WHITE PAPER

OPTIMIZE PLANT COMMUNICATIONS FOR A COMPETITIVE ADVANTAGE

MOBILE INTEGRATED VOICE AND DATA DRIVES INCREMENTAL GAINS IN LEAN MANUFACTURING

MOTOROLA

EXECUTIVE SUMMARY

In order to remain cost-competitive and maximize their profits, today's manufacturers have made operational efficiency one of their top priorities. Many manufacturing companies have embraced the term "lean manufacturing" as a strategic imperative, using the principles of continuous process improvement as a cornerstone of their businesses.

And many manufacturers recognize that mobility plays a key role as a foundation for boosting the impact of lean initiatives. According to the 2011 Motorola Manufacturing Barometer survey, 87% of manufacturers recognize the increasing importance of mobile technologies.

In this white paper, we look at the role that mobile communications can play within a manufacturer's operations in support of lean manufacturing goals at a time when innovation is an imperative for survival, even with limited resources. The demand for mobile voice and data communications can now be satisfied through a range of innovative technologies that can help manufacturing companies increase operational efficiencies via real-time visibility, connectivity and control. These technologies provide employees with mobile solutions that deliver the specific communication capabilities they need to promptly and effectively perform their jobs. By giving each employee the information he needs where and when he needs it, delivered in the most appropriate manner, an organization can improve its overall ability to intelligently monitor, know and act on increasingly stringent customer, regulatory and operational demands.

Mobile communications can play an important role in supporting lean manufacturing goals

EVOLUTION OF PLANT COMMUNICATIONS

Over the course of time, manufacturing companies have experienced a proliferation of wired and wireless communications technologies to support the ever-changing needs of the operation. Initially, plant communication needs centered on voice connections — both internal and external to support standard business functions. In addition, a focus on ensuring employee and facility safety and security was paramount. In support of these needs, manufacturers deployed:

- A PBX or office phone systems to enable employees to place and receive calls both internally and externally.
- Private two-way radio systems to ensure instantaneous connections through individual or group calls for mission- or business-critical situations such as unplanned production downtime or situations involving employee or facility security.
- Paging systems that analyze the statistical process control (SPC) data stream from plant equipment to provide wireless alerts to key personnel regarding situations such as an individual piece of equipment in danger of malfunctioning or trending out of tolerance.

It's common knowledge that today's manufacturers need more than voice communications and message alerts to effectively manage their operations and meet the increasing need to reduce costs, improve productivity, ensure quality and maintain accurate records to meet regulatory compliance. In order to stay competitive, most have looked to mobile and wireless solutions to automate manual processes, streamline data collection and provide access to real-time information. Satisfying these requirements has often led to the addition of an even more complex array of wired and wireless networks and devices including:

- Cellular or Wide-Area-Network (WAN) systems and devices for on-the-go employee access to voice and business data applications such as email.
- Wireless Local Area Networks (WLANs) that enable mobile data capture technologies such as bar-code scanners, mobile computers and RFID readers to access and update business systems with real-time information

Advancements in the performance, reliability and security of today's wireless technology have previously reluctant manufacturers turning to WLAN and mobile devices to meet the demand for real-time information in a considerably more cost-efficient manner than running fiber or copper cabling. According to the Motorola Solutions Barometer study, 40% of manufacturers who have deployed WLAN expect to fully upgrade to 802.11n by the end of 2012 primarily driven by the need to improve throughput and reliability, and extend range to support greater data volumes and increasing mobility of the workforce.

Access to email and other productivity-enhancing applications traditionally running on consumer PDAs are being replaced with rugged hand-held computers that offer additional functionality such as bar code scanning or RFID reading. While consumer devices are designed to use service providers' cellular networks for connectivity, enterprise-class devices such as rugged mobile computers and tablets can subscribe to cellular networks and/or take advantage of the WLAN, thereby avoiding costly airtime and subscriber charges in a form factor more conducive to the industrial environment.

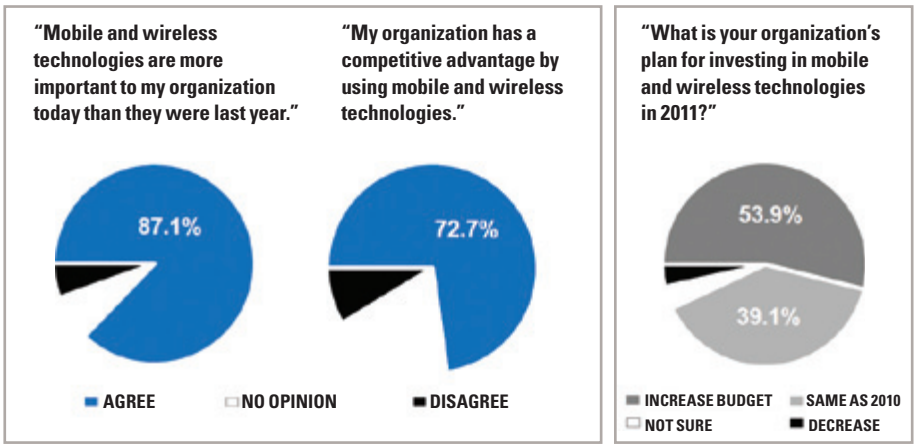
Employees use a range of wireless devices to support different job functions.

