SOLUTION PAPER

MOTOROLA

21st Century Airport Transportation Hubs

How wireless services-oriented networks are streamlining operations, lowering costs and enhancing profitability at 21st Century airports

How wireless platforming is transforming today's airports.

An airport is one of the most visible and important goodwill ambassadors for a city. After all, what forms the first and last impression of a city for thousands and thousands of air travelers every day of the year? The airport. It doesn't matter how large or small the city or where in the world it's located, the common perception of "good airport, good city" (or the converse) is a fact of life.

For weary travelers, there's not much worse than a bad airport experience. Flight delays. Lost luggage. Long lines at security check-points. Hard-to-find parking. Searching for WiFi connectivity. Wondering how secure the facility is. The truth is, no matter how sleek and contemporary its architecture and design, an airport is always going to be judged by its security, its service, and its capability to handle peak periods and irregular operations.

For airport operators and managers, it's crucial to alleviate these very real concerns. It's no surprise, then, that a growing number of airports around the world are turning to the emerging concept of wireless platforming to help increase performance, efficiency and security. They do this by migrating the airport's many disparate fixed station wired networks into a common use, interoperable, property-wide network system without all of the pain and expense of connecting each access point to a data wire. In airports around the globe, wireless platforming is proving its operational effectiveness, not to mention helping airports become the best possible gateways to the cities they represent.

The 21st Century Airport

Today, airports are more than just places to hop a flight, change planes or pick up a friend for a holiday visit. The fact is, because of issues such as increased security and more frequent and longer flight delays, people are spending more time and doing more things in airports. That's why the 21st Century airport is also a place for business, entertainment, shopping and dining. Whether the airport is owned and/or run by the city or the port authority or a private enterprise doesn't really matter. The idea of turning airports into commercially viable transportation hubs is already beginning to shape the thinking of airport managers worldwide.

GREAT EXPECTATIONS

Airports around the globe are seeking to improve security, find new ways of streamlining efficiencies, creating new loyalty solutions and offering enhanced services. To be successful, they must make major improvements. Improvements that reduce cost, converge services and promote scalablity for a growing number of constituents, all of whom have high expectations and low tolerance for ineffectiveness. Implementing these improvements at the lowest cost possible requires breakthrough thinking and technology.

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Today, airport managers are turning to highly available wired and wireless services-oriented networks to handle the broad variety of services today's constituents demand. Who are these constituents? Some are the public, whether passengers or visitors. Some are retail and commercial businesses. Some are the airlines that employ thousands of workers such as flight personnel, ticket agents, baggage handlers, air traffic controllers, ramp workers, security and safety officials, mechanics, maintenance people, administrative staff and more. What do these constituents expect? They expect everything. And they expect it fast, without a hitch.

SERVICES-ORIENTED NETWORKS

The reality is, in too many of today's airports, too many different constituencies have separate communications networks and platforms. That inevitably leads toward too many people spending too much time trying to use, manage and coordinate them all. That's where the services-oriented network comes into play.

In services-oriented networks, IT designers create an architecture that allows the common use of a core system of converged services including voice, video, real-time location services, deployed mobility and sensor arrays. These are used by virtually every application in the airport, and in virtually every environment – from control tower to terminals to maintenance to security. The benefits are significant: seamless high-speed connectivity and interoperability among all crucial constituents. The results are just as significant: faster, more efficient performance, improved airside and landside operations, enhanced security, reduced costs and higher customer satisfaction.

WIRELESS PLATFORMING

Wireless platforming – the concept of an airport operator migrating numerous disparate constituent networks to a single, interoperable, high-speed IP-based system – is gathering steam. The power and versatility of wireless networks enable airport operators to better serve the business, service and operations needs of each of its crucial constituents. The wireless platform approach eliminates the need for upgrading and deploying miles and miles of physical cable across the airport. Operators are replacing or extending difficult-to-deploy wired networks with equally powerful and reliable – but much less disruptive and much lower-cost – services-oriented wireless networks.

As airports begin moving to the transportation hub/destination model, they are finding that a wireless platform enables the network and its IT support to more closely align with the communications needs of every constituent – from the business organizations that run the airport to the commercial businesses and other constituencies that share the system. The wireless platform also facilitates the goals of passenger and cargo operations: the safe, secure movement of people, baggage and goods as fast and as efficiently as possible.

CITY WITHIN A CITY

Managing an airport is incredibly challenging. It's much like managing a busy, self-contained city. In this metropolis, there are distinct "neighborhoods," each with its own requirements and its own applications. The wireless end-to-end network allows airport management to ensure that each neighborhood – security, operations, maintainability and loyalty – meets its own individual connectivity and communications needs while interoperating effortlessly with the airport-wide backbone infrastructure. Services-oriented networks enable more efficient, more cost-effective management of these "neighborhoods."

