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Comparing the Cost of BlackBerry Enterprise Server vs. Microsoft Direct Push

Enterprise Management and Security TCO Comparison



A hands-on white paper
commissioned by
Research In Motion, Ltd.

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White Paper

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Executive Summary

Given the importance of instant communications, it is no surprise that so many Enterprises are planning to build out their corporate E-mail systems to support wireless messaging.

“Experience is the best teacher” goes the old saying. But, all too often, as Will Rogers said: “The trouble with using experience as your guide is that sometimes the final exam comes first, then the lesson.” How true.

Unfortunately, constructing your Enterprise Wireless Messaging infrastructure is not something you can afford to sweep clean and rebuild if you should make the wrong choice for your organization’s needs. Making an educated choice is paramount.

With this in mind, Research In Motion, Ltd. (RIM) commissioned The Tolly Group to not only “spec out” alternative systems but to actually build out working prototypes.

Our task was to research, procure and build prototype messaging systems based on each of the two major alternative offerings: RIM’s BlackBerry and Microsoft’s Windows Mobile 5.0 (using Microsoft’s Direct Push mobile messaging technology). We carried out this project interacting with T-Mobile — selected because the carrier supports both offerings — without involving either RIM or Microsoft directly in the initial process. That is, we approached T-Mobile just as any “regular” potential customer would. *(Note: While Microsoft was not involved in the procurement of the system, The Tolly Group did share all Microsoft-related information to allow the vendor to review for accuracy. The Tolly Group contacted Microsoft on several occasions and invited the vendor to review info related to the Windows Mobile 5.0 solution. Microsoft did not respond to repeated contacts.)*

The Tolly Group built a pair of live mobile messaging environments using the “base” mobile messaging offerings of both Microsoft and RIM, with each environment outfitted with a pair of either BlackBerry or Windows Mobile 5 handheld devices.

At a high level, our goal was to identify and analyze the essential components of a secure mobile messaging system and to determine whether these components are provided as part of the base system or require additional software and/or hardware to be purchased.

Enterprise-Class Mobile Messaging

As there is no universal definition of this term, each customer is left to create his own - or accept someone else's definition.

Security, robustness, manageability and performance are hallmarks of Enterprise-class solutions.

Be sure to understand specific characteristics of each as you make your messaging choice.

A hands-on evaluation by Tolly Group engineers of both RIM's BlackBerry and Microsoft's Windows Mobile 5.0 technologies reveals a wide chasm in cost of deployment to effectively field a comparable set of "enterprise-class" mobile messaging services. The Tolly Group examined costs for the licensing software for clients and servers, plus the server hardware. Pricing does not focus on costs of the handheld units or carrier services. Research conducted by The Tolly Group shows that Microsoft's Windows Mobile 5.0 solution costs \$106,900 for a 500-user network configuration — almost three times the price of a RIM BlackBerry solution configured with a comparable set of services.

Beginning the Journey

Superficially, the RIM and Microsoft Enterprise messaging solutions are "the same" — inasmuch as the goal of each is to deliver E-mail messages to a user's handheld device in real time and without the user having to request those messages. This similarity of ultimate purpose, however, masks the fact that each vendor has implemented this service in significantly different ways.

Importantly, these architectural differences can ultimately translate into significant differences in important areas such as end-user satisfaction and system cost.

With the exception of the fact that both support the corporate Microsoft Exchange Server, the architectures and implementation differ significantly. *(Note: All testing was conducted using Microsoft Exchange Server 2003 since Exchange Server 2007 was released after testing was completed.)*

Where RIM integrates a plethora of management and security options — explored later — into its base implementation, Microsoft chooses to provide many of the same features either as add-ons or make them available as options via third-party partners. RIM believes security and management are core functions for enterprise-class messaging and thus the focus of this report is what does it take for RIM and Microsoft to deliver a comparable set of enterprise-class services.

Where RIM offloads the communication with individual handheld devices to a dedicated messaging server system and architecture (BlackBerry Enterprise Server), Microsoft integrates the control of individual communications sessions as an additional function to be handled by a company's existing "corporate" Microsoft Exchange server.

