How to Make Your Wireless Networks Industrial Strength

A Practical Guide to Understanding the Fundamental Requirements for Reliable, High-Performance Industrial Wireless Networks
ARE YOU DEMANDING ENOUGH FROM YOUR INDUSTRIAL WIRELESS NETWORK?

Or is your current wireless network demanding too much from you? The reality is, too many enterprises have been content to use wireless communications technologies that aren’t designed to deal with the more demanding requirements of dynamic indoor and outdoor industrial environments. That usually doesn’t work very well, and it’s proving to be a significant issue that can adversely affect enterprise connectivity, reliability, productivity and profitability. It’s easy to see why.

More Demanding Requirements

Your industrial environments present a unique set of requirements not found in your carpeted spaces. Today’s industrial networks face a volatile and evolving set of difficult communications challenges. They must ensure persistent mobile connectivity for workers, vehicles and equipment.

Operate at peak efficiency in interference-riddled spaces. Offer flexible, pervasive coverage indoors and out. Survive and excel in extreme temperatures and under the harshest weather conditions. Provide for integrated, proactive network management. Above all, industrial networks must deliver mission-critical reliability no matter how challenging the environment.

Making the Right Decisions

The network decisions you make must take into account these and other challenges unique to difficult industrial environments like plants, warehouses, distribution centers, depots, yards, ports and more. It’s not hard to decide what you need from your industrial wireless network.

You need a network that assures maximum quality of service for your end users in your industrial spaces, providing the power and performance to make sure each line-of-business application and real-time conversation is supported with reliable, secure connectivity. You also know that this can be easier said than done.

Actionable Answers

The time is right to take a closer look at your current industrial network strategies and technologies and determine if they’re delivering the performance, security and productivity you need from them. In our companion paper, “Is Your Wireless Network Industrial Strength?” crucial questions were posed to point out the issues involved in ensuring that your wireless communications networks perform powerfully and reliably in highly complex industrial environments and under the most stringent conditions.

This guide provides actionable answers to those questions. It is divided into seven sections, each examining one of the fundamental challenges to creating successful, hard-working industrial wireless networks. Each section highlights some of the most important ways Motorola’s wireless technology expertise and innovation assures that your WLAN is truly industrial strength.
AS YOU BEGIN TO OPTIMIZE WIRELESS COMMUNICATIONS IN YOUR INDUSTRIAL ENVIRONMENTS, THE FIRST STEP IS CHOOSING THE RIGHT PLATFORM ARCHITECTURE.

Your goal should be to minimize network congestion and bottlenecks. The optimum solution is a backbone architecture with distributed intelligence. In typical wireless LANs, all traffic is routed through a wireless controller. That can be a problem; when traffic increases or spikes there can be significant controller delays, causing performance levels to drop substantially. In your industrial environments where latency, jitter and packet-loss are at a premium, you need a new type of architecture.

At Motorola Solutions, we’ve developed our WING 5 WLAN architecture to solve these congestion issues. The architecture is purpose-built to accommodate the 10-fold increase in traffic enabled by the 802.11n standard, as well as the 30-fold increase enabled by the new 802.11ac standard. It’s also designed to easily and cost-effectively handle the complex demands of the evolving industrial environment.

The WING 5 distributed architecture helps you segment and route your traffic to eliminate system outages, avoid congestion and bottlenecks and help you control and optimize bandwidth. Distributed intelligence is the key. By distributing controller intelligence to the access points, the architecture maximizes performance with low delay and latency, and improves network resilience by reducing or eliminating congestion and single points of failure.

Our WLAN solutions ensure business continuity while eliminating costly and painful downtime for industrial workers and staff. Reliable networking can be established virtually anywhere and almost instantly — even if the link to the controller should go down. This translates into greatly reduced administrative and maintenance costs and saves precious IT resources.

The result is substantially improved performance with applications that don’t stall, audio that’s crisp and clear, video that’s not jittery and mobile service that’s highly reliable for your business-critical line of business applications. The architecture also maximizes end user QoS throughout the network with smart, network-aware access points that intelligently and automatically determine the best direct routing paths.
2 CONNECTING IN CHAOTIC ENVIRONMENTS

UNLIKE THE CARPETED SPACE, INDUSTRIAL WIRELESS ENVIRONMENTS AREN’T RELATIVELY COOL, CALM AND PREDICTABLE.

