

WHITE PAPER

Mobilizing Your Workforce

Motorola's Architectural Approach To Seamless Mobility

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Executive Summary

Not so long ago, the terms “mobile computing” and “mobile worker” conjured up images of employees lugging cumbersome, expensive laptops while seeking the refuge of wired Internet and LAN connections wherever they could find an available port. Today, new computing technologies and wireless connectivity are driving a revolution in mobility. It's a revolution that will soon touch people everywhere—offering new capabilities to workers in traditionally mobile professions, new freedom and productivity for formerly desk-bound professions, and entirely new business opportunities as mobile information access creates entirely new markets.

According to IDC Research Inc. (IDC), the global mobile workforce is expected to grow by 20 percent in just the next four years, totaling 878 million mobile workers worldwide by 2009. In the United States alone, the mobile worker population will reach 113 million. And in far too many cases, IDC warns, the IT staffs that will be supporting these mobile workers are likely to be woefully unprepared. It's one thing to support basic mobile functions such as email and voice, but as mobile workers increasingly access applications and data on the enterprise network—the lifeblood of the corporation—the hazards and challenges of mobile support increase exponentially.

To optimize mobile functionality, maximize ROI and minimize risk, enterprises will need:

- Efficient ways to develop and deploy mobile applications
- Affordable and non-disruptive solutions for remote device management
- Non-invasive interfaces to existing, often multiple back-end systems
- A software architecture for delivering solutions to avoid replication and complexity
- Strong security that protects corporate information assets beyond the firewall
- Relevant applications that meet the needs of mobile workers and reinforce corporate policies and procedures

And perhaps the biggest challenge is to provide all of this without introducing so much complexity into the mobile IT environment that, as enterprise mobility expands, it becomes increasingly impossible to manage. Unfortunately, many companies today are enabling mobility in a piecemeal fashion, using multiple single-point solutions that add to total acquisition and maintenance costs, foster unmanageable “scope creep” over time, and leave gaping security holes. Companies should reject this tactical method of adding single-point solutions as needed, in favor of a strategic approach that centralizes and standardizes the entire mobile architecture.

Motorola combines the latest mobility technologies with your specific business processes in a flexible, configurable and seamless solution. Motorola's MOTOPRO™ Mobility Suite offers an integrated solution supporting application development, remote device management and security. Backed by Motorola's world-class service and support, MOTOPRO Mobility Suite enables a structured enterprise approach to centralized mobility management—optimized for your unique business needs.

This paper gives an overview of the Motorola approach to productive and secure mobility for today's mobile worker. We'll discuss the benefits that Motorola's complete MOTOPRO Mobility Suite offers in contrast to a mobility environment built upon a loose conglomeration of costly point solutions. Other papers will focus on solutions for mobile professionals—solutions that leverage many of the building blocks discussed in this document.



MOTOPRO™ Mobility Suite

MOTOPRO Mobility Suite integrates application development with infrastructure services (mobile device management and security functions). These elements work together to enable businesses to extend their enterprise applications to mobile workers while ensuring system reliability, data integrity and network security. The Mobility Suite roadmap helps bring together separate and often disparate technologies, offering a simple way for enterprises to integrate data, voice, applications and infrastructure management. Over time, the Mobility Suite will be expanded to provide even richer network management and security communications capabilities to match enterprises' evolving mobility needs..

MOTOPRO Mobility Suite Architecture

Mobility is a complex technical challenge, especially when users in the organization have different mobility needs, and when those needs change and grow over time. Many organizations deal with this rising complexity by adding new point products to handle each emerging requirement. That's not the ideal approach because it means that corporate policies and IT management become needlessly convoluted over time—entailing new integration challenges, inconsistent training requirements, multiple management techniques, asset-tracking nightmares, mounting security issues and more. And the challenges will only become more difficult as a new generation of smartphones and handheld devices emerges, enabling users to combine business and personal information on a single device that lives on the fringes of IT control.

