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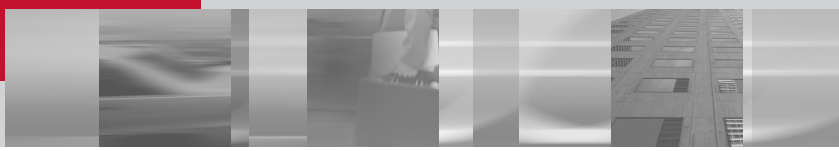

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Scaling Enterprise Mobility Deployments with Integrated Mobile Device and Wireless Local Area Network (WLAN) Management Solutions

Executive Summary

This document is written for senior business executives and technology executives who have already conducted or are considering the deployment and management of enterprise mobility solutions for mission-critical components of their business operations. The purpose of this paper is to highlight the challenges associated with developing, deploying and managing an enterprise mobility solution. It discusses the benefits of the Mobility Services Platform, a powerful integrated mobility management solution from Symbol Technologies, The Enterprise Mobility Company™.

Mobility management systems enable operations and IT groups to reduce the complexity and total cost of ownership of deploying mobility solutions by advancing from complex and difficult-to-manage installations to high performing, reliable and scalable solutions that are easy to develop, deploy and manage. Key benefits include rapid development, accelerated deployment, end-to-end wireless network and mobile device visibility, expedited problem resolution and system reliability, availability and scalability (RAS). Enterprise-class mobility management systems are powerful, integrated tools that enable rapid scaling and total control and visibility of enterprise mobility deployments.

Introduction

To win in today's competitive business environment, companies must find new ways to innovate, optimize business processes, shorten cycle times and empower employees to better serve customers. To achieve these benefits, chief information officers (CIOs) are increasingly putting mobile technologies into the hands of front-line operations, customer service and distribution center/logistics personnel. This enables greater customer satisfaction and enhanced product selection while maximizing supply chain efficiencies and accuracy—ultimately increasing operating margins.

The promise of mobility is immense. However, realizing its full potential can introduce some significant IT challenges. Today's typical mobility solutions are single purpose in nature and reside on mobile devices that are connected to corporate back-end systems via ad-hoc systems. Management of these deployments is usually an afterthought. The result is a static, complex and non-scalable mobility infrastructure that is unable to expand in an efficient way to meet growing business needs. The net effect is increased deployment and support costs; brittle, underperforming systems; and dramatically increased organizational risk.

Fortunately, technologies are rapidly being brought to market to address these challenges. The main elements of scalable and cost-effective enterprise mobility solutions are now available with the advent of standardized pervasive application architectures (.NET and J2EE), advanced mobile computing devices designed upon robust operating systems (Pocket PC, Palm OS® and Linux) and standardized wireless LAN infrastructure (IEEE® 802.11a/b/g).

An important advancement is the introduction of centralized mobility management solutions that significantly reduce the risk and complexity associated with mobile deployments. These systems provide the basis for rapid development, deployment, management, support and control of mobile devices and infrastructure in a focused, secure manner. At the same time, mobility management enables operations and IT groups to contain support costs and maintain complete, real-time visibility into the health and performance of the enterprise mobility systems.

Challenges

A standard enterprise mobility deployment may include several thousand mobile devices, wireless switches and access points. Large-scale deployments, common in retail, transportation and logistics and manufacturing industries, can be dramatically larger. The complexity of these environments makes routine tasks such as device and network component roll-outs, updates and maintenance and support/problem resolution unduly difficult. Without a centralized mobility management solution, these routine tasks become a barrier to growth and leave the promise of mobility unrealized.

While management of wired networks and computing devices is a mature, standardized industry, it's challenging to extend these management tools into the world of wireless networks and mobile computing devices. Existing network management tools are unable to deal with roaming devices, intermittent network connectivity or wireless security. Similarly, existing software distribution tools were not designed to deal with multi-user mobile devices, offline and online device usage and push-versus-pull distribution models.