They’re just the opposite and always in a state of flux. With constantly moving merchandise, manpower, equipment and vehicles, industrial environments can change their wireless characteristics hour-by-hour, or even minute-by-minute. These are dynamic spaces containing significant RF obstacles ranging from rolling stock to tractor-trailers to cargo ships being loaded and unloaded to steel-walled containers stacked seven high. Your network must be able to automatically adapt to these changing requirements.

Intelligent Connectivity
At Motorola, we’ve embedded innovative wireless technologies into our WiNG 5 architecture that help you overcome your most challenging connectivity issues. The architecture’s built-in SMART RF algorithm delivers outstanding interference mitigation, enabling the network to autonomously adjust its physical (e.g. power, channels, etc.) configuration to mitigate the impact of obstacles on wireless coverage and deliver exceptionally reliable service in real time. SMART RF is a multi-faceted technology that helps ensure connectivity in a number of critical ways.

Self-Forming Networks
It begins with initial configuration. During network setup and deployment, our Access Points (APs) empower the network to self-form and self-configure by automatically recognizing and learning from one another. SMART RF enables APs to accurately adjust power levels and channel assignments, eliminating gaps in coverage and minimizing co-channel interference. The result is simpler, faster network deployment, installation and configuration.

Persistent Connections
Today’s complex industrial spaces tend to be prone to constant change that can wreak havoc on wireless communications. This includes changes such as new or relocated equipment, temporary walls or structures and any other environmental changes within a facility that can drastically alter WiFi propagation.

The addition of new temporary wireless signals onsite, such as personal WiFi hotspots with cellular backhaul, can also disrupt the flow of traffic. The network sees these changes as sources of interference. With the SMART RF algorithm searching for interference every two seconds, the APs can dynamically adjust their power levels and channel plans whenever necessary, ensuring strong coverage and connectivity throughout the facility.
Self-Healing Reliability

Our industrial WLAN networks are also self-healing, able to optimize resiliency and availability in the event of a physical failure such as an AP losing power. SMART RF technology enables the network to immediately recognize that an access point has gone down, and to provide sustained backhaul of collected traffic via another AP or node. All neighboring APs automatically adjust their power levels and, if required, change their channel assignments to cover the RF space previously served by the downed AP.

Fast, Seamless Roaming

Industrial communications environments are increasingly empowered by mobile connectivity for workers on foot and moving vehicles that need session persistence to roam throughout the facilities, indoors, outdoors and to and from one environment to another. Our technology supports continuous connectivity for mobile workers’ devices, automatically forwarding credentials ahead to enable users to roam between APs without the need for reauthorization.

The network can also be configured to adjust its power levels dynamically so that a single specific device, a certain type of device, or any device running a particular high-priority application will maintain a minimum specified data rate as it moves throughout the site or facility.

With this SMART RF feature, the system automatically optimizes access point power to ensure signals won’t fade as those devices move farther away from any single access point, thereby protecting the productivity and satisfaction of the mobile worker. In addition, SMART RF is application-aware; when it detects voice clients, it automatically stops scanning to ensure continued connectivity with low latency and minimum delay.

Connectivity for workers on vehicles roaming within and across your industrial facilities is also crucial in the industrial space. Many of these vehicles, such as forklifts, are equipped with vehicle-mounted computers and move at moderate speeds between indoor and outdoor environments. MeshConnex complements SMART RF, and the two work hand-in-hand to ensure physical and logical settings for the network are optimized to support mission-critical wireless connections. Our MeshConnex routing engine provides for low hop latency, high-speed handoffs and proven scalability to support fast and seamless roaming from one AP to another.

Many vehicles may move at higher speeds of up to 50 mph or more. These are typically speeds that standard 802.11 WiFi networks normally can’t support. The MeshConnex algorithm combines with Motorola’s predictive analytics to ensure persistent connectivity, even for fast-moving vehicles or remotely guided equipment equipped with vehicle-mounted modems (VMMs) such as AGVs, hostlers and forklifts.
Extending Coverage

MeshConnex also allows you to extend reliable and robust coverage and connectivity to places that are hard to reach or where it is cost-prohibitive to run cables to the LAN. With MeshConnex technology, one of the AP radios can be used for servicing clients, while the other is used to backhaul data to a neighboring AP or node that’s connected to the LAN via Ethernet cable. The AP dynamically and proactively determines the best path to send and route traffic via adjacent nodes.

