics operators need reliable wireless connectivity across large outdoor yards and challenging indoor areas (warehouses, terminals, maintenance zones). Traditional Wi-Fi can struggle with outdoor wide coverage, mobility and interference, while public cellular networks often don't offer the level of control, security and guaranteed QoS required for business-critical operations.

Private 5G provides connectivity for mobile and mission-critical assets such as automated vehicles, yard tractors, cranes, handheld terminals and safety equipment—supporting latency-sensitive, always-on workflows. It also enables data-intensive applications such as high-definition video surveillance, IoT sensors and digital twin systems, delivering real-time visibility and faster decision-making across terminal operations.

The solution

Alcatel-Lucent integrates Private 5G into an end-to-end enterprise networking framework, combining LAN, WLAN and Private Wireless with a unified security approach.

The **Alcatel-Lucent Private 5G** network delivers secure, low-latency LTE/5G connectivity for critical systems, addressing coverage, mobility and QoS requirements in demanding environments. It complements Wi-Fi deployments and provides reliable connectivity in vast, uncarpeted outdoor spaces typical of ports and logistics sites, ensuring service continuity where Wi-Fi or public networks may fall short.

Key differentiators

- Interference-free spectrum for consistent, disruption-free performance in congested RF environments
- Low latency and deterministic connectivity to support real-time control and mission-critical workflows
- Enhanced security with SIM-based authentication, aligned with Alcatel-Lucent LAN and WLAN Zero Trust capabilities
- Scalable indoor and outdoor coverage for vast and complex environments (yards, terminals, warehouses)

What to order

Alcatel-Lucent Private 5G

Advanced Private 5G for Business-Critical Connectivity

Solution 9

Ensure effective coordination among multiple transport operators

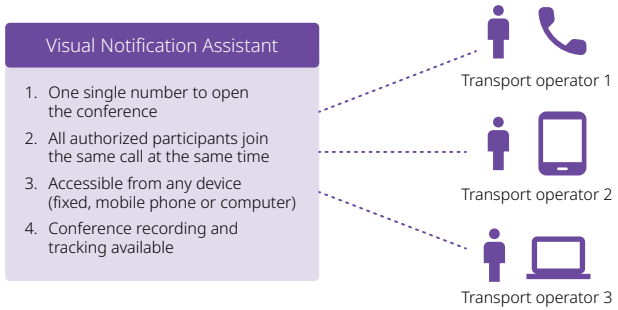
Facilitate information sharing and decision-making in multi-urban operator environments

Overview

The urban transport sector faces a significant challenge: bringing together multiple transport operators under the common goal to deliver a seamless and integrated service for passengers. The current context is marked by limited resources, skill shortages, cost optimization pressures and evolving passenger expectations.

Transport operators must collaborate closely and establish strong coordination mechanisms to maintain high quality services. Effective cooperation is essential.

Voice conferences play a critical role in operational coordination, particularly during service disruptions. They enable rapid information sharing as well as collective decision-making to implement corrective actions (onsite intervention, etc.) and restore normal operations as quickly as possible.



The solution

The **Visual Notification Assistant** orchestrates an emergency conference by automatically initiating a conference session with all authorized members whenever one of them dials the designated master number. Authorized calling numbers are pre-registered to ensure that only approved users can trigger a conference when required.

Each conference is recorded, and the recording is distributed to all participants to support process documentation and continuous service quality improvement.

Key differentiators

- Inter-operator coordination conference
- Real-time collaboration through emergency conference to reduce response time
- Transparent sharing of incident information between operators

What to order

Visual Notification Assistant

Project-based Professional Services

Solution 10

Converge OT and IT network connectivity across roadsides

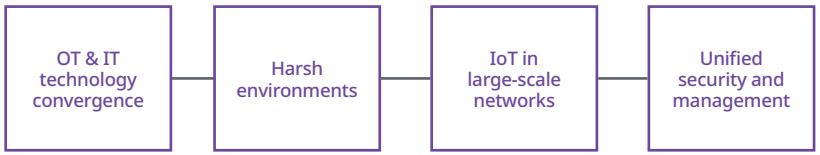
Deliver highly available connectivity for highway and roadside devices

Overview

Roadside assets such as cameras, sensors, traffic controllers, Variable Message Signs (VMS), weather stations, tolling systems and emergency equipment are widely distributed across highway infrastructure. These operational technology (OT) systems must operate continuously —often in harsh outdoor environments—while remaining securely interconnected with IT systems at traffic control centers and data centers.

Traditionally, highway operators have deployed multiple parallel networks, each dedicated to a specific system or vendor. This approach increases operational complexity, limits visibility and creates cybersecurity risks, especially as legacy OT systems become IP-based and connected to central platforms and cloud services.

To support modern and future highway operations, operators require a unified networking management approach that maintains physical or logical separation between OT and IT while providing centralized visibility, automated onboarding, micro-segmentation and robust cybersecurity—without disrupting existing brownfield infrastructure.



The solution

Ruggedized industrial switches deliver highly available connectivity for roadside devices, designed to withstand harsh environments while meeting long lifecycle and security requirements. Devices are automatically discovered, profiled and onboarded upon connection.

Traffic flows are dynamically classified and segmented through policy-based controls, keeping OT and IT environments logically or physically separated to reduce cyber risks.

Centralized management and AI-assisted monitoring provide real-time visibility and proactive detection of anomalies to help maintain service availability.

Key differentiators

- Unified OT/IT networking management architecture
- Automated device discovery, profiling and inventory
- Micro-segmentation and policy-based enforcement
- End-to-end visibility through centralized management
- AI-assisted network monitoring and analytics
- Long-term hardware and software support (10 years)

What to order

OmniSwitch Industrial Ethernet Switches

OmniVista Network Management System

OmniVista Network Advisor

Alcatel-Lucent OT/IT networking overview

We make everything connect by delivering technology that works for you

Our vision is to deliver the customized technology experiences our customers need. Our mission is to make everything connect by delivering digital age networking, communications and cloud solutions with services tailored for your business success.

In the Cloud. On Premises. Hybrid.

Alcatel·Lucent