Key mobility challenges for the enterprise include:

- Cumbersome Manual Processes for Device Rollouts—Newly purchased devices or systems that are returned from the service center must go through a staging process before they are functional. This process is either outsourced or executed internally, but it's an additional cost and further delays deployment. The ability to rapidly provision and configure mobile devices and wireless networks is of paramount importance.

- Mixed Applications Deployed—Ensuring uniformity of software versions on mobile devices across hundreds or thousands of locations is a monumental task. The wrong version of an application on a mobile unit prevents certain business functions from being performed or creates inaccurate results. Version control of business applications, operating systems and firmware is necessary.

- Continuous Manual Updating of Applications and Networks—With new applications, device refreshes, security and network settings constantly being pushed to devices and networks, operations and IT teams often must work overtime to update mobile devices and wireless infrastructure across hundreds of locations just to remain current and consistent. Enterprise-class mobility management solutions provide centralized, remote configuration and provisioning capabilities to alleviate this manual IT dependency.

- Problems are Hard to Isolate and Resolve—Fault isolation is complicated and hard to resolve. Common device problem reports, such as "slow response time" could, in fact, be the result of many different conditions—an access point (AP) that is overloaded, bad radio frequency (RF) coverage or memory leakage on the device. Rapid fault isolation capabilities are required.

- Increase in Support Calls—Hands-on technical staff required to support large-scale enterprise deployments is expensive, both in the number of and the cost per technician. The ability to support remote diagnostics and remote problem resolution is critical to reduce these expenses.

- Reactive Monitoring—Lack of integrated management tools puts enterprises in a reactive mode rather than proactive when it comes to responding to problems encountered with the wireless infrastructure or mobile devices. Problem response includes dispatching a specialist to the site, which is an expensive proposition. A proactive monitoring solution is needed so potential problems with the wireless network or the devices are caught and addressed before an event occurs.

- Managing Batch or Intermittent Connectivity—A mobile device inherently has limited processing power, battery life and memory. This makes collecting performance data difficult. Intermittent connectivity and bandwidth limitations compound this problem. An optimal mobility management solution operates with batch and intermittent connectivity and with configurable bandwidth usage.

- Ensuring Security End-to-End—Wireless solutions are inherently less secure than wired solutions. As a result, security risks are compounded when mobile solutions are scaled across the enterprise. An optimal mobility management solution provides secure transmission of data, detection of rogue networked devices and remote authentication and lock-down, among other important security functions.

- Application Development Issues—To-date, mobile application developers have relied on custom coding and point solutions to create one-off mobile applications relying mostly on older technologies (such as DOS, Telnet, Batch) and integrated with a single back-end system (mainframe, database, etc.). This point-to-point approach is now proving too hard to change and adapt with the advent of multi-application deployments, a proliferation of mobile devices, and multiple back-end systems to integrate with.

Introducing Symbol Mobility Services Platform

The Mobility Services Platform from Symbol is an extensible service-oriented mobile computing foundation that enables Symbol's customers and partners to advance from complex and difficult-to-manage installations to high performing, reliable and scalable solutions that are easy to develop, deploy and manage. MSP delivers rapid development, accelerated deployment, end-to-end visibility, expedited problem resolution and system reliability, availability and scalability (RAS). Symbol devices and wireless networks are enhanced and provide monitoring information in addition to executing administrative tasks initiated by MSP users.

Key benefits of MSP include:

- Rapid Development—MSP enables application developers to develop new and extend existing back-end applications to a large variety of mobile computing devices with faster time to market and 50% less cost than custom coding and point solutions.

- Accelerated Deployment—MSP enables rapid deployment of mobile devices, wireless networks and mobile applications. Features include out-of-the-box provisioning and configuration of mobile devices plus remote provisioning and configuration of groups of access points and wireless switches.

- End-to-End Visibility into Health and Performance—MSP ensures that your enterprise mobility deployment is always available and stays within preset performance baseline levels. MSP enables full visibility into your deployment while providing pro-active mobile device and network monitoring, comprehensive alerting and integration to enterprise management systems.

- Expedited Problem Resolution—MSP dramatically reduces help desk costs by enabling your staff to rapidly diagnose and solve a full range of network, device and infrastructure problems. Features include integrated device and network fault isolation, remote diagnostics, remote device control, remote configuration and patch management.