In the event of an external event that alters the connection between a meshed AP and its primary node, or if the node goes down due to a malfunction, MeshConnex quickly establishes a connection with the next best node. MeshConnex and SMART RF work seamlessly together to ensure maximum uptime with minimal disruption to business operations. This is all accomplished automatically, without requiring IT resources to manually update or adjust settings.

HOW IT WORKS

INDUSTRIAL STRENGTH PORT

A large container port was experiencing difficulties in providing reliable, high-performance signals with its traditional WiFi network. With signal-sapping obstacles like steel containers stacked high over a more than four square mile area and a dynamic environment of mobile equipment, vehicles and workers, interference issues were rampant and productivity was suffering. The port decided to deploy a powerful network that uses advanced meshing WiFi technology to reduce and even eliminate interference issues and signal problems to complement their overlay narrowband network that provides pervasive low data-rate coverage across the entire port. The result is seamless, more reliable mobile communications and significantly enhanced productivity and ROI.
HARD WORKING SOLUTIONS FOR HARD WORKING SPACES

INDUSTRIAL ENVIRONMENTS ARE HARDLY KNOWN FOR BEING NEAT AND TIDY.

They’re hard-working areas where dust and dirt can degrade performance and shorten useful life. Where temperature extremes can cause networking equipment to freeze or overheat, shutting down or disrupting service. And where humid conditions can cause moisture to seep into radios, not only degrading performance but often causing permanent damage. Although third party NEMA enclosures can help solve these challenges, they aren’t the only viable solution to consider.

Intelligent, Tough Technology
Motorola offers a wide range of industrial-strength access points that can be deployed in any environment: indoors, outdoors and everywhere in between. For example, in a typical cold storage application, APs must normally be situated outside the area due to their inability to withstand the extreme temperatures within the freezer or chiller environment. Organizations often resort to either trying to “blast in” WiFi from just outside the freezer, or they bifurcate their cold chain operations and run them in “batch mode,” which provides no real time access, updates or visibility.

At Motorola, we solve these issues with ruggedized APs that can be located inside a cold storage or freezer area. Purpose-built to work in extreme cold or heat, our radios have the ability to provide coverage within the most extreme indoor and outdoor environments, resulting in more accurate, real-time communications to protect employee productivity and safety, while also helping our industrial customers ensure product safety.

Plenum-Rated and Permissive-Change Flexibility
We offer APs that provide embedded self-contained environmental protection with ruggedized IP67 enclosures, eliminating the need to purchase third-party NEMA enclosures for use in harsh indoor or outdoor locations. Of course, using an AP that was designed for outdoor usage inside an industrial building isn’t as easy as simply hanging that AP in the ceiling. Two major considerations need to be accounted for when pursuing this approach.

First, is the need for plenum-rated casings to guarantee materials used in constructing the units comply with all indoor safety and environmental regulations. Second, is the requirement for permissive-change functionality that ensures power levels and channel frequencies can be adjusted in software to comply with FCC guidelines for indoor APs, which differ significantly from outdoor APs. Without meeting both of these requirements, deploying APs in particularly harsh or extreme indoor industrial facilities can be a risky and expensive proposition.
**HOW IT WORKS**

**COLD STORAGE CONNECTIVITY**

A distribution center with an extensive cold storage facility finds that in their freezers, where temperatures can reach -30°C or lower, indoor-rated access points are simply unable to function properly in sub-zero environments, sometimes even with NEMA enclosures. By deploying select Motorola outdoor APs that carry plenum ratings, provide software-triggered permissive change functionality and are inherently rated to operate to either -30°C or -40°C, the DC is now able to deliver outstanding performance in a wide range of temperature-challenged applications.
4 ASSURING CONNECTIVITY FOR MULTIPLE CLASSES OF DEVICES

REGARDLESS OF THE NUMBER AND TYPES OF DEVICES YOU USE, MOTOROLA WLANS HELP ASSURE PERSISTENT CONNECTIVITY.

As the industrial space relies more and more on mobile communications, your network must be able to support the multitude of mobile communications devices already on the market, not to mention the new ones arriving seemingly every day.

