



Total Enterprise Access Mobility (TEAM): Achieve leaner manufacturing operations with a unified voice and data architecture



In manufacturing environments, Motorola's TEAM VoWLAN Solution allows workers to carry a single mobile device instead of multiple 'point-functionality' devices. Now managers and others can access HMI, SCADA, quality, warehouse and plant maintenance line of business applications in real time as well as email, push-to-talk radio services, text messaging and more — all on a single pocketable device.

The business issue: the high cost of the multi-network architecture

In manufacturing operations, many workers spend a good portion of the day away from their desk. Supervisors are moving throughout the facilities to manage different aspects of the business necessary to meet production levels and schedules. Equipment technicians are out on the production floor performing routine maintenance and fixing malfunctioning machinery to keep the production line up and running — crucial in an environment where unplanned downtime can translate into hundreds of thousands of dollars a minute. Operators are at industrial equipment stations on the plant floor involved in the production of goods. And quality engineers are moving throughout the building, ensuring that incoming raw goods bound for the production line, work-in-process (WIP) and finished goods all meet defined quality standards.

All day long, these on-the-go workers across functional areas need access to voice and data communications to get the job done. But the typical multi-network architecture within the manufacturing plant consists of multiple disparate backbones.

- **PBX/wired phone line** for traditional voice communications and a host of productivity-enhancing voice features on the deskphone, designed for workers who spend the day primarily at the desk.
- **Legacy text paging system** to support paging throughout the enterprise. Enables paging between employees, organizes and filters the volumes of incoming data from plant equipment, and provides supervisors and other personnel with text messages and alarms whenever a machine is in danger of malfunctioning or becoming out of tolerance.
- **Wired Ethernet Local Area Network (LAN)** for traditional wired corporate network access to desktop computers, plant equipment and application servers.
- **Trunked radio system**, an independent radio network involving the purchase of licensed frequencies, providing enterprises with complete control of network performance and availability of mission- or business-critical two-way radio communications.

- **Wireless Local Area Network (WLAN)** to enable the extension of the corporate voice and data services to mobile devices inside the four walls — including handheld mobile computers and Voice-over-IP handsets.

In a multi-network architecture, users must carry multiple devices in order to access the voice and data services required to meet key performance indicators (KPIs), enable cost-effective yet timely production and ensure that orders are fulfilled on time and within target profit margins to protect profitability.

For example, maintenance engineers might carry a two-way radio to help ensure availability for emergency repairs, and need to either carry a laptop or return to the desk to access the wealth of data required to best service any given piece of equipment on the production line — such as service history, maintenance routines or inventory. Plant managers might need three or more devices: a two way radio for a business-critical voice connection to plant workers; a pager for equipment alarms and status updates; a mobile phone to ensure accessibility for customers, suppliers and more; and possibly a laptop to access email and the wealth of critical business data in back-end Enterprise Resource Planning (ERP) systems required to keep business running smoothly and production on track.

The upside for these multiple networks is that the manufacturer is free to select and deploy the right device for the right role — for example, for workers who only need mission-critical voice, a single function device such as a two-way radio can be issued. But the downside is the high cost of this multi-network architecture — plus the cost of multiple devices for employees that require multiple modes of communication — measured in high capital and operational costs as well as reduced business productivity:

Capital/equipment costs:

- Network-related expenditures include the purchase of network infrastructure, licensed frequencies, servers and the installation of network cabling and power outlets — frequently a major expense due to the need to install wiring in conduit.
- Device-related expenses include the costs

associated with the purchase of multiple devices per person, complete with required accessories, such as high capacity batteries, headsets and holsters.

Operational costs:

- IT operational costs include the substantial time required to manage multiple networks as well as a much larger device pool — from initial staging and ongoing provisioning to troubleshooting and day-to-day management.
- Employee-related operational costs include the time employees must devote to the management of multiple devices — from charging batteries and managing accessories to training and troubleshooting.