To keep adding new point products is to head down the road to chaos, both in terms of manageability and budget. By contrast, the ideal solution is to implement a single architecture that allows for centralized mobility management—no matter how many different mobile device types are in use, no matter how many existing back-end solutions are in deployment, and no matter what new mobile applications are in development. MOTOPRO Mobility Suite is a comprehensive mobility solution that allows enterprises to consolidate their entire mobility architecture, thus avoiding the need to deploy an open-ended series of point products and endure the resulting complexity creep.

The ideal mobile enterprise must meet two conflicting goals at the same time. On one hand, the mobility architecture must enable workers to engage business processes effectively at the “point of interaction,” where business is actually conducted, whether with a person or a piece of machinery, using any of the multiple devices and applications supported by the enterprise. On the other hand, the architecture must provide centralized management of applications, devices, users, permissions and security, so IT can quickly and cost-effectively respond to evolving business requirements without becoming mired in complication.

Motorola's Mobility Suite software architecture meets these goals through an event-driven Services Oriented Architecture (SOA) platform built on the principles of dynamic IT. This platform is enhanced by a suite of tools designed to make development, deployment and management of mobile applications straightforward and cost-effective for any enterprise need—manufacturing, operations, finance, customer service, government and beyond.



The Mobility Suite includes the following:

Application Platform

Enables organizations to deliver rich, job-specific information to mobile workers in real time, so they can manage enterprise data more effectively and efficiently. Working with easy-to-adopt, process-driven mobile applications that are securely integrated with enterprise systems, your mobile workforce can improve productivity and accuracy—enhancing customer service and loyalty.

Infrastructure

MOBILE SECURITY PLATFORM. Allows IT managers to implement the same security policies on mobile devices that they have employed on desktops and laptops. Consistent enforcement of security is simplified. With control from a central console, you can leverage multiple security options, including authentication/authorization, remote device wipe, intrusion detection, network security, integrity management and Virtual Private Network (VPN) connectivity.

MOBILE DEVICE MANAGEMENT PLATFORM. Tools in the Device Management Platform enable your IT department to efficiently manage mobile devices and applications across the enterprise. Software distribution, provisioning and configuring. Device and asset tracking. Connectivity and performance management. Diagnostics. The Device Management Platform streamlines all of these enterprise-critical tasks, helping to reduce IT expenses.