Research in Motion, Ltd.
BlackBerry Enterprise
Enterprise-based Management and Security Evaluation



As a customer, “their” architecture becomes “your” architecture — and it is important to understand how it might benefit — or limit — your own corporate messaging capabilities.

Tolly Group examination of both solutions shows that two areas — security and management — help distinguish mobile messaging solutions as “enterprise-class” or not.

On the security side, capabilities such as anti-virus protection, integrated firewall and digital certificate support are some key capabilities that RIM offers as standard in its base BlackBerry packaging. RIM believes these are central to offering an enterprise-class security service.

Microsoft, on the other hand, supports the capabilities, but not as part of its base system with Microsoft Exchange Server 2003 (with Service Pack 2). Instead, users must invest extra dollars for software add-ons, or deploy third-party applications for anti-virus, for instance, just to layer in a set of services that meet enterprise needs and bring the Microsoft offering to parity with RIM’s BlackBerry.

It is important to note that even after Microsoft Direct Push is shored up, the foundational differences between the two products will still exist. For example, RIM uses a sophisticated architecture that enhances security by isolating devices from direct connection against corporate firewalls. With Microsoft Direct Push, third-party tools can be acquired to increase the manageability of devices, but those devices still connect directly against the firewall. In other words, while add-ons can be implemented to increase the degree to which Microsoft Direct Push is enterprise-friendly, the overriding product differences are still just as material.

The same is true when it comes to management support. The Tolly Group’s hands-on examination of both mobile messaging solutions shows that RIM’s BlackBerry offers centralized control of handheld devices, supports local and remote software upgrades, delivers centralized management and offers a rich set of IT policies. All of those services are offered standard.

To obtain the same set of services from Microsoft and its Windows Mobile 5.0 products, users would need to deploy a series of extra-cost add-ons, including Microsoft’s System Management Server. This underscores the philosophical difference between RIM’s full-blown standard services within a base system, and Microsoft’s layer-as-you-go approach.

Sizing up Security

The differences between RIM's BlackBerry approach to enterprise mobile messaging and Microsoft's Windows Mobile 5.0 approach become apparent when buyers study the standard, out-of-box security and management features of both solutions.

With BlackBerry, RIM has taken a complete packaging approach in which the company has made a decision to outfit BlackBerry with the majority of security features/functions it believes are required by enterprise users.

For instance, all messages to and from BlackBerry devices are encrypted using Triple DES or AES-256 encryption bit-bulk key technology. SSL encryption is supported for Web and application messaging. Microsoft's Windows Mobile 5.0 supports Triple DES/AES-256 encryption, as well.

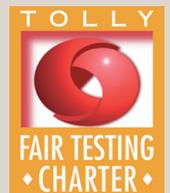
Where the products begin to diverge is the area of anti-virus protection, or content protection. Windows Mobile 5.0 does not directly offer content protection. This is a particular strong suit for RIM's BlackBerry, as it provides protection of handset devices from malicious programs such as viruses, trojans, worms and spyware with 256-bit encryption.

It's also important to note that RIM's BlackBerry uses a purpose-built OS in its handhelds, while Microsoft uses a version of "Windows" for mobile devices. While that allows Windows programs to run on the Windows Mobile platform, it also opens up users to many of the same security issues that exist of desktop and notebooks running Windows.

Microsoft does not offer anti-virus capabilities in its Microsoft Exchange Server 2003 (with Service Pack 2), relying instead on the offerings of third-party software vendors such as

Reaching Out to Microsoft

In accordance with The Tolly Group's Fair Testing Charter, company representatives reached out to Microsoft representatives on several occasions to solicit the vendor's assistance in reviewing product-related info and to verify configurations. Microsoft did not respond to any of these contacts.



For more information on the Fair Testing Charter, visit:
<http://www.tolly.com/FTC.aspx>



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Trend Micro Devices to install Mobile Security 3.0 or similar tools. This leaves Microsoft mobile users vulnerable to any attacks on their handheld messaging devices, while BlackBerry users are secure since the BlackBerry Enterprise Server comes with the protection as a standard out-of-the-box function.

This makes it necessary for network administrators to upgrade all handheld devices using the Microsoft software to layer in a third-party antivirus/security package. Not only is this time-consuming, but it likely requires additional cost to purchase and deploy all the individual software licenses to each of the handhelds.