Our networks support devices such as powerful desktop and laptop computers, as well as ruggedized handheld and wearable computers, bar code scanners, RFID readers and even consumer smartphones and tablets. Although the ideal situation from a management and configuration standpoint would be to provide all mobile workers with uniform, industrial-grade handheld devices like Motorola’s MC75 handheld computer or ET1 enterprise-grade tablet, in many cases the reality is considerably different, requiring a broad mix of different device types for different workers, each optimized to their job function or task.

Power and Intelligence
Our thorough understanding of the intricacies of RF planning and connectivity enables Motorola’s industrial networks to take into consideration the RF power and connectivity issues inherent in the mobile devices of today and tomorrow. Mobile devices other than laptops—such as handheld computers and workers’ personal BYOD devices—often have considerably less transmit power and much lower receiver sensitivity, presenting significant roadblocks to connectivity. Most networks in place today were not designed specifically to support the different RF performance of these devices, and most wireless planning software today builds coverage and design recommendations not for these devices, but for higher-powered laptop computers. Your industrial network must be able to support a wide range of different mobile devices of differing receiver sensitivity and power levels, and that starts with the planning stage.

Claims about power performance of a network should relate not only to the strength of a wireless signal that will be seen by a device, but the device’s battery life as well. At Motorola, we assure power performance by building our extensive technological and networking knowledge and expertise into our industrial wireless solutions across both the network and device elements. When you operate most Motorola mobile computers on a properly configured Motorola WLAN, you can achieve a battery life improvement of up to 20 percent on those devices.

Smarter Sending and Receiving
Our SMART RF Autopower capabilities enable the network to automatically increase or decrease power from the AP. This enhances connectivity by compensating for different devices with different RF signatures, varying transmit power levels and disparate receiver sensitivities. Our intelligent access points are purpose-built with higher output power, advanced antenna design and robust receiver sensitivity, providing strong listening capabilities to recognize even weak device signals at the same time they mitigate the exceptionally high interference inherent in complex industrial environments.
ONE OF THE MOST CRITICAL CONSIDERATIONS AS YOU DEVELOP A NEW OR UPGRADED INDUSTRIAL NETWORK IS WHICH—AND HOW MANY—APPLICATIONS YOU PLAN TO USE.

Mobile communications. M2M automation. Data transmission. VoIP. Mobile streaming video and video surveillance. Perimeter security. As your applications portfolio grows, your need for bandwidth grows with it. With these common industrial applications—plus the growth of browser-based network access and cloud-based native applications—it’s clear that your industrial network will soon experience a major increase in traffic, if it hasn’t already. It’s also quite clear that office-grade network solutions will most likely be unable to deliver the robust, reliable and pervasive bandwidth you need, when and where you want it.

Because so many of today’s applications are bandwidth intensive—and because bandwidth is finite—it’s important to be able to manage your throughput efficiently and effectively. Our WiNG 5 WLAN architecture helps you segment and route your traffic to help you dynamically manage bandwidth so you’re able to deliver the right amount of throughput to the right application at the right time.

Client Connectivity
More and more of today’s applications, however, require larger amounts of bandwidth. Motorola WLANs enable you to prioritize traffic and place the highest priority on devices and applications—such as VoIP and streaming video—that demand the highest levels of bandwidth. IT administrators can specify minimum data rates an AP should sustain for particular client devices sending particular types of traffic. This means an AP will increase power as one of these devices moves further away from it, automatically sustaining the minimum guaranteed data rate and providing consistent levels of throughput in support of bandwidth-intensive priority applications. Our industrial wireless networks make certain your high-bandwidth applications avoid dropped packets by receiving the high levels of throughput they need precisely when and where they need it.
**Client Load Balancing**

Whenever a large number of devices—such as handheld computers, VoIP devices, readers and scanners—associate to the WLAN, one or more APs can choke from client overload unless there are algorithms in place to facilitate sharing the load among multiple radios. Competing vendors often set a hard limit to the number of devices supported by a single AP, regardless of what applications they are running. Video applications, for example, can demand anywhere from 5 to 10 Mbps, which can adversely impact other users associated with that access point.

With Motorola’s Smart Load Balancing algorithm, our industrial networks add intelligence that evaluates not only the number of devices, but also their data rates, the applications and bandwidth they are using and available AP capacity. With Motorola, the goal is maximized RF spectrum utilization.

**Client Band Steering**

Motorola WLAN networks also offer efficient client band steering, dynamically routing traffic to the best frequency, whether it is the 2.4 GHz or the 5 GHz band. Because 2.4 tends to be noisy, many networks automatically assign any device that supports 5 GHz to the 5 GHz band. That’s not always the best answer. The fact is, whatever the frequency, too many people using the band can still cause congestion.