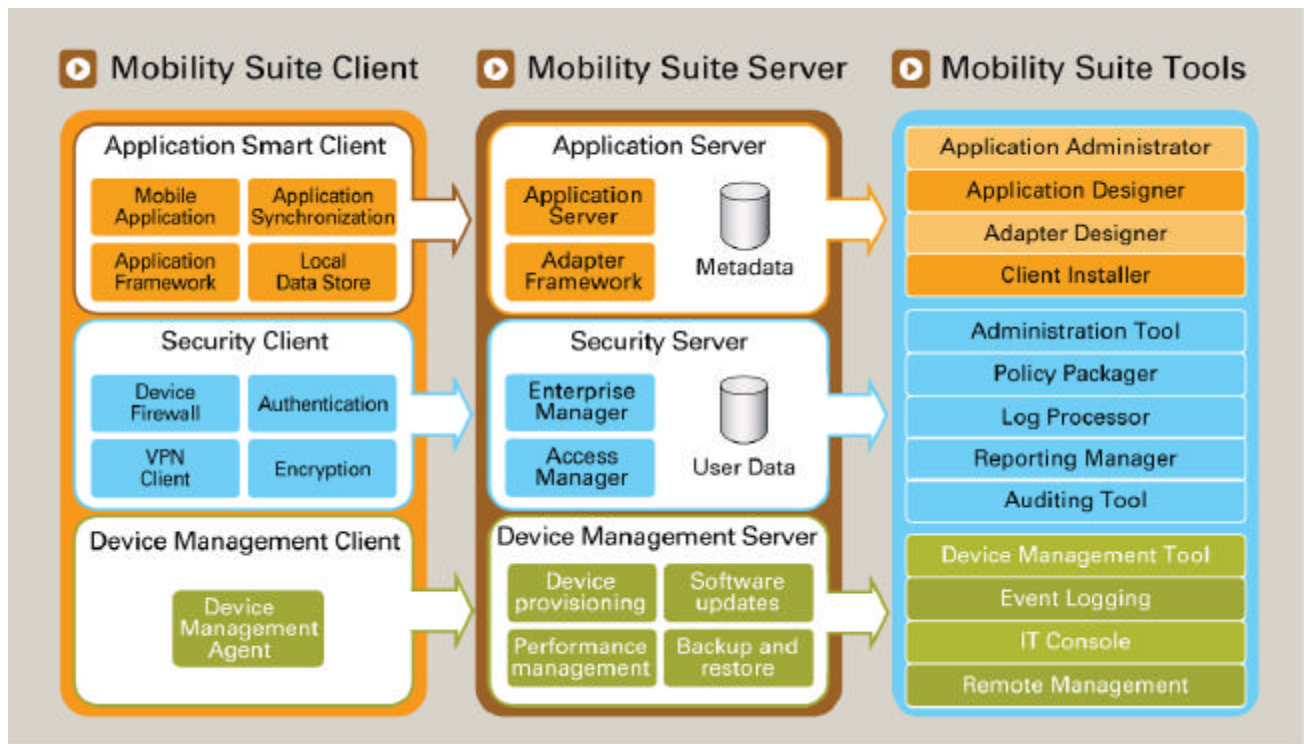


Figure 1. The Motorola MOTOPRO Mobility Suite Architecture

The Mobile Applications Platform consists of the following components:

Application Server

The Application Server is a stateless, metadata-driven engine that provides information, applications and business processes to the mobile client on end-user devices. The stateless architecture is designed to intelligently manage the flow of information between mobile applications and enterprise data sources. The server manages this data flow without interim data stores or synchronizations, performing all functions within the context of defined user application, system or business processes to ensure that data relevance and integrity are maintained between the Mobility Suite and the enterprise's back-end databases and applications.

This capability is achieved through a metadata database that defines the structure of the business objects, data and rules that govern the business process performed by the mobile application. The metadata comprises a data abstraction layer that allows the Application Server to connect to back-end systems without storing any actual enterprise data locally, avoiding disruption while maximizing cross-functional data access, consistency and integrity.

The Application Server is built on an event-driven Services Oriented Architecture (SOA). It provides a highly scalable and adaptable Web services solution, using XML (Extensible Markup Language) and SOAP (Simple Object Access Protocol) for data exchange and transport. With service components for intelligent data management, messaging and security, the Application Server addresses the complex requirements for delivering effective solutions outside the firewall—while enabling security, reliable messaging, data integrity, transaction management and application management.

Mobility Connectors

Mobility connectors running on the server allow mobile applications used on smartphones and notebooks to “talk” to mainstream back-office enterprise applications, such as ERP (Enterprise Resource Planning), CRM (Customer Relationship Management) and other solutions. Connecting via an enterprise application's native Application Programming Interface (API), these connectors allow mobile clients to leverage the business rules defined on back-end systems without compromising the data integrity of those systems. The result is seamless, low-risk integration between mobile systems and a range of enterprise data sources, whether these data sources communicate via Web services, Open Database Connectivity (ODBC) or a standard API (Application Program Interface).

Motorola provides a .NET-based advanced connector framework that enables rapid development of connectors to accommodate all kinds of back-office applications. Using this framework, Motorola continues to develop connectors offering broad functionality that can be configured to specific enterprise requirements. By providing vendor-specific connectors from existing back-office applications to standardized mobile applications on a wide range of mobile client devices, Motorola shortcuts what could otherwise be a long development cycle—giving companies a huge head start in the race to mobilize applications. Companies can also take off-the-shelf, vertically oriented connectors and modify them to meet the specific demands of their business, using a connector framework plug-in that works with Visual Studio .NET.