Firewalls are important security tools in any enterprise. Some vendors, like RIM, bundle firewall functionality into handset devices. This blocks hackers from sniffing traffic on a user's handheld to thwart Denial-of-Service attacks, PING flood attacks and other attacks that attempts to break the secure connection between the handheld and the back-end server.

While RIM integrates such functionality into its BlackBerry handsets, Microsoft does not support integrated firewalls in Windows Mobile 5.0, forcing users instead to lean upon third-party companies such as Trend Micro or others to deliver firewalls. This affects the total cost-of-ownership for the Microsoft Windows Mobile 5.0 technology, since users need to purchase and deploy one more extra software add-on, not to mention the deployment of such an add-on to hundreds, or even thousands of handheld devices, will result in network administrators having to load and integrate the software at additional cost and complexity.

There are several security functions supported by both BlackBerry and Microsoft Windows Mobile 5.0. Both solutions support local and remote "wipe out," which is the ability of an administrator to wipe out a user's data on a handheld that has been lost or stolen. This capability is integrated into RIM's BlackBerry Enterprise Server software, while it is a free utility for Microsoft Exchange Server 2003 called Microsoft Exchange Server ActiveSync Web Administration Tool that results in additional installation costs.

Both solutions support local and remote handset device locking as part of the base package offering, an extra layer of security that forces users to logon to devices after they have been idle for extended periods of time.

The PGP protocol and Secure Multipurpose Internet Mail Extensions (S/MIME) for secure E-mail messaging also are supported by RIM's BlackBerry, while Tolly Group tests reveal that the Microsoft Windows Mobile 5.0 only supports PGP, and that support is offered on Exchange Server 2003 SP2.

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Likewise, both solutions support a variety of Root Certificates such as VeriSign, Thawte, etc. on handheld devices. Whereas both solutions support a variety of third-party certificates, BlackBerry Enterprise Server, by default, offers certificate-based authentication for handset devices. Microsoft Windows Mobile 5.0 does not offer this as part of a base package offering, but instead requires users to upgrade and deploy a Microsoft Certifi-

Standard Security Features Supported			
Features	RIM BlackBerry Enterprise Server & BlackBerry Handset	Microsoft Direct Push Technology Solution (Microsoft Exchange Server 2003 (SP2) with ActiveSync 6.5 & Windows Mobile 5 Handset)	Additional Software Required for Microsoft Solution
Encryption using Triple-DES or AES-256 bit bulk key technology for all messages. SSL encryption is supported for Web and application messaging with or without the Triple-DES and AES approach.			None
Anti-virus content protection on handset from malicious programs like viruses, trojans, worms and spyware, with 256-bit AES encryption			Need to install third-party software such as Trend Micro Mobile Security 3.0
Local and remote "wipe-out" support			Need to install "Microsoft Exchange Server ActiveSync Web Administration Tool" to enable administrators to support the "wipe" feature
Local and remote handset device lock			None
Handset device activation through server policies			None
Firewall integrated into hand-set device			Need to install third-party software such as Trend Micro Mobile Security 3.0
Hand-set supports TLS and WTLS			None
Certificate-based authentication for handset devices			Need to install Microsoft Certificate Server
Root certificate support for VeriSign, Thawte, etc.			None
PGP and Secure Multipurpose Internet Mail Extensions (S/MIME) support for secure E-mail messaging			Exchange Server 2003 SP2 only supports S/MIME for secure messaging

Source: The Tolly Group, March 2007

Figure 3

Seven Critical Management Functions for Enterprises

- Centralized control from a single location
- Central control of handset applications
- Local and remote software upgrades
- Policy administration
- Control restrictions on Web content and file attachments
- Supports filters to control message redirection
- Central monitoring of client usage patterns

cate Server to gain support for the digital certificates. This certificate server add-on must be installed manually and integrated into Windows Server 2003.

In order to beef up Windows Mobile 5.0 to offer security similar to BlackBerry Enterprise Server, users would spend upwards of \$46,000 for a 500-user network. That covers almost \$5,500 for a Microsoft Internet Security and Acceleration Server, \$17,475 for third-party anti-virus client software for 500 users (Trend Micro Mobile Security 3.0 at \$34.95 each.), \$19,025 for Microsoft System Management Server Enterprise Edition R2 plus 500 user licenses and another \$4,000 for a dedicated security server. That's a hefty price to pay for enterprise-class security already available in BlackBerry's base package.