- Extensible Platform Architecture—MSP offers interoperable software components to develop and deploy additional mobility management applications and adds support for new mobile devices and wireless infrastructure. Features include a customizable portal framework, standards-based architecture, centralized event repository, value-added mobility management application programming interfaces (APIs) and plug-in-based device agent architecture.

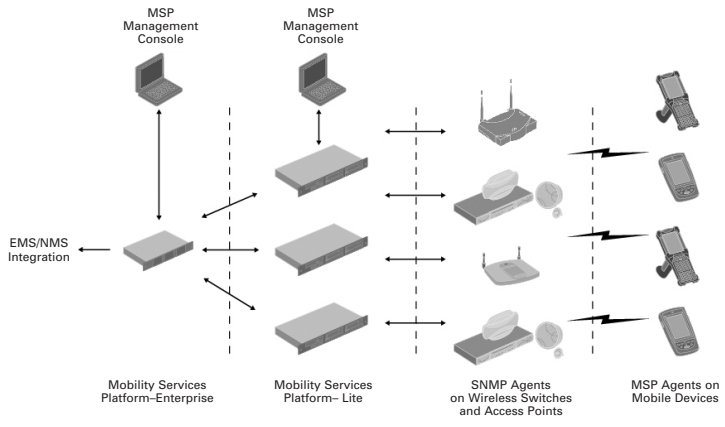
A Look Inside the Mobility Services Platform

The Mobility Services Platform from Symbol consists of three components: MSP Server, MSP Agents and MSP Studio. Comprehensive wireless network management capabilities are seamlessly integrated with advanced device provisioning, monitoring and security functionalities. For example, device provisioning is policy-based so that a mobile device is provisioned based on its type, user, location or any other attribute. In addition, advanced device monitoring capabilities provide visibility into key device metrics such as bandwidth consumption, battery status, RF status and scanner status. A secure, role-based console provides customizable views that are appropriate to different functional areas.

- MSP Server—This provides server-side control of the enterprise mobility deployment. MSP server features several enhanced management services for mobile device and wireless LAN management and monitoring, including discovery, monitoring, remote control, configuration, provisioning and trouble-shooting.

Through a Web-based console, MSP server provides network and mobile unit administrators and support personnel with a central mission

MSP Enterprise Mobility Deployment *(Figure 1)*



control dashboard with role-based access to MSP management services. MSP Server console is utilized through standard Internet browsers such as MS Explorer and Netscape Navigator.

- MSP Agent—Symbol devices and systems feature embedded mobility services agents (MSP Agents) that collect monitoring and asset information to enable the configuration, provisioning, monitoring and troubleshooting of your mobile units. In addition, MSP interacts with SNMP agents for control and visibility into wireless switches, access points and access ports from Symbol. MSP Agents run seamlessly in both offline and online mode, taking into account the inherent unpredictability of wireless network coverage.

- MSP Studio—MSP enables application developers to develop new and extend existing back-end applications to a large variety of mobile computing devices with faster time to market and 50% less cost than custom coding and point solutions. In addition to offloading complex mobile run-time middleware to MSP, organizations can take advantage of MSP Studio's visual programming environment to empower developers to focus on rich, transactional applications.

How These Components Work Together

Each MSP Agent is associated with an MSP server appliance. As it is running, the MSP Agent collects information about the device on which it resides—information such as remaining battery strength, memory and CPU use, wireless signal strength and more. Periodically, the MSP Agent sends this collected information back to its MSP server (via a switch/AP), which displays the information in the MSP console.

Over on the wireless switch/AP side, MSP Server automatically discovers wireless switches and APs that support wireless network management protocol (WNMP), extensible markup language (XML) or simple network management protocol (SNMP) and queries them for relevant information through their management information base (MIB). MSP Server displays this information in the MSP Server console, intermingled with the mobile device information collected through MSA.

From the MSP Server console user's point of view, the intermingling of switches/APs and devices presents a single, cohesive view into the enterprise mobility deployment. Through the console, users examine the state of the wireless network, generate reports, create notification policies and, in general, manage the end-to-end enterprise mobility deployment.