Adapter Designer

The Adapter Designer provides a flexible and reusable infrastructure for leveraging existing enterprise applications and business processes. It interfaces to the data source business logic through API, Web services and other methods, and integrates with out-of-the-box objects as well as custom objects. The Adapter Designer is non-invasive, requiring no modification to the enterprise application.

Adapters define the method of input/output between the Application Server and the existing back-end system. Each adapter provides the physical-level integration to the associated enterprise data sources. The technology for integration to the enterprise back-end system depends upon the interfaces available from the back-end provider. For example, SAP provides a .NET interface to the BAPIs, Remedy provides a Web services interface to the Remedy Action Request System APIs, Salesforce.com provides a Web services interface, and Clarify provides a J2EE interface to the APIs.

Smart Client

The experience of Seamless Mobility depends on a client suited to the end-user's specific mobility and application needs. That's why a truly comprehensive solution for enterprise mobility—a centralized solution that can effectively replace multiple point solutions—must support a wide range of mobile client devices. Initially, the Smart Client was designed to support Microsoft Windows Mobile 2003 and 2005 (Pocket PC and Smartphone); however, support for Linux and Java are planned, creating new mobility opportunities for the rapidly growing open-source community.

Motorola's Smart Client resides on the mobile equipment to facilitate seamless information flow and integrity between the mobile equipment and back-end enterprise applications, as well as to provide for device management and security.

While the Smart Client has been specifically optimized for the small form factors needed in mobile fieldwork, it is a "smart" client that offers ease of use, richness of application functionality and open-standards compatibility. It includes three components:

- **BUSINESS FLOW MANAGEMENT.** This component comprises the core XML Web services used by applications running on the mobile equipment. It includes a persistent data store for managing both metadata and business data used by mobile applications, enabling complete freedom from tethered operations in online, offline and "occasionally connected" environments. And it offers rich Application Programming Interface support for simple integration with the applications that mobile users need—providing a stable, effective environment for delivering enterprise functionality to the field.
- **DEVICE MANAGEMENT.** With support for software configuration, repair and distribution, policy management, performance management and diagnostics, this component supports scheduled remote management, automatic software updates and customized reports for individual or multiple devices under management.
- **SECURITY.** This component supports remote lock and wipe of enterprise data on the mobile device, encryption, authentication, on-device firewall, integrity management and intrusion protection.

Note that there are security and device management workings in the Motorola Smart Client that are complemented by security and device management components located on the Application Server.

Device Management and Mobile Security Platforms

Most enterprises that have resisted going mobile are apprehensive about securing and managing devices (complete with sensitive corporate data that can be lost, corrupted or stolen) that physically travel beyond the company firewall.

These are justifiable concerns, as mobile devices are much more likely than office desktops to be connected to unsafe networks and loaded with risky personal information. Lacking effective technologies for mobile device management and security, it can be difficult or impossible for IT to ensure that mobile devices are kept up-to-date with security patches and the latest software. Because mobile devices connect wirelessly, there's an increased danger that sensitive communications can be intercepted. And the smaller the device, the easier it can be lost or stolen—potentially giving an intruder access to enterprise data.

All of these issues can be solved, but the typical approach of deploying multiple point solutions unnecessarily complicates management and too often leaves security gaps that may not be caught until it's too late. Motorola's Mobility Suite software architecture offers a centralized approach that's more manageable, more secure and more cost-effective than point solutions. Let's take a look at some of the technical advantages this centralized, enterprise-wide mobility solution offers, as opposed to point solutions that are deployed, secured and managed on an ad hoc basis.

Device Management Platform

When it comes to managing and securing mobile devices, one of the biggest problems is keeping devices up-to-date with the latest operating systems, software and patches. Many organizations have adopted policy-based controls for evaluating the compliance of PCs and automatically updating them with the appropriate configurations, patches, virus definitions, encryption keys and other attributes.