Tale of Two Managements

Out of 7 critical management functions that RIM believes are required for enterprise-class mobile messaging, Microsoft provides just two bundled directly, opting instead to place management into the hands of third parties, who then must integrate their functions into a variety of Microsoft products.

Right from the start, Tolly Group engineers sized up both mobile messaging solutions for their ability to offer centralized management from a single location to all handsets and servers. RIM provides just this type of central management within BlackBerry Enterprise Server. Microsoft offers no such support in its basic Windows Mobile 5.0 technology package.

Instead, users must purchase and install Microsoft's System Management Server 2003 Release 2 software. While System Management Server 2003 won't break the bank at a cost of \$525 for server software, the incremental per-user license cost, even for a 500-user installation, will grow pricey, at \$18,500 (\$37 per user on average for the 500 user scenario surveyed). That's a cost that is above and beyond the functionality already built into BlackBerry Enterprise Server.

System Management Server is necessary within Microsoft's Windows Mobile 5.0 technology to enable network administrators to control handheld devices. Moreover, the management functionality offered by Microsoft represents basic functionality — such as controlling all 500 handheld devices from a single management window. BlackBerry Enterprise Server offers a much more advanced set of management services that provide IT administrators robust control over mobile BlackBerry hand-held units from a central location.

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Likewise, RIM believes it is vital to provide local and remote application software upgrades to handset devices on an automatic basis. Microsoft does not support this as a basic feature required by enterprises, but instead supports the function in a System Management Server 2003 add-on.

The same holds true for centralized control of handset applications, like calendaring. Users must upgrade to System Management Server to obtain basic application management services (such as turning off calendaring for some users, or disabling a Web browser for some users.) Then there's the issue of policy administration. IT policies enable administrators to control the desktop behavior of a desktop device by enabling/disabling custom applications and monitoring the behavior of the handset, the server and the domain controller.

RIM provides over 300 IT policy rules that can be applied to a single user, or to a group of users via administration (See Sidebar: RIM's Enterprise Focus on Policy Control). Microsoft does not offer policy management as a standard, out-of-the-box capability. Instead, users must opt for another

Standard Management Features Supported			
Features	RIM BlackBerry Enterprise Server & BlackBerry Handset	Microsoft Direct Push Solution (Microsoft Exchange Server 2003 (SP2) with ActiveSync 6.5 & Windows Mobile 5 Handset)	Additional Software Required for Microsoft Solution
Centralized management from a single location to all handsets and servers			Microsoft System Management Server 2003 R2
Local and remote software upgrades to handset devices			Microsoft System Management Server 2003 R2
Centralized control of handset applications			Microsoft System Management Server 2003 R2
Extensive IT policy support to control the behavior of any handset			Internet Security and Acceleration (ISA) Server 2006. (RIM supports 160 IT policies in standard base package to a single user or group of users.)
Support for administrative filters to control messaging redirection for a single, a group or all user accounts			Exchange Server 2003 supports limited functionality. Allows administrators to forward E-mails to other users
Central control of Web content and file type restrictions for attachments			None
Central collection and display of basic statistics on message volume, message status and device status at user and server level.			Microsoft Exchange Server User Monitor to provide current client usage patterns

Source: The Tolly Group, March 2007

Figure 3

extra-cost add-on — this time Microsoft's Internet Security and Acceleration (ISA) Server 2006. At just under \$5,500, the ISA Server, along with the additional System Management Server needed for management purposes, account for almost \$25,000, or almost two-thirds the price of what users would pay for a full-featured RIM BlackBerry solution.

Every centralized network management team needs tools that report back basic statistics on such operational characteristics as message volume, message status, and device status at both the user and server levels. RIM's BlackBerry solution provides just such a reporting function built into its base package as an out-of-the-box management reporting capability.