Managing Airport Security

As movers of goods and people, airports are vital to a city's and a country's economic and social success and well-being. In today's complex global environment, establishing and maintaining safety and security throughout the airport is the single most important management priority. Airport protection is fundamentally a four-step process: prevention, detection, response and forensics for archiving and analysis of data.

MOTOROLA'S WIRELESS POINT-TO-POINT (PTP) SOLUTIONS

Motorola's PTP Ethernet bridges provide the information technology for backhauling data and video files and providing interconnectivity between two locations. Proven to deliver five nines availability and data rates up to 300 megabits per second (Mbps), our PTP networks provide carrier-grade reliability for transmitting large volumes of information in both licensed and unlicensed frequencies.

Security Technology Solutions

Threat detection and the capability of initiating multi-channel response are drivers in the airport security management. The wireless network enables real-time capabilities through a variety of advanced fixed, mobile, and application-specific functions. Among the most important are:

- **Command and Control Systems.** An end-to-end wireless system leads to a command and control infrastructure that provides for all voice, video and data to be backhauled to a centralized Command and Control Center for decision support and coordination of activities from a wide variety of resources. The command and control network enables real-time management of all security issues and facilitates voice dispatch, text messaging dispatch and computer-aided dispatch (CAD) systems to speed and optimize response.
- **Radio Systems for Emergency Responders.** Over the years, radio systems dedicated to two-way voice services have helped most airports coordinate the activities of emergency responders. Now, however, as airport police are seeing more and faster access to data and information in the field, many of these radio systems of the past are being augmented or replaced by updated digital systems. New digital radio technologies advance intelligence at the emergency responder and command levels and are critical in facilitating the force multiplier effect of effective communications.
- **Intelligent Video Surveillance.** Today's intelligent video cameras integrate with the services-oriented network to provide real-time images from perimeters and other remote or especially vulnerable areas of the facility. Video solutions can include infrared and thermal imaging for night surveillance. Video surveillance also contributes to more effective management of traffic into and away from the airport. In addition, today's video analytics and forensics capabilities allow for both real-time and post-analysis of data.
- **Mobile Data Communications.** Mobile connectivity empowers safety and security personnel to assess and address situations in real time through in-vehicle and handheld devices with data capabilities. The mobile network provides the ability to see or capture streaming video, is vendor- and frequency-agnostic, and compliant with Project 25 interoperability standards, allowing real-time communications with local police and other public safety organizations. Benefits include improved situational awareness, streamlined methods of calling for backup if and when it is needed, and tight integration with the on-airport CAD function.
- **Edge Sensors.** An edge sensor network layer enables the airport authority to monitor perimeters 24/7 and includes connectivity solutions for surface management systems, biological, chemical and radiological sensors, shot detectors, underwater systems, highway sensors, gate/doorway and other layered technologies that enable advanced intrusion prevention, detection and response. All of these technologies can be deployed on and off airport property and connected to centralized functions without wires.

The end-to-end wireless network functions as a basis for both strategic and tactical planning, enabling operations planning at the airport authority level, integrating with the airport operating committee. It provides a blueprint for combining divergent environments and creating a functional airport interoperability plan.

Managing Airport Operations and Maintainability

MOTOROLA'S WIRELESS POINT-TO-MULTIPOINT (PMP) SOLUTIONS

Our PMP networks use either licensed or unlicensed spectrum to deliver and support high-speed applications and connectivity. Airport operators use PMP networks to connect multiple locations at the airport and to facilitate collaborative interoperability from a specific building or facility, or in situations in which a number of locations need access to a common application.

AIRPORT OPERATIONS

Effective management of an airport's assets is about more than increasing productivity and efficiency; it's also about reducing costs. Access control and the ability to track personnel and assets are crucial for secure, efficient operations. High-speed services-oriented networks optimize airport operations by facilitating sophisticated access control solutions both in and out of the airport itself, and also for controlling access to restricted areas. In addition, wireless communications networks excel at the locationing and tracking of airport and airline personnel, vehicles and other assets to enhance productivity and reduce waste and cost.

Operational Technology Solutions

In most airports, asset control is driven by secure zoning, which is supported by powerful integrated, interoperable networks that enable control, tracking and locationing in each area of the facility. Today's most powerful operations applications include:

- **Access Control Systems.** Most of today's airports are divided into zones that are largely defined by security levels and supported by the airport network. In ascending security order, for example, zones might include parking facilities, the terminal, the concourse and the tarmac. Restricting access to these areas to authorized personnel is mission-critical for security and is supported by applications like electronic ID and badge systems, including biometric identification such as fingerprint reading.
- **Real-Time Asset Tracking.** Mobile equipment such as in-vehicle communications technology and applications such as asset tracking systems ensure the most productive use of mobile assets. To successfully manage mobile personnel and equipment, you have to know where they are at any given time. Whether you're trying to optimize the productivity of thousands of baggage trucks or provide fast service for passengers who need wheelchairs, for example, airports are making increasing use of network-enabled tracking technology such as RFID, tracking via GPS or Real Time Locationing Systems (RTLS).