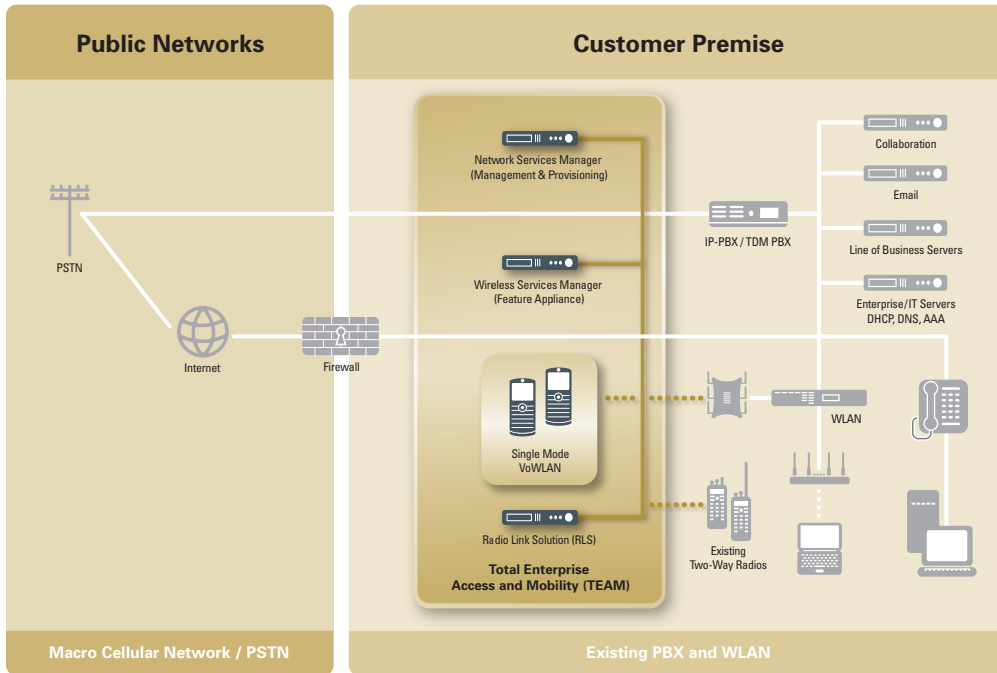
Operational inefficiencies:

In addition to hard capital and operational costs, the existence of disparate networks ultimately impacts business productivity. Since the separate networks do not support ‘cross-talk’, your workers are forced to effectively act as routers between the networks: the multiple types of devices in use in your facility act as the ports on a router, while your employees become a literal ‘router’ — the bridge between your networks.

For example, a supervisor may receive a call on a two-way radio from a worker with an emergency. The supervisor will need to use a cell phone or mobile handset to contact upper management and determine the appropriate action, and then use the two-way radio to communicate that action back to the worker. Or a quality engineer may receive a call on a mobile PBX-based handset from a warehouse worker who needs to know if a shipment has been cleared for use in production. In order to respond, the quality engineer must look up the information on a laptop that is in hand or return to the desk to access the information.

As a result of this ‘human bridging’ of your networks, the speed at which information moves throughout your facility is reduced, impacting workflows and worker safety as well as production volumes and the velocity of your supply chain. In addition, worker productivity is reduced — the time your workers spend ‘bridging’ the networks could be much better spent on more critical business tasks.

TEAM VoWLAN Solution



The solution: Total Enterprise Access Mobility (TEAM) Voice over WLAN (VoWLAN)

Motorola's Total Enterprise Access and Mobility (TEAM) Voice over WLAN (VoWLAN) Solution addresses these business issues by converging the many disparate network backbones into a single ubiquitous system capable of enabling comprehensive communications between workers throughout the facility. The WLAN becomes the central network 'pipe', enabling the flow of comprehensive voice and data communications to and from your mobile workers. The result is an effective and cost-efficient unified voice and data architecture.

The ability to converge voice and data network traffic into a single pipe allows manufacturers to take advantage of the latest generation of integrated voice and data devices. Now, manufacturers can provide workers with a single mobile device — instead of multiple 'point-functionality' devices. The

once disparate communication networks are now integrated, enabling workers to easily reach each other regardless of device type. Now:

- Production line managers can carry a small easy-to-use voice over wireless LAN (VoWLAN) smartphone to access full PBX functionality, including the ability to use convenient 4-digit extension dialing to quickly reach a quality manager who may be on the receiving dock inspecting an incoming shipment of raw materials.
- In business or mission critical line of business applications, alarms generated by event and notification management servers for paging that are constantly analyzing the statistical process control (SPC) data stream from plant equipment can be immediately sent to all the right people, regardless of where they are in the enterprise — by email or text message.