Microsoft, on the other hand, does not. It requires users to deploy yet another add-on utility, Microsoft Exchange Server User Monitor, to provide data details on current client usage patterns. This is a free utility offered on Microsoft's Web site. This continues to underscore the basic philosophical difference in the built-in out-of-box enterprise services layered

RIM's Enterprise Focus on Policy Control

The BlackBerry Enterprise Solution gives IT administrators robust control over their wireless handheld network through comprehensive IT policy management tools. The IT policies provided in BlackBerry Enterprise Server can be applied at an individual level, a group level or across the entire BlackBerry environment. Although not verified by Tolly Group engineers, RIM says it offers over 300 IT policies, enabling administrators to enforce specific capabilities around:

- Forcing password use, password complexity and timeouts
- Application availability
- Functions that can be performed within each application
- Bluetooth peripherals and how they connect to the BlackBerry smart phone
- The BlackBerry Smart Card Reader, for two-factor authentication to the BlackBerry smart phone
- Internet browser availability and capabilities
- IT policy change notifications
- Owner information settings
- Attachment viewing and supported formats
- Backup and synchronization requirements and frequency
- SMS, MMS and PIN to PIN message capabilities
- S/MIME and PGP requirements
- Private key storage level for encrypted messages
- Content protection strength
- Encryption settings and certificate use
- SIM card control over location-related information and call capabilities



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into BlackBerry Enterprise Server, versus the bare bones approach employed by Microsoft where users deploy optional, extra cost software or tools to build a custom set of services.

To its credit, Microsoft did offer two functions in its base enterprise mobile message solution. Both companies offered support for administration filters that enable IT administrators to control message redirection for a single user, a group of users or all user accounts. One point to note: Tolly Group engineers found that

Microsoft Exchange Server 2003 supports limited functionality (such as forwarding a message to another address). RIM, on the other hand, provides a much more robust set of services.

Finally, Microsoft, like RIM, enables IT administrators to control the restriction on Web content and file type for attachments.

Cost Details

The cost differences between RIM's BlackBerry and Microsoft's Windows Mobile technologies are driven in large measure by the philosophical differences in the mobile messaging architectures.

RIM has devised BlackBerry to deliver a base package rich in enterprise-class mobile messaging services and functions required for enterprise users. It is the equivalent of a "prix fixe" dinner, where all of the elements (or courses) are bundled together under one fixed price. With its BlackBerry products, RIM has addressed wireless transport, wireless security and IT administration all in one product.

Microsoft, on the other hand, has devised Windows Mobile to be an "a la carte" selection, where users purchase a base system, and then elect to add options to complement the main selection to suit a user's individual needs. While Microsoft users may be attracted to initial deployment costs for a base Direct Push-based Windows Mobile system, they soon will more than double their capital outlay as they deploy a set of services comparable to what is available in BlackBerry Enterprise Server for less money.

The cost of a BlackBerry Messaging Solution for a Microsoft Exchange environment with 500 users is \$36,729, according to pricing data collected by Tolly Group engineers between 01 March 2007 and 16 March 2007. Pricing was acquired through business vendors, such as Dell and Best Buy Business.



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That includes \$27,499 for 500 client access licenses (\$55 per user), \$4,000 for a dedicated server on which to run the BlackBerry Enterprise Server for Microsoft Exchange, version 4.1, \$2,999 for the server software, and \$2,231.41 for Microsoft Windows Server 2003, R2 Enterprise Edition.

Moreover, the price for the BlackBerry solution is the same, regardless of what version of Microsoft Exchange a user may be running. That means there is no requirement to upgrade to the latest Exchange version and incur the extra operating system costs for server and for client licenses.

By contrast, the cost just to add the base functionality of Microsoft Windows Mobile 5.0 would be \$58,720. (See Figure 4.) This cost largely is for Microsoft Exchange Server 2003 and 500 client licenses, which includes base Windows Mobile technology to synchronize mobile handheld mailboxes with Microsoft Exchange Server 2003. Users also would deploy Windows Server 2003 and client licenses. If the Windows 2003 Servers and client licenses are in place, the base cost for Microsoft Windows Mobile