But even with the most advanced policy-based management, mobile devices potentially open a back door that invites noncompliance. Even the most conscientious users will connect via networks that are out of your corporate control, will be unaware that a new patch is available, will be tempted to load personal information on the device, and so on. And mobile devices can easily go for days or even weeks without attaching directly to the enterprise network and obtaining the latest updates. With limited opportunities for updating devices, the cumulative risks of noncompliance grow each day. Moreover, employee productivity is affected when corporate email, contacts, calendars and other work-related items are updated on the corporate network, but not on the remote devices where the information is needed.

Motorola's Mobility Suite addresses these issues, while remotely managing all of the following areas for a complete mobile device management solution.

- **APPLICATION PROVISIONING/CONFIGURATION:** Wirelessly provision and configure multiple applications; for example, email, MMS, data synchronization connectivity, instant messaging, browser and security policy management
- **SOFTWARE VERSION MANAGEMENT:** Download incremental versions of the software base to mobile devices wirelessly. Manage several versions and configurations of software for a target mobile device model

- **APPLICATION MANAGEMENT:** Install and configure new applications on mobile devices. Remove obsolete and unauthorized applications to free up memory and other device resources
- **AUTOMATIC/SCHEDULED SOFTWARE DISTRIBUTION:** Automatically download critical software components to mobile devices using Motorola-defined rules and/or scheduled transactions
- **CONNECTIVITY MANAGEMENT:** Remotely configure and manage connectivity of mobile devices and their applications to ensure continuous connectivity to the network and enterprise. Remotely configure mobile device and application settings
- **SOFTWARE REPAIR:** Download and repair device firmware and application software over-the-air
- **HARDWARE INVENTORY AND ASSET MANAGEMENT:** Hardware inventory and tracking
- **ACCESSORIES MANAGEMENT:** Inventory and tracking of accessories attached to the mobile device
- **MOBILE DEVICE/HARDWARE DETAIL:** Access mobile device make, model, software version, chipset version, platform supported, TransFlash, SIM card and associated IMEI/ESN
- **DEVICE TRACKING:** Track applications supported, operating system supported, OS version, FLEX version or any other proprietary software version critical to the uptime of the device
- **ASSET TRACKING:** Track all other assets associated with the mobile device; for example, SIM cards, TransFlash cards and peripherals
- **PERFORMANCE MANAGEMENT:** Performance management features include key performance indicator logging, call detail report logging, call statistics, location logging and battery performance tracking (allowing you, for example, to send new batteries to mobile workers before the old batteries fail)
- **MOBILE DEVICE DIAGNOSTICS:** Remotely track fault detection, battery level, signal strength and memory use/allocation
- **SOFTWARE LICENSE MANAGEMENT:** Track installed software and the status of any licenses needed to access software
- **ALERTS/NOTIFICATIONS:** Receive automatic alerts when remote diagnostics fail or a device falls out of compliance with device management policies due to user action or failure
- **OPERATIONAL PROFILING:** Generate reports on remote application use, duration of use and frequency of use

Mobile Security Platform

When companies send their employees out into the world with mobile devices that hold sensitive corporate information and are configured to connect to the corporate network, they face significant new risks. In fact, according to Forrester Research, the largest number of CIOs surveyed—35 percent—cited security concerns as the chief obstacle to acquiring wireless technology. Cost was a distant second to the security concern, at 19 percent of respondents. And in Motorola's own research, many enterprise customers stated that they would invest more in mobile technology if their security concerns were addressed.

Mobile devices have evolved quickly from relatively “dumb” pieces of hardware to sophisticated computing and communication devices that are increasingly subject to the same hazards as desktop PCs—hacking, data theft, distribution of malicious codes and more. Mobility itself gives rise to additional issues, such as the need to secure wireless connections against eavesdropping. And even increasing miniaturization brings with it new security concerns; after all, the smaller the device, the more easily it can be lost or stolen.