- A plant manager can use push-to-talk radio services on the TEAM VoWLAN device to reach a maintenance technician with a two-way radio or to reach all technicians with a single group call.
- Plant personnel can access HMI, SCADA, quality, warehouse, plant maintenance applications and more in real-time without having to return to an office or workstation.

Comprehensive voice and data communications designed for today and tomorrow

The TEAM VoWLAN Solution truly unifies the voice and data network, enabling the creation of a pocketable mobile office that provides access to six core business communication tools on a single device. Now, as workers move throughout your facility, they can access the type of communications required to get the job done on the spot, including:

- **PBX-based telephony:** Enables the extension of the desk phone to the mobile device
- **Complete push-to-talk (PTT) services:** Enables private calls (one-to-one) and dispatch groups (one-to-many) plus group calling to reach entire departments and specific teams at the press of a button
- **Corporate email, calendar, address book and other personal information management (PIM) applications:** Keeps workers in touch and on top of schedules, task lists and more
- **Text messaging services:** Provides fast, effective communications between workers within the WLAN
- **Internet and intranet access:** Allows easy access to web-based applications and information as needed throughout the business day
- **Line of business applications:** Enables workers to access business-critical server-based applications to view customer data, place orders, check inventory and more while on the move

The TEAM VoWLAN architecture

Following best practices in networking, the TEAM VoWLAN solution can be easily integrated into existing WLAN and PBX infrastructure, creating a single common platform for the delivery of integrated voice and data services. The TEAM VoWLAN solution is architected to easily enable future capabilities, including dual-mode (VoWLAN and cellular) and the extension of services to other voice-capable Motorola devices, including mobile computers and bar code scanners.

TEAM VoWLAN solution components

- **TEAM EWP1000/EWP2000 Business Smartphones** built on the robust Windows Mobile® 6.1 platform deliver mobile access to the six fundamental worker communications services.
- **The Wireless Services Manager (WSM)** resides between the mobile device and the PBX. This appliance simplifies the delivery of voice services in converged solutions by brokering the connection between the mobile device and PBX. In addition, the WSM manages the delivery of advanced voice features, including push-to-talk and text messaging.
- **The Network Service Manager (NSM)** provides centralized management, monitoring and provisioning of the TEAM integrated voice and data solution. The NSM provides instant visibility into any system level fault and a wealth of real-time and historical statistics, providing the information required to keep the TEAM solution up, running and available for users.
- **The Radio Link Solution (RLS)** (optional) enables basic PTT talk-group communications between two-way radio systems and the TEAM solution devices, allowing enterprises to leverage existing two-way radio systems while extending the advantages of the TEAM solution to other employees.

The advantages of an appliance-based solution

The TEAM Solution's appliance-based architecture provides a number of unique advantages for unified voice and data networks:

- **Superior interoperability.** The TEAM WSM appliance effectively acts as a translator between the business smartphone and the PBX: the smartphone need only communicate with the server (via the WLAN) — the appliance communicates with the PBX. This greatly expands interoperability with a wide range of IP PBXs and TDM PBXs (via SIP and T1/E1 PRI/Q.SIG gateways). In addition, the appliance helps to provide mobile support for a wide range of PBX features and functionality.
- **Improved mobile device performance.** Without an appliance, the mobile device must manage and maintain the voice connection, requiring substantial battery power. In the TEAM architecture, the WSM handles the majority of the processing required to maintain connections, extending battery life and ensuring ample power for a full workday.
- **Improved network performance.** The TEAM solution enables the delivery of unicast Push-to-Talk (PTT) services, which dramatically reduce traffic over the wireless LAN — and improve network efficiency and performance.
- **Improved security.** The WSM provides an additional layer of security by requiring a two factor authentication between the user, device and WSM — a username and password in addition to a TLS certificate exchange — prior to enabling usage of the WSM services. This is the same authentication required for the user to gain access to the WLAN network. Additionally, the WSM provides secure connections to the PBX, AAA server and line of business (LOB applications).