- **Mobile Personnel Check.** To enhance overall productivity, it's crucial to improve individual worker effectiveness and operations efficiency. Through the use of technology ranging from vehicle-mounted computers to two-way radios to handheld computers, airport management can keep track of where virtually every worker is every minute of the day or night. Managing personnel through mobile connectivity is a proven method for maximizing efficiency, productivity and security.

In addition to helping manage physical and personnel issues, the broadband wireless network facilitates the transformation and management of business systems, allowing for interoperability of data and communications flow from virtually every airport constituency.

AIRPORT MAINTAINABILITY

Maintainability is one of the most crucial airport and constituent responsibilities. Proper maintenance of the airport's horizontal assets – runways and taxiways, buildings, electricity, water, fuel, piping systems and other physical assets – is crucial to both safety and efficiency. Constituent airlines, service contractors, and vendors must maintain plant, property, equipment and service environments in clean and functional conditions. Maintainability services require functional systems such as computerized maintenance management systems (CMMS), asset management systems, inventory management systems, and mobile field service that can take full advantage of services-oriented network layers.

Maintainability Technology Solutions

To optimize horizontal asset management, today's airports are making increasing use of advanced technology solutions that help reduce costs while increasing productivity and security. These include:

- **Inventory Management.** Through the use of electronic tagging and location-tracking systems, airports are able to use their networks to provide real-time management of virtually all assets and supplies used in airport activities. Results include better service, smoother operations, reduced costs and increased constituent satisfaction.
- **Maintenance Management.** Automated inspection of physical assets enables airports to proactively manage and maintain vehicles and equipment from water pumps to baggage carts to tools to luggage carousels and much more. Preventing equipment problems or breakdowns before they happen, ensuring proper condition and usage of tools, monitoring the flow of water and electricity and other proactive maintenance activities helps ensure safety, productivity and profitability.
- **Emergency Management.** Maintainability systems and locationing solutions enable faster, more efficient management of emergency situations by ensuring emergency personnel and equipment – including police and fire vehicles, mobile computers and handheld devices – are in working order and available when and where they are needed.

Loyalty Management

As more and more airports explore the airport "transportation hub" business model, an increasing emphasis is being placed on passenger, customer and constituent loyalty. Wireless networks enable a host of loyalty initiatives that help ensure not only positive airport experiences, but also ensure that people retain a positive impression of both the airport and the city. Loyalty solutions enabled by the wireless network encompass a wide range of airport services, ranging from concessions to parking to passenger experience to traffic management and a great many more.

Loyalty Technology Solutions

In the world of airport management, image and branding are becoming increasingly important. Clean, modern facilities and intuitive layout and design remain paramount, but improved amenities, easier-to-use services and unexpected benefits and comforts are influencing constituent, passenger and customer attitudes more and more. Technology solutions that blend commercial and communications solutions and facilitate more positive experiences include:

- **Parking Management.** Airport Parking Loyalty Solutions (APLS) are helping to streamline what was once one of the banes of airport service: parking. These solutions include such amenities as online reservation and payment systems, credit card and license plate recognition, preferred section service, automated vehicle location and seamless entry and exit.
- **Concessions Services.** Interoperability with concession, store and restaurant communications systems enhances customer satisfaction by providing information, directions and fast payment processing.
- **WiFi.** Airport operators, working in concert with airlines, are offering passengers and other customers the convenience of WiFi service. Some services are fee-based for generating revenue; some are offered free of charge for generating goodwill. Today, a growing number of airports are shifting to a marketing/ad-based model, which generates additional advertising revenues for operators and constituents while providing customers with complimentary WiFi service.
- **Wireless Messaging.** Airport wireless networks enable operators to offer their passengers the convenience of receiving informational text messages on their cell phones, alerting them with real-time information like "Shuttle will arrive in 2 minutes," providing electronic records of all airport purchases and more.
- **Payment Processing Solutions.** The convergence of mobile phone and payment processing technologies is a benefit to both concession operators and customers, making payment faster and easier. Wireless broadband networks also provide the capabilities of utilizing bold new technologies such as the "mobile wallet" phones that can read bar codes or can be swiped with a credit card.

MOTOROLA'S MESH WIDE AREA NETWORK SOLUTIONS

Motorola Mesh networks use WiFi and purpose-built MEA (Mobility Enabled Access) technologies to provide fixed and mobile IP-based communications solutions over a large area. Our Mesh Wide Area Network Solutions utilize 802.11/a, /b, /g as well as powerful new 802.11n standards. Mesh solutions enable the creation of ad hoc networks that give all constituents instant access to real-time information and the ability to communicate emergency information when necessary. With a mesh network, all airport constituents can transmit and receive information exactly when and where it's needed.