RISE OF MOBILITY APPLICATIONS

Mobility has proven to deliver the expected productivity benefits by automating manual processes and enabling real-time access to information. As seen in the figure below, over seven in ten decision-makers surveyed view mobile and wireless solutions as a key contributor to competitive advantage.

MOTOROLA SOLUTIONS BAROMETER 2011 — MANUFACTURING

RISING IMPORTANCE OF MOBILITY



N=535 (Manufacturing, NA and EU)

Manufacturers recognize the increasing importance of mobile technologies (87%) and the competitive advantage for their business (73%); the majority (54%) are planning increased spending on mobile and wireless technologies in 2011.

A critical example involves programmable logic controllers (PLCs), the "brains" that control production machinery for many types of manufacturing operations. Traditionally operators have moved back and forth throughout their work day between the line and a desktop computer to interact with the automation system, where they could enter and access data from inspection information and alarm codes to performance indicators and maintenance schedules. By making connectivity to the automation systems available

through a mobile data device, operators no longer need to leave the production line to perform business tasks, providing a considerable boost to operator efficiency.

The addition of Voice-over-wireless LAN (VoWLAN) essentially operates as another software application running on mobile data devices, providing functionality similar to that of a cellular telephone. VoWLAN technology lets users place and receive calls and even send text messages, but without the airtime or subscriber charges entailed with cellular.

Although the productivity gains have been significant with each additional solution, the net result is that many manufacturers are now finding themselves responsible for managing and maintaining this overwhelming array of devices and infrastructures. Some workers are now forced to carry multiple devices to effectively perform their jobs, increasing capital and operational expenses and creating extra work for everyone from purchasing to information technology(IT). And technologies such as paging systems nearing end of life often have limited internal and external vendor support that puts operations at risk. At a time when many organizations have reduced IT budgets and staff, the ongoing requirement to manage these multiple communications technologies puts unneeded pressure on resources that already are thinly spread.

Employees use a range of wireless devices to support different job functions.

INTEGRATED MOBILE VOICE AND DATA SOLUTIONS

Fortunately, manufacturing companies now have technology solutions available to them that can consolidate communications onto a common platform. The 2011 Barometer study also showed that manufacturing enterprises are looking at unified communications and video capabilities, with almost 62% reporting plans to integrate the various streams of communication by 2012. These new offerings have the potential to generate significant up front and operational communications equipment cost savings, while at the same time enhancing overall functionality and productivity.

Employees have different communication needs as job scopes vary from task-based functions to supervisory and managerial duties. Historically:

- A production line worker would be required to capture data using a rugged bar code scanning device to validate a step or process, or to use a two-way radio to alert about a potential raw material shortage.
- A plant manager who needed access to real-time KPIs on a mobile computer to ensure peak operating performance would also need a two-way radio to contact the operations supervisor to schedule an emergency repair.
- A quality engineer would need to receive alerts via a pager to notify him/her of an out-of-tolerance situation and would then need to use a cellular telephone to place a call to a supplier to address a material issue.
- Warehouse personnel would receive notifications for immediate line side replenishment via two-way radios and would process incoming material deliveries using an RFID or bar-code enabled mobile computer.