With an integrated mobility management solution, these core management functions are available across all the areas of the mobility enterprise. Fault detection and isolation is resolved through the wireless infrastructure into the mobile device and down to a device application or registry setting. Configuration parameters are managed by policy and continuously monitored for exception. Network and device usage and performance data is collected into a centralized database, where it's available for analytical processing to help determine performance issues, validate return on investment (ROI) of new deployments and aid in capacity planning.

Value-Added Management Services

Some of the key value-added management services provided by MSP include:

- Rapid Deployment—New mobile devices are rapidly and securely connected to the network with minimal effort. Devices are then automatically provisioned and ready for operational use. This tool significantly accelerates the deployment of mobile devices.

- Device Discovery—This enables operations and IT staff to find all mobile devices that are currently on the wireless network. Through a tree view presented in MSP Server console, the user can "walk the network" to see the associations between wireless switches, access ports, access points and mobile devices.

- Device Monitoring—Operations and IT teams are able to focus on groups of mobile devices to aid in problem resolution. This function allows for the interrogation of various system functions and variables within large groups of mobile devices, including RF signal strength, CPU usage, software inventory and battery level.

- Device Provisioning—MSP users specify groups of devices onto which software packages need to be deployed. As scheduled by the MSP user, this automatically pushes new applications and updates to mobile devices when they connect to the network.

- Device Remote Control—Device administrators and help desk support personnel can get visibility into what is being viewed on the mobile user's screen. Together, problems are diagnosed, and experienced personnel train the mobile user as configuration problems are fixed.

- Asset/Inventory Management—The centralized management collection capability of MSP provides a comprehensive database of all your wireless assets—both fixed infrastructure and mobile devices. The MSP automatically discovers the contents of the wireless environment. Asset/Inventory information is reviewed with built-in reports.

- Network Discovery and Configuration—MSP discovers all wireless infrastructures deployed within defined Internet protocol (IP) address ranges and enables configuration templates to be predefined and applied to groups. This simplifies management and mass configuration of wireless switches and access point.

- Network Monitoring—Monitoring features provide system administrators with up-to-the-minute information on the status of all elements of the wireless network,automatically notifying administrators of any problem via email or pager.

All these value-added management services are controlled through the MSP Server console, shown in Figure 2. It enables users to tie these value-added management services together to solve specific business problems utilizing concepts such as:

- Grouping—MSP provides value-added management services on large groups of large numbers of mobile devices, wireless switches and access points. This eliminates a lot of repetitive work that would otherwise need to be done device-by-device.

- Charting—MSP enables users to display health and performance data in numerous customized ways. Charts can be used to map the history of a particular attribute over time, or to relate one attribute to another, and so on. In addition, the user arranges the layout of the charts on the screen, making it easy to compare and correlate the statistics from two or more managed devices.

- Security—MSP provides a portal-style, highly customizable user interface with role-based and rules-based security policies. Mobile devices are secured with access control functions including local and network user authentication and power-on passwords.

- Events and Thresholds—MSP presents an interface that lets the user choose the device events and construct the threshold expressions that are of interest. It also lets the user specify the appropriate response when an alert is triggered—these programmed responses include sending an email, setting the device's health indicator or even telling the device to modify its behavior.

Mobility Services Platform for Integrated Network & Device Management *(Figure 2)*

- Integrated Fault Isolation and Diagnosis—With health and performance information being collected from mobile devices and wireless infrastructure, MSP users rapidly isolate faults down to a specific portion of their enterprise mobility deployment. With centralized configuration and remote control, MSP users rapidly fix the isolated faults to restore the enterprise mobility deployment back to peak health and performance.

- Integration with other Management Systems—MSP provides the ability to forward any system traps to enterprise management systems, such as IBM® Tivoli, Hewlett-Packard® OpenView and CA® Unicenter, providing further integration into the existing network.