Unlike many other systems, Motorola APs can be configured to steer clients based on ratios, looking at usage and actual device utilization and automatically steering a device to the most appropriate band and/or channel. This can substantially increase performance, and give network administrators complete control on segmenting the client base.

**Narrowband Applications**

Not all applications are bandwidth-intensive. Motorola understands that many outdoor yard and port applications don’t demand high data rates, but they do require reliable cost-effective connectivity over very wide areas. Our narrowband wireless networks and mobile computing technologies provide long-distance coverage, and enable you to extend low-bandwidth applications—such as text-driven applications like work orders or telnet sessions—to every corner of your most expansive industrial sites.

You can easily overlay our narrowbanding solution to your WiFi network. This allows you to have a highly reliable, exceptionally cost-effective solution for mission-critical but low-data-rate applications to the edge of your facilities, while still enjoying a complementary robust, high-bandwidth network at the core of your hubs and terminals.

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Multi-Tasking, Modular AP
Motorola innovation is also on display in our access points themselves, offering you the ability to support multiple band-unlocked radios—including a third radio that can be dedicated to monitoring—in the same enclosure. You can dedicate one radio as a network sensor for intrusion protection and detection on both 2.4 GHz and 5 GHz bands, while using the two primary radios for client access.

Additionally, our AP 8132 is the industry’s first modular access point, enabling you to plug different peripherals—such as video cameras, environmental sensors and more—directly into the AP, eliminating the need for running additional cabling or power cords or purchasing special wireless accessories for these devices.

Gap-Free Security
Today’s industrial environments are increasingly at risk. Many are vulnerable to serious security and reliability issues including physical perimeter breaches, network intrusion by hackers using rogue devices, compliance/ non-compliance issues and more. Motorola’s AirDefense Services platform is an industry leader in delivering gap-free security, network authentication and access control, sensor- and video-based monitoring, data encryption including FIPS-140 and compliance documentation.

Network Assurance
AirDefense is designed to maximize network reliability performance through its powerful WLAN management capabilities and ability to manage equipment from multiple vendors. AirDefense offers centralized network monitoring and troubleshooting to help identify and fix physical or technology issues before they affect the overall network or, even more importantly, the productivity of the workers at your industrial sites. For example, Network Assurance can actually use the radios in your APs to test one another before a shift starts, mocking one of your devices trying to associate to the network and access a particular application.

If any step in that process fails, a detailed alert will be generated and sent to the identified expert responsible for that device, that network or that application. In this way, the necessary troubleshooting and changes can be made before the potentially affected worker starts his shift and would otherwise have experienced this failure himself.
The AirDefense platform also offers historical data capabilities that include detailed forensics. It provides real-time network visibility and powerful management tools such as remote monitoring and testing, performance and intrusion alarming, centralized live network view, spectrum analysis and many more.

Our RadioShare technology improves the network assurance cost-to-performance ratio for our WLAN networks. RadioShare allows a radio on the AP to perform double duty. Not only does it handle clients, but it also acts as a sensor for applications that typically do not require full time sensors. This minimizes the need—and cost—of having separate APs, supporting Power-over-Ethernet (PoE), while at the same time increasing network functionality and monitoring.

When RadioShare is enabled, the continuous stream of data collected by infrastructure radios is passed to the network assurance software module for processing, and for access to a powerful management toolset that includes remote, real-time and historical troubleshooting, spectrum analysis, forensics and testing. RadioShare software works at the AP level, improving efficiency while eliminating the need for—and expense of—deploying a separate sensor network or purchasing APs with extra radios dedicated solely to these management and troubleshooting tasks.

**Complementary Services**

Here’s the big question. Do you have the internal IT resources you need to design, implement and manage an industrial strength mobile wireless network that optimizes network productivity and value? If you’re not sure of the answer, it may make sense to explore the wide range of flexible services options from Motorola for your industrial wireless network. Combining our leadership in mobile technology with our deep knowledge of the industrial wireless space, Motorola is an industry leader in providing efficient, cost-effective services that ensure maximum WLAN value while allowing you to concentrate your internal resources on strategic business initiatives and management.