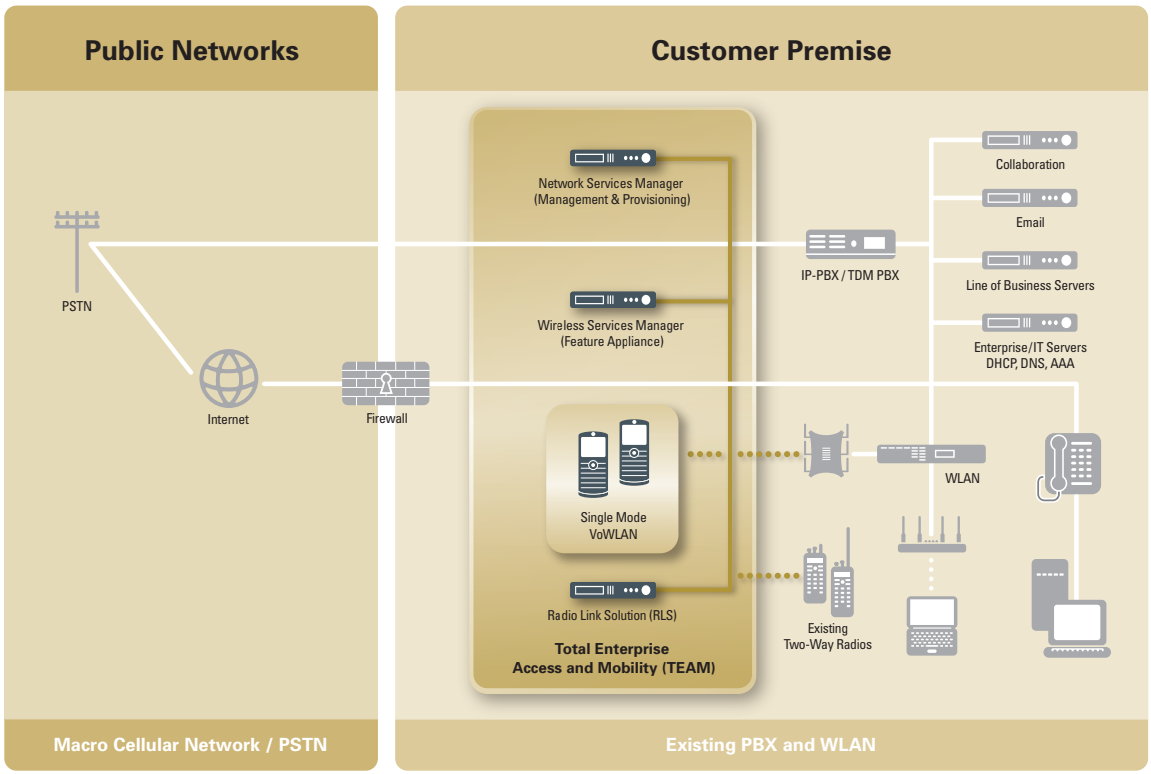
Each of these scenarios required the worker to use a wide variety of devices and networks to accomplish the tasks. Today, using a WLAN as the central "pipe" for both voice and data and taking advantage of multi-function enterprise class devices, communications can be enhanced, while the number of devices can be reduced:

- Production line workers can now use a single rugged mobile computer with integrated bar code scanning and VoWLAN capabilities to accomplish both tasks.
- Plant managers move in and out of the plant armed with a single dual-mode voiceenabled mobile computer allowing both in-plant and remote access to KPIs and business applications. And leveraging push-to-talk to connect to the operations supervisor enables quick and easy connections from a single device.
- The quality engineer now receives alerts on his mobile device—either via text, email, cell phone call, or PTT radio call while monitoring quality tolerance reports on the go.

The ideal integrated voice and data solution allows you to leverage your current technology while building a foundation for future innovations. It delivers high-performing, mobile voice and data services with robust

standards-based security throughout the enterprise. A non-intrusive overlay to the existing PBX and WLAN network creates a single common platform for PBX enterprise grade voice telephony, Push to Talk (PTT), text messaging, email/personal information management (PIM), internet/intranet and line of business applications – all through a single rugged EDA. This solution can be expanded even further by including a link to the enterprise's private radio system. The concept of a single communications device is now a reality including PTT group communication with two-way radios.

The architecture to support this solution is comprised of network components that control all voice features, integrated with the private radio system, and providing centralized management, monitoring and provisioning. The system can be controlled on site or remotely managed by IT. The total number of devices is reduced as well as the range of device types requiring support.



The figure above outlines an integrated communications architecture that can truly unify the voice and data networks, enabling the creation of a pocketable mobile office providing access to multiple business communications tools on a single device.
The ability to deliver VoWLAN capability from a mobile data device is one example of how equipment manufacturers are combining forms of communications that previously required multiple devices onto a single product. A connection to the company's PBX or office phone system enables calls to be placed to and from phone numbers outside the organization This approach has the added advantage of enabling time-saving PBX-based features such as four-digit dialing to extensions within the organization or the ability to transfer calls to another extension.

One wireless equipment manufacturer also has introduced dual-mode devices supporting WLAN and cellular connectivity as well as a voice client interface to traditional two-way radio systems. And when mobile data devices can support instantaneous communication through SMS capabilities, it also paves the way for companies to eliminate legacy paging systems.By establishing this interface between mobile data delivery platforms and the server that runs the programmable logic controller (PLC) analytics, a company can have alerts that previously went to pagers sent instead to WLAN-based mobile devices.

Having multi-function devices operating on an integrated platform can help manufacturing companies minimize their overall communications costs by

enabling workers to reach one another, even when they have significantly different communication needs. In so doing, manufacturing companies eliminate the need to over-equip employees who only need certain functionality.