Benefits

The unification of the communication networks provides next-generation network simplicity for manufacturers, delivering results that are nothing less than astounding:

- **Reduction in capital and operational costs.** The reduction in the number of networks and devices required reduces capital equipment purchases. IT management time can also be dramatically reduced as there are fewer networks and devices to manage. Since employees now carry fewer devices, time previously spent managing multiple devices is eliminated. And finally, the deployment of a wireless system in new industrial locations can be much less expensive than the deployment of a wired LAN. Regulations that may require conduit for wiring and more can easily drive wiring costs alone up to \$100 per foot in a typical processing plant.¹ In contrast, the cost of a wireless system in an industrial environment can be just a fraction of the cost of a wired network.
- **Substantial increase in employee productivity.** With access to the people and information they need, where and when they need it, your employees can now spend more 'time on task', increasing overall employee efficiency and improving the utilization of one of your most valuable and expensive assets — your workforce.
- **Substantial increase in plant productivity.** The streamlining of your network architecture in turn streamlines the flow of voice and data communications throughout your operations. The more rapid movement of information through your business results in increased employee productivity to improve throughput, ensuring delivery schedules are met — ultimately protecting customer service levels, margins and profitability.

1. ABI Research; Wireless Sensor Networking (WSN) in Industrial Automation/Market Assessment for Monitoring and Control Applications; 2007)

- **Substantial increase in business agility.** In today's highly competitive world, consumers are king, with consumer demand driving shorter product evolution cycles — often requiring the production of many smaller customized orders in a shorter period of time that may require re-tooling of the manufacturing line. By choosing a wireless LAN as the core voice and data communication backbone instead of a wired LAN, manufacturers can help address this challenge. Unlike a wired LAN, manufacturers are free to dynamically reconfigure production lines to address competitive pressures and customer demands, providing a true business advantage. And wireless LAN enables the easy and cost-effective extension of voice and data services in hard to wire areas as well as outside in the yard, enabling the cost-efficient delivery of communication services wherever they will streamline business processes.
- **Protects and extends the value of existing technology investments:** This standards-based solution is designed to integrate with existing enterprise wireless LAN and PBXs, allowing enterprises to simply add a layer of technology to enable cost-effective mobile voice and data services — no forklift upgrade required.
- **Future-proofing:** This extensible solution offers an architecture that can easily support a growing staff and changing enterprise requirements:
 - Add additional devices and calling capacity as needed
 - Easily extend support for dual mode WLAN/cellular services (when available) to provide employees who work inside and outside the four walls with seamless mobile voice and data services
 - Provide support for other voice-enabled devices with a Common Voice Client (when available) — including mobile computers, bar code scanners and cellular phones — ensuring that workers have the right device with the capabilities they need to get their job done

Summary: 'Leaning' the enterprise with a unified voice and data network

In the quest for continuous improvement in the manufacturing plant, lean principles are applied every day to help identify and eliminate areas of waste — and the associated costs — from the business. In the past, continuous improvement in plant communications was accomplished by adding new networks as new technologies became available, with each new layer in the communications architecture delivering a unique set of benefits. However, the end result is the antithesis of the original goal — a multi-network architecture, a patchwork quilt of backbones that actually add complexity and cost, injecting waste into plant communications. The disparate networks and the many disparate devices impede the movement of information throughout your facility, negatively impacting employee productivity, production volumes, customer service and profitability.

The TEAM VoWLAN Solution eliminates cost and complexity associated with your legacy communications system by unifying these disparate networks into a single wireless system. The result is a leaner network — and a leaner operation. The new unified voice and data network provides your employees with true mobile voice and data communications virtually anywhere and anytime throughout the enterprise, providing the tools required to act on the spot, improving the speed — and the health — of your business.

For more information

For more information on how Motorola's TEAM solution can give your manufacturing operations a competitive edge, please call 1.800.416.8593, visit us on the web at www.motorola.com/team or access our global contact directory at motorola.com/enterprisemobility/contactus. To explore other Motorola manufacturing mobility solutions, please visit www.motorola.com/business/manufacturing

About Motorola's Enterprise Mobility Solutions

When it comes to enterprise mobility, Motorola delivers, providing the dependable real-time connection you need to streamline your warehouse, distribution center and manufacturing plant operations. As an industry leader, we offer the proven expertise and technology you need to achieve maximum value and a fast return on investment. Our true end-to-end mobility solutions include: a comprehensive portfolio of mobile devices with extensive wireless communications capabilities — designed for enterprise use; a portfolio of wireless private wide area and local area network infrastructure; RFID tags and readers; a partner channel delivering best-in class applications; and a complete range of pre-and post-deployment services to help get and keep your enterprise mobility solution up and running at peak performance every day of the year.



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