The Motorola Wireless Platform

The single most important aspect of wireless platforming is choosing and deploying the optimum IP backbone for the services-oriented network. That means making sure the IP network offers the capability, the reliability and the scalability to provide continuous improvement in every aspect of airport operations for years to come. It must be a highly intelligent network. Built-in network intelligence is crucial for leveraging the powerful "smart" equipment and technologies – from video cameras to mobile devices to CAD systems – of today and tomorrow. The network must have strong mobile capabilities to maximize work force mobility, track and monitor vertical and horizontal airport assets and enhance safety and security. It must also enable sophisticated Command and Control centers that serve as central hubs enabling airport management to control and coordinate operations indoors and out, perimeter to perimeter.

MOTOROLA'S LOCAL AREA NETWORK (WLAN) SOLUTIONS

Motorola's WLAN solutions provide airport environments with crucial indoor mobility and communications from offices to the control tower to hangars and maintenance facilities to constituent business offices. WLAN communications provide faster and more accurate communications between constituents and enable leading-edge applications ranging from barcode scanning to video analytics.

WIRELESS INDUSTRY LEADERSHIP

Motorola is a wireless industry pioneer and leader. We understand complex environments such as airports and seaports, and are respected global experts in designing and providing integrated wireless voice, video and data networks for a wide range of mission-critical public safety applications. Our wireless broadband portfolio is ready to help airports of all sizes move to a safe, secure, interoperable wireless platform quickly and affordably. Motorola's integrated network hardware and software solutions empower airport operators to improve security and service while reducing cost and increasing productivity.

Our wireless networks provide reliable broadband coverage under virtually any conditions inside or outside the airport. These include low-, medium- or high-density environments; open, obstructed and even non-line-of-sight situations; and indoor, perimeter and outdoor locations. Equally important to airport operations, they also provide proven, industry leading high-speed mobile connectivity services. Motorola's IP-based hardware and software solutions are vendor-and frequency-agnostic and compliant with Project 25 interoperability standards, allowing real-time communications with local police and other public safety organizations.

By leveraging Motorola's unparalleled wireless expertise and technology, airport IT professionals can design and implement a network that includes any or all elements of our wireless broadband solutions portfolio:

- **Services-Oriented Network Infrastructure.** Motorola is the first wireless provider that delivers end-to-end communications solutions both indoors and out. Our wireless broadband technology portfolio encompasses Point-to-Point (PTP), Point-to-Multipoint (PMP), Mesh Wide Area Networks

(MWAN) and indoor Wireless Local Area Network (WLAN) solutions. It also includes the One Point Wireless Suite that allows real-time remote management and monitoring of the entire network from a centralized control point.

- **Command and Control Centers.** The basic elements of highly efficient and effective centralized airport Command and Control centers are Motorola's automated IP dispatch consoles and CAD systems. In today's streamlined airport operations, these centers collect, correlate and analyze crucial security data, and distribute relevant information in real-time to improve problem detection and response. In addition, the centers are the hub of records management operations that include the storage and retrieval of video and other data.
- **Security Systems.** Motorola provides the highest levels of network security. Our enhanced outdoor network security solutions offer state-of-the-art encryption including DES, AES and WPA2 WiFi security, plus GPS synchronization and authentication technology. In addition, our powerful AirDefense solution provides indoor WLAN network security with 24x7 continuous sensing, intrusion protection, rogue termination, vulnerability management, troubleshooting capabilities and compliance with a world of regulations.
- **Ruggedized Equipment.** A great many airport operations rely on Motorola's two-way portable and mobile radios to provide mission critical communications networks with integrated voice, video and data supporting day-to-day operations and emergency response under even the most difficult conditions. Motorola is also an industry leader in providing ruggedized handheld computers that place powerful communications applications in the hands of mobile workers of all types where they need it most.

The 21st Century Airport Takes Off

Thriving, efficient airport operations are crucial to local, national and international economies. The need for increased security, more efficient operations and enhanced constituent service is leading to more and more airports adopting the airport as a transportation hub model and deploying Motorola high-speed services-oriented communications networks that enable and support it. Equally important, as airports around the world begin leveraging their powerful IP-based networks to increase security, productivity and profitability, they are proving themselves to be exceptional goodwill ambassadors presenting a positive image not only of the airport itself, but of the city it represents.

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MOTOROLA'S ONE POINT WIRELESS SUITE

The One Point Wireless Suite is an innovative set of software solutions designed to simplify the design, deployment and management of indoor WLAN and outdoor wireless broadband networks. With innovative unified, map-based network visualizations, the One Point Wireless Suite lets you see every network node at its actual location and manage your entire wireless network from one screen – including indoor and outdoor access, distribution and backhaul layers.

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