Cost of Hardware/Software to Deploy BlackBerry Enterprise Server into a 500-User Microsoft Exchange Environment	
Hardware/Software	U.S. list price
Microsoft Windows Server 2003 R2 Enterprise Edition	\$2,231
BlackBerry Enterprise Server for Microsoft Exchange version 4.1	\$2,999
BlackBerry Enterprise Server Client Access License (500 Users)	\$27,499
Server hardware (Single-processor, dual-core Intel Xeon, 3 GHz and 4 GB memory, 1 TB of useable memory and RAID 5)	\$4,000
TOTAL	\$36,729

Source: The Tolly Group, March 2007

Figure 3



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drops to \$36,502. While the cost may be comparable to the BlackBerry Enterprise Server Deployment, the functionality pales in comparison since the BlackBerry solution delivers a full set of enterprise-class services while the Microsoft solution delivers basic functionality.

Tolly Group research shows that pricing for an enterprise-grade Microsoft Windows Mobile 5.0 solution, for users who already have Microsoft Exchange Server 2003 deployed, costs \$106,900 — or almost three times more than the cost to deploy BlackBerry Enterprise Server with a full suite of enterprise services. (See Figure 5.) The Microsoft Windows Mobile upgrade includes extra-cost options required to bring it on par with BlackBerry Enterprise Server. The price includes the bundling of Microsoft System Management Server and related client licenses, Microsoft Internet Security and Acceleration Server and third-party anti-virus software. But it also includes a second license for Microsoft Exchange Server 2003 and associated client licenses (\$32,843 combined) because the second

Cost of Hardware/Software Required for a Base Microsoft Direct Push Deployment in a 500-User Environment (For Sites without Microsoft Exchange 2003 or Exchange 2007)	
Additional Hardware/Software	Cost
Microsoft Exchange Server 2003 Standard Edition (with Service Pack 2)	\$668
Microsoft Exchange Server 2003 Licenses -- 500 Users	\$31,815
Microsoft Windows Server 2003 R2 Enterprise Edition (Two at \$2,231.41 each)*	\$4,463
Microsoft Windows Server 2003 CALs (Client Access Licenses) - 500 Users	\$13,775
Servers (Two at \$4,000 each)	\$8,000
TOTAL	\$58,721

**NOTE: One Windows Server 2003 server supported Active Directory (Domain Controller), DNS and DHCP. The second Windows Server 2003 device supported Microsoft Exchange Server 2003 (Service Pack 2) for messaging services.*

Source: The Tolly Group, March 2007

Figure 4



WHITE PAPER: RIM BlackBerry Enterprise Server vs. Microsoft Direct Push Exchange Server

Exchange Server must be deployed on the network front end to offload the

Cost of Hardware/Software Required for a Microsoft Direct Push Deployment in a 500-User Enterprise Environment	
Hardware/Software	U.S. list price
Microsoft System Management Server 2003 Enterprise Edition R2	\$525.00
Microsoft System Management Server 2003 Enterprise Edition R2 Licenses (500 Users)	\$18,500.00
Microsoft Exchange Server 2003 Standard Edition (Front-end Server)	\$667.84
Microsoft Exchange Server 2003 Licenses (500 Users) - (Front-end Server)	\$31,815.00
Microsoft Windows Server 2003 R2 Enterprise Edition (3 each at \$2,231.41)	\$6,694.23
Microsoft Windows Server 2003 CALs (Client Access Licenses) - (500 Users)	\$13,775.00
Microsoft Internet Security and Acceleration Server 2006 Enterprise Edition	\$5,448.49
3rd. party Anti-virus software (Trend Micro Mobile Security 3.0)* Price per User = 34.95	\$17,475.00
Servers (Three each at \$4,000)	\$12,000.00
TOTAL	\$106,900.56

**NOTE: All prices exclude shipping and do not include the cost of Microsoft Exchange Server.*

Source: The Tolly Group, March 2007

Figure 5



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primary Exchange Server.

BlackBerry users do not incur the cost of adding a second Exchange Server because the BlackBerry Enterprise Server acts as a front-end processor to offload the back-end Exchange Server.

Consider also that these are just upfront acquisition costs. Users who deploy Windows Mobile 5.0 face additional costs in the form of widespread deployment of the extra components, plus maintenance and support costs.

When users take the time to investigate pricing of the two enterprise mobile messaging solutions, it becomes clear that buyers pay a premium for the “a la carte” approach Microsoft has adopted with Windows Mobile 5.0.