It's no longer enough to simply enforce a PIN-based login at power-on, and then count on employees to comply with corporate policies. Today's mobile enterprises need a comprehensive security solution designed to harden mobile devices and mobile communications end-to-end. The solution needs to provide centralized, policy-based control for all devices and users—no matter how diverse, today and tomorrow—as well as robustly and responsively provide a method for locking down devices or even wiping out data remotely in case of theft, loss, misuse, or employee separation.

Motorola offers a centralized, policy-based mobile security platform that is designed for mobile devices, easy to deploy, compatible with wired and wireless networks, and transparent to users. This security suite protects enterprise data on multiple levels, providing the same assurance for mobile devices as you have come to expect for the corporate network:

- **SECURITY ACCESS MANAGER:** Enables IT managers to implement the same security policies on mobile devices that they have employed on desktops and laptops. Enhanced user and device registration functions eliminate the need to manually collect and link device and owner information, greatly simplifying security policy enforcement.
- **SECURE VIRTUAL PRIVATE NETWORK (VPN):** Optional VPN capabilities ensure that communications can't be intercepted in transit. This thoroughly tested and validated solution encrypts communications end-to-end, including all log-in and authentication information. It works across Wi-Fi, LAN, GSM and CDMA networks, and uses standards for easy integration with existing network infrastructures. Additionally, it complies with Federal Information Processing Standards (FIPS) 140-2, meeting the stringent security standards required for use by U.S. Government agencies.
- **AUTHENTICATION:** Enforces power-on PIN or password requirements.
- **ON-BOARD DATA ENCRYPTION:** Protects data stored in secure folders on the device or on removable storage cards with AES 128-bit encryption, in full compliance with FIPS 140-2. A “logout and encrypt” feature can be invoked to automatically encrypt data at power-off.

- **INTEGRITY MANAGER:** Monitors core system assets and automatically alerts the user of an integrity violation on the device. The Integrity manager can be set to actively alert and log an event or to quarantine the device by blocking all incoming and outgoing network communication.
- **INTRUSION DETECTION:** Scans inbound network packets to identify and prohibit attacks.
- **REAL-TIME LOGGING:** Captures and retains detailed logs of security events such as successful and invalid login attempts, password resets, quarantine overrides, port scans, firewall security level changes and integrity violations. All logging is controllable at the administrator level, and administrators can determine device usage by choosing to log all network traffic to the device.
- **FIREWALL:** Filters traffic to the device in compliance with administrator-controlled port and protocol policies via an integrated LAN/WAN firewall.
- **ANTIVIRUS:** Motorola supports compatibility with a choice of leading solutions from many of the most respected names in enterprise virus protection, such as McAfee VirusScan PDA Enterprise or Symantec AntiVirus Corporate Edition PDA Software.
- **REMOTE WIPE:** Enables the remote deletion of data if, for example, a specified number of log-in attempts fail. Remote wipe helps ensure that only the authorized user has access to confidential corporate information stored on the device.

Development Tools

To enable quick and efficient change management, Motorola provides a plug-in to Microsoft Visual Studio that allows you to develop, modify and deploy mobilized applications to the field in a matter of hours. Millions of IT developers and managers already have extensive experience with Visual Studio, so this familiar development environment also helps companies reduce development and support costs.

Since this tool allows developers to configure, assemble, customize and build applications from scratch without writing a single line of code, applications can be written quickly without the need to employ leagues of software programmers. Moreover, the tool uses the Application Framework to develop applications bound to data definitions in metadata, abstracting the mobile application data from the data that lives in the back-end enterprise application. This abstraction provides maximum flexibility and the ability to easily change and reuse applications.