You can choose to utilize them individually or in a comprehensive total network management solution. We offer a wide range of industrial wireless network services including WLAN planning and design, network security, mobile application integration, wired/WLAN network integration and a portfolio of robust managed services such as network assurance, mobile device and application management, regulation compliance, troubleshooting, network evolution and many more. Alternatively, many of Motorola’s highly skilled, certified channel partners offer similar service and support solutions for designing, installing and managing an industrial wireless network on your behalf.

**How It Works**

A mid-size manufacturer with an older industrial wireless network wanted to boost productivity by deploying a new state-of-the-art wireless communications solution. The issue? The organization’s IT staff was small and lacking in high-level wireless expertise. Rather than add expert personnel to their department, the company decided to take advantage of Motorola’s managed services; first to plan and deploy the new network, second to provide total network management services. The result is a flawlessly performing industrial network, obtained with significantly less CAPEX and OPEX—and with substantially higher performance—than if they had attempted to plan and manage the network internally. Savings from the project (both in terms of budget and resources) can now be deployed to add new capabilities and unlock value for the business and its customers.
7 REDUCING COMPLEXITY WITH A UNITED CORPORATE WLAN

IT’S EVIDENT THAT INDUSTRIAL ENVIRONMENTS REQUIRE TOUGHER, MORE RELIABLE, HIGHER-PERFORMANCE WIRELESS NETWORKS THAN THE CARPETED SPACE.

So is the answer simply to have a bifurcated network, with one system for office space and a different system for industrial environments? Some organizations may choose to go that route, but separate networks like these generally only add cost and complexity. A better, more efficient solution is to create a powerful single network you can optimize for both locations.

**Split Personality**
 Basically, you need a network with something of a split personality. First, it must excel in the more predictable, less volatile carpeted world of business-driven applications such as high-speed data for e-mail and teleconferencing via VoIP. Second, it must be hardened and powerful enough to function flawlessly and reliably in the complex, RF-challenged, indoor/outdoor world of today’s industrial spaces. The truth is, industrial wireless expertise is about much more than simply enclosing office-grade equipment in NEMA enclosures. It’s also about providing pervasive coverage and mobile connectivity that delivers faster roaming, stronger security and more cost-efficient redundancy to assure connectivity, reliability and availability.

**Industrial Innovation**
 Our portfolio—including ruggedized APs and controllers—is purpose-built to deliver the performance and reliability you need to enable bandwidth-rich applications even under extreme industrial conditions. Innovation is the common denominator. Our solutions are currently delivering high performance in environments ranging from automated plant floors to large-scale distribution centers to the unpredictable outdoor spaces of yards and ports.
Unified Network Management

One of the most important considerations as you contemplate a unified corporate network is the ability to manage the entire network—office space and industrial environments—from a single, centralized control center. Our cost-efficient AirDefense management software gives you real-time, 24/7 visibility of your entire network, enabling you to proactively monitor, troubleshoot, repair, secure and streamline network assurance and performance. Wireless Manager helps you maximize uptime and productivity while lowering your Total Cost of Ownership (TCO).

Wireless Leadership

As this report makes clear, planning and implementing truly industrial strength networks is a complex undertaking that requires leadership and experience and demands a history of delivering excellent results. Of course, finding a proven network solution that is equally strong in the office and the yard can be a difficult task.

There are many wireless network providers whose expertise is focused on the carpeted space. There’s a smaller number that offer expertise in complex, RF-challenged industrial networks for both indoor and outdoor locations. There’s only one that can truly do both. At Motorola, we are an industry leader in offering in-depth expertise, advanced technology and a proven track record in both office-grade and industrial strength wireless solutions, enabling us to provide you with advanced and comprehensive unified networks across your entire enterprise.

INDUSTRIAL STRENGTH PARTNER

As you look to enhance the efficiency and agility of workers across your industrial sites and facilities through the deployment of wireless mobility solutions, it’s critical to have a trusted partner with the portfolio and demonstrated performance that can make it all a reality. At Motorola, we’re ready to help you with the expertise, the technology and the innovative solutions that will ensure that your industrial and unified wireless networks are fundamentally sound, empowering them to deliver the value you need throughout your enterprise.

FOR MORE INFORMATION VISIT
www.motorolasolutions.com/industrialwireless

MOTOROLA LEADERSHIP SERIES

This paper is one of a series examining the challenges, the opportunities and the realities of how wireless communications innovation is transforming the enterprise.