Test Details

Test Setup & Methodology

Tolly Group engineers conducted hands-on testing of both wireless mobile messaging solutions — RIM’s BlackBerry and Microsoft’s Direct Push on two individual enterprise environments capable of supporting up to 500 users each. The wireless carrier network utilized for both solutions was T-Mobile, Inc.

Engineers assembled all of the products in order to represent and understand the hardware and software requirements on each messaging solution. First, engineers deployed and configured two individual Microsoft messaging environments that consisted of a Microsoft Exchange Server 2003 (Service Pack 2), Domain Controller and DNS servers. Then, engineers deployed in one of the Microsoft messaging environments, RIM’s BlackBerry Enterprise Server on a separate Windows Server 2003 server.

The second environment simply consisted of Microsoft Exchange Server with Service Pack 2, the Domain Controller and DNS Servers. Once both mobile messaging solutions were deployed and configured with their respective handsets, engineers identified and listed the “core” features and functions that an enterprise mobile messaging environment must have under the categories of security and management.

Engineers validated the list of features and functions on both mobile messaging solutions and compared the set of default features provided by each solution. If one or more features were not provided by default by one of the mobile messaging solutions, then it was marked as “not available” and en-



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engineers listed which extra component was needed to support those features with its cost.

Regarding server hardware selected for this test, Tolly Group engineers researched and collected information on Microsoft's Web site about the minimum system requirements needed for software products, such as Microsoft Exchange 2003, Microsoft Systems Management Server 2003 and Microsoft ISA Server 2006, and determined that one server for each product was able to handle and perform well in a 500-user environment.

<http://www.microsoft.com/technet/sms/2003/library/whatsnew.mspx#E4B>

<http://www.microsoft.com/isaserver/prodinfo/system-requirements.mspx>

<http://www.microsoft.com/technet/prodtechnol/exchange/2003/sysreqs.mspx>

For more information on system requirements for the products mentioned, please refer to the following links:

"Corporate" Messaging Infrastructure

Windows Server 2003 R2 Enterprise Edition (Service Pack 1)

Microsoft Exchange 2003 Enterprise Edition (Service Pack 2)

- o ActiveSync (version 6.5.7638.1)

- Server hardware (for both RIM and Microsoft solutions)
 - Single processor dual-core Intel Xeon processor running at 3-GHz with 4 MB of cache memory
 - 4 GB of RAM memory
 - 1.5 TB of hard drive space (1 TB usable)
 - RAID Level 5 configured for fault tolerance and redundancy
- One Dell Precision WorkStation 650
 - Dual socket Intel Xeon (single-core) processors running at 2.8 GHz
 - 2-GB RAM
- Two Dell Dimension 2350
 - Single-core Intel Pentium 4 processor running at 2-GHz
 - 512-MB RAM
- Two IBM-compatible PCs



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- Single-core Intel Pentium 4 (Hyper Threading) running at 3-GHz
- 1-GB RAM
- Two NETGEAR eight-port Dual Speed Hub (Model DS108)
- Juniper/NetScreen NS100 (Version 4.0.0r4.0)
- Wireshark (formerly Ethereal Network Protocol Analyzer) version 0.99.0

RIM BlackBerry-specific Environment

Certain software and hardware was part of only the RIM environment:

- 2 x BlackBerry 8700g Wireless Handheld (version 4.1.0.346, platform 2.0.0.143)
- BlackBerry Enterprise Server (version 4.1.2.25)
 - o Component Info:
 - USB Channel Controller (Version 3.0.0.4)
 - Device Manager (Version 4.2.0.7)
 - Application Loader (Version 4.2.0.10)
 - RIM Intel Programmer (Version 1.0.0.35)

Microsoft Windows Mobile 5.0-specific Environment

- 2 x T-Mobile Dash Wireless Handsets
 - o Operating System: Windows Mobile 5.0 with the Messaging and Security Feature Pack (version 5.1.342 (Build 15097.3.0.1))
 - o Radio version 4.1.13.24_02.48.90
 - o RIL version 2.002
- Microsoft Exchange Server 2003 Enterprise Edition with Service Pack 2
 - o ActiveSync (version 6.5.7638.1)