Mobile Application Development and Integration

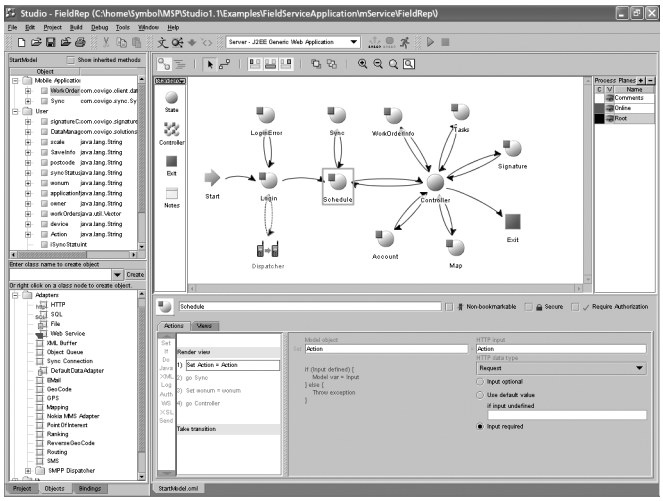
MSP Studio software enables you to develop new and extend existing back-end applications for your mobile devices faster and more cost effectively than custom coding and point solutions. Developers can exploit the visual business process modeling environment in MSP Studio to build rich, transactional applications. Component-based integration enables easy connection of mobile applications with existing databases, applications and systems through pre-built adapters to J2EE, JDBC, web services and more. What's more, integration and application components can be reused across multiple projects and applications, further reducing your development costs. From middleware to database applications, MSP Studio's open integration framework delivers features that enable you to reduce both time and costs in the development process.

With MSP Studio's device-resident smart client, business logic and data are stored locally on the mobile device. Applications transition

smoothly between offline and online states, seamlessly synching stored information either wirelessly over WWAN or WLAN or via a cradle, once the mobile device is reconnected to the network. MSP Studio provides a rich set of run-time components including transactional store and forward synchronization, device-resident smart client, session management, device detection, alerts delivery, transcoding, scheduling and security.

For more information on MSP Studio, please refer to separate whitepapers and datasheets on MSP Studio.

MSP Studio's Visual Business Process Modeling tools for rapid application development. *(Figure 3)*



Business Benefits of the Symbol Mobility Services Platform

Increased Productivity

The Mobility Services Platform saves time by automating a number of management activities that were previously handled manually. By defining compliance policies, an administrator ensures that all wireless switches are running with the same security settings and the same software versions. The need to periodically connect to switches to check the configuration is eliminated. If an operator inadvertently changes a configuration to conflict with corporate guidelines, the administrator is notified. In addition, a policy automatically sets the switch back to its proper configuration.

Designed to improve productivity, another key feature of MSP is automated rapid deployment to new mobile devices. The complex and error-prone activity of manually entering security and network settings on each new device is now performed by simply scanning a sheet of paper.

Eliminating these manual steps improves business productivity and reduces opportunities for operator error that lead to downtime.

Increased Reliability

Increased reliability ensures that business-critical transactions are always performed. High reliability is the result of regular maintenance of infrastructure, proactive monitoring and quick time-to-resolution whenever problems occur.

Scheduling features make maintenance activities a standard and easy IT activity. Scheduling, with advanced device management software, ensures that software upgrades are pushed out in a timely manner and that the data transfer has little impact on business operations.

MSP also provides proactive visibility into your business operations. Statistical trending of performance and fault information helps to identify risk areas before failures occur. By collecting performance and fault data for both mobile devices and the network infrastructure, MSP makes troubleshooting easier. Network operators and support personnel have access to real-time statistics and alerts as well as historical trends. This information leads to faster and more accurate time-to-resolution.

Lower Costs

Increased reliability and automation of management tasks helps to further drive down IT staff costs. By increasing the accuracy of problem diagnosis, MSP reduces support and maintenance costs. Time spent sending mobile devices to the repair depot is reduced with a more accurate picture of the software usage on the device and its performance history. Tools such as remote control are used to troubleshoot the mobile device before sending it to a service center or requiring a technician visit.