"As mobile and wireless technology becomes more commonplace, it eventually will become a business requirement for all companies, with late adopters forced into the position of playing "catch up" with their competitors."

BENEFITS OF INTEGRATED PLANT COMMUNICATIONS

Developing and deploying an integrated plant communications platform delivers significant benefits to manufacturing operations, effectively 'leaning' the enterprise. Benefits include:

- Reduction in capital and operating costs by collapsing the number of networks and devices required to support the business.
- Optimization of employee communication by providing the right device for the right communications needs.
- Increase in employee productivity through real-time access to people and information when and where they need it, enabling employees to spend more time on the work that needs to be performed rather than on attempts to locate people or information.
- Increase in overall plant productivity by streamlining the flow of voice and data communications and enabling the rapid movement of information.
- Better decisions based on real-time information that enables prompt response to changing conditions in the plant.
- Protects existing investments in technology such as PBX and WLAN while enabling cost-effective extensions for mobile voice and data solutions.
- Enhances data security by increasing control over the flow of information traveling to and from devices/ workers and by allowing missing devices to be disabled or wiped clean if necessary.
- Reduces strain on IT resources to deploy,manage and maintain multiple networks and systems in support of the business. And with the use of advanced management software leveraging wireless connectivity, devices can be provisioned, deployed, updated and even made available for troubleshooting without the need to drop off the device for IT support.
- Improves employee safety by avoiding the unnecessary risk associated with workers navigating the plant floor with multiple devices connected to them via dongles.
- Reduces up-front equipment costs. As manufacturers move closer to providing a single mobile device per employee, there are fewer devices to purchase, manageand maintain on an ongoing basis.

SUMMARY

In recent years, the marketplace has seen numerous examples of companies that gained a significant, often long-lasting edge by adopting important new technology before their competition. The first bank to deploy automated teller machines gained substantial share of a market, for example—and the first manufacturer to use an enhanced automated packaging process also achieved significant market gains.

Today, an integrated communications platform, including mobile solutions, that leverages WLAN technology has the potential to create substantial productivity gains for a manufacturing company. These gains can ultimately translate into a significant competitive edge, especially for early adopters. But that opportunity won't last forever. As mobile and wireless technology becomes more commonplace, it eventually will become a business requirement for all companies, with late adopters forced into the position of playing "catch up" with their competitors.

A 2010 survey of organizations that have deployed mobile technology offers a snapshot of adoption trends today and provides a sense of the wide variety of applications for which mobile solutions are being used. According to the Enterprise Mobility Solutions: 2010

Market intelligence Service survey[1], conducted by VDC Research Group, the most popular mobility application was inventory and warehouse management, with 44% of respondents saying they had used mobile technology for that purpose.

Other popular applications included field mobility (43%), asset management (39%), quality control and assurance (30%) and workforce management (30%). Additional applications that have been deployed, though less widely, include plant operations via human-machine interface (23%), work order automation (23%), work-in-progress tracking (21%) and location-based services (20%).

According to VDC, organizations that have deployed mobile technology point to increased mobile worker productivity, improved customer loyalty and improved real-time decision making as their top three benefits. The survey showed 28.8% percent of respondents said mobile technology had "increased mobile worker productivity," 25.2% said it had "improved customer loyalty and repeat business," while 25.1% cited "improved real-time decision making."

VDC's research supports what early adopters of mobility solutions already have discovered — mobility is great for business, particularly when it is tied into an integrated communications platform unifying voice and data networks.

With an integrated communications platform, manufacturing companies can reduce the cost and complexity of devices and systems needed to enable optimum communications among employees, and when needed, with customers and trading partners. By offering a range of devices, a manufacturing company can ensure that each worker has a device that is optimized for the tasks he is required to perform. Employees can access, send and receive the information they require to better perform their jobs in the most efficient and timely manner. Phone tag and the time wasted tracking down a key employee can be minimized or even eliminated. By improving the enterprise's overall ability to know, monitor and act, an integrated communications platform ultimately can help companies meet or exceed lean manufacturing goals.

The best-managed manufacturing companies know that lean manufacturing is an ongoing process. An integrated communications platform with a strong mobility component can go a long way toward achieving incremental gains in lean manufacturing, ultimately enhancing a company's ability to better serve its customers and improve its competitive edge.

To learn more about Motorola's innovative optimized manufacturing mobility solutions and how they can help you achieve competitive differentiation, visit www.motorolasolutions.com/manfacturing.

1. © 2010 VDC Research Group, Inc. Source: Enterprise Mobility Solutions: 2010 Market intelligence Service, 7th Edition, Track 4, Volume 4: Manufacturing Vertical Market Analysis.

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