World-Class Service and Support

One more ingredient is required for an enterprise-class mobility solution: world-class service and support. Motorola offers exactly that. Based on its unsurpassed, worldwide experience in delivering and supporting complex, secure, mission-critical mobile solutions, Motorola has the expertise, infrastructure and programs to meet your exacting needs. Motorola service and support offerings provide:

- **FLEXIBLE, SCALABLE OPTIONS.** Whatever services and support you need—from design consulting to maintenance, technical support, device management, issue tracking and reporting, security and more—Motorola can provide customized support optimized for your technical and operational needs.
- **SUPERIOR SYSTEM UPTIME PERFORMANCE.** Motorola uses efficient, proven processes in performing all scheduled maintenance and repairs. The result is highly reliable operations over the full solution lifetime.
- **RAPID RESPONSE AND RESTORATION.** When a problem does arise—whether it's due to a malicious attack, natural disaster or an unexplained glitch—data-driven enterprises need their systems back online as quickly as possible. Motorola has decades of experience providing immediate response to restore even the most complex data systems to full operations—virtually anywhere around the world.
- **BROAD TECHNICAL SUPPORT NETWORK.** Motorola has formed an extensive network of technical alliances that allow us to provide support for virtually any system or problem, anywhere—drawing upon the expertise of trained service providers who specialize in every aspect of mobile technology.

The Value Proposition

Nothing we've discussed up to this point has any meaning unless it improves operational efficiency and adds to the enterprise's bottom line. Mobile enterprises are so varied in scope and mission that we can't possibly give a blanket prediction of ROI. However, Motorola believes our single-vendor, cross-enterprise, architectural approach to mobilizing mobile workers offers many advantages, particularly in addressing the following needs of the mobile worker:

- Real-time access to enterprise data often residing on multiple back-end systems
- Reduce business risks and improve manageability when mobilizing the workforce
- The ability to transact business in a timely fashion (e.g., to view inventory, order parts, reconfigure systems, view schematics, capture customer signatures to invoke billing, and more)
- Access to process-driven applications that ensure compliance with corporate processes and policies
- The ability to easily capture data through barcode scanning, imaging, and other point-of-contact methods, and to automatically populate forms or accompany reports with that data

Furthermore, consider the advantages of mobility itself. In fields such as manufacturing, transportation, utilities, healthcare, retail and more, a well-defined and well-architected mobility solution can mean:

- Increased employee productivity
- More integrated, accurate and streamlined business processes
- Cost containment
- Enhanced competitive edge through differentiated services, resulting in new customers, increased revenue and profitability
- Greater visibility across every facet of operations
- Centralized control over IT environments
- Greater ability to respond to emergency situations
- Personalized responsiveness, fostering customer delight and loyalty

We believe the key to maximizing all of these benefits is to create a complete enterprise architecture, avoiding the trap of adding on point solutions as the need arises. And we believe that the best way to create a unified, centralized and efficient architecture is to rely on a single vendor who can cover all your needs: integration with back-end enterprise systems, a selection of mobile devices to meet any need, mobilized applications, remote device management and end-to-end security.



Mobility Leadership

Do you already have a mobile workforce? Are you thinking of expanding your mobility options? Or perhaps you're new to mobility altogether, and looking for a solid foundation to get started? Whatever your mobile capabilities and plans, you owe it to yourself and your enterprise to investigate Motorola's MOTOPRO Mobility Suite.

Motorola is the recognized mobility leader. We're dedicated to transforming the way people work, travel, communicate and serve in a new world of Seamless Mobility. Sooner or later, most mobile enterprises will be looking for ways to simplify, consolidate and centralize their mobile operations on a single architecture. Motorola is the only vendor that can help you achieve that vision, not just tomorrow but today.

Learn more about how Motorola's MOTOPRO Mobility Suite architecture is transforming the mobile workplace, enabling a new era of Seamless Mobility at motorola.com/enterprise.



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MOTOROLA

Motorola, Inc.
1301 E. Algonquin Road
Schaumburg, Illinois 60196
1-800-367-2346
Visit www.motorola.com/enterprise

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