Historical trending provides insight into the point at which devices start to fail. This information leads to increased and more predictable device reliability, and reduces costs by dramatically shrinking pools of spare equipment.

Reduces Complexity

As the reliance on mobile solutions increases, so does the size of the mobile deployments for both mobile devices and wireless infrastructure. Large, enterprise mobility deployments often include tens of thousands of mobile and wireless infrastructure devices. The sheer volume of these physical assets and their

particular firmware, operating system and application data overwhelms even the most capable IT/network operations staffs.

The Mobility Services Platform streamlines the complexity of managing large mobile environments by providing for the combination of many elements into a group that is managed and monitored as one element.

Further complexities are removed with an automated detection and monitoring of all elements in the mobile enterprise and the management of these devices with policy-based device provisioning. Policy-based management simplifies the management effort by setting rules that establish and maintain the desired configurations for mobility devices.

Investment Protection

It's important for any mobility solution to fit into a corporation's existing IT infrastructure. The Mobility Services Platform works well with enterprise network management solutions such as IBM® Tivoli and Hewlett-Packard® OpenView, supporting interaction through standard protocols.

The Mobility Services Platform provides a complete management solution and also serves as a platform that is easy to extend by Symbol business partners. The modular platform approach and the use of standard interfaces make it more convenient for the Symbol partner community to provide additional mobility services such as radio frequency identification (RFID), voice over IP (VoIP) or security. It's this level of product extensibility, enabling future technologies, that ensures maximum investment protection.

Mobility Services Platform—Differentiators

The Mobility Services Platform from Symbol is one of the first integrated mobile device and wireless LAN management solutions. With MSP, IT and operations professionals can develop, deploy and manage their end-to-end enterprise mobility deployments in a comprehensive and complete manner. A number of unique, differentiating features are described in Figure 4 below.

Features and Benefits *(Figure 4)*

Features	Function	Benefits
Rapid Deployment	New mobile devices are rapidly and securely connected to the network and provisioned with minimal effort	• Eliminates requirement for pre-staging equipment • Deployment cycles cut from months to days
Integrated monitoring, charting and analysis	End-to-end visibility and troubleshooting of devices and WLAN networks	• Fault resolution reduced from days to hours
Integrated management of devices and networks	Remote discovery, configuration and provisioning	• Deployment of new settings and software reduced from months to days • Reduction in support personnel required
Rapid application development tools	Rapid mobile application development and integration tools and middleware	• Reduce mobile application development time and cost dramatically • Reduce ongoing application maintenance and support costs
Open, standards-based platform	Ability to develop and deploy additional mobility management applications and add support for new mobile devices and wireless infrastructure	• Easily extensible to new applications, mobile devices, wireless infrastructure and existing management tools

Summary

With the increasing proliferation of mobility solutions throughout businesses of all sizes, centralized management is a must. The Mobility Services Platform from Symbol is an extensible service-oriented mobile computing foundation that enables Symbol's customers and partners to advance from complex and difficult-to-manage installations to high performing, reliable and scalable solutions that are easy to develop, deploy and manage.The Symbol approach to mobility management reflects its long history of delivering business-critical solutions to meet the enterprise mobility needs of companies in a variety of industries. More than seven million Symbol scanners and mobile devices are in use worldwide in addition to wireless LAN installations at over 45,000 customer locations. With MSP, Symbol delivers an important element in your ability to achieve total success in capturing, moving and managing information to and from the point of business activity.

For more information about MSP, contact us at +1.800.722.6234, or visit us on the web at **www.symbol.com/software**

About Symbol Technologies

Symbol Technologies, Inc., The Enterprise Mobility Company™, delivers solutions that capture, move and manage information in real time, from the point of activity to the point of decision. Symbol solutions integrate advanced data capture technology, ruggedized mobile computers, wireless infrastructure, enabling software and high-ROI applications from our business partners and Symbol Enterprise Mobility Services. Symbol enterprise mobility solutions increase business productivity and velocity, reduce costs and realize competitive advantage for the world's leading retailers, transportation and logistics companies and manufacturers as well as government agencies and providers of healthcare, hospitality and security. More information is available at **www.symbol.com**

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