

Technical White Paper BlackBerry™ Enterprise Server

**For Microsoft® Exchange™
Version 2.1**

Research In Motion Limited

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1. Introduction

The BlackBerry solution for linking the desktop and the handheld is an innovation in simplicity. As most organizations view manageability and scalability as priorities, the BlackBerry Enterprise Server addresses these issues by providing an innovative solution for the organization's IT department that is focused on IT concerns: centralized administration, control of wireless email, security and deployment. However, individual users may still configure their email redirection settings using the BlackBerry Desktop Manager on their desktops.

2. System Architecture

2.1 Basic Architecture

The purpose of the BlackBerry Enterprise Server is to centralize management and control of the BlackBerry solution within an organization. The BlackBerry Enterprise Server performs the following functions for each user:

- Monitors the user's mailbox for new email.
- Applies user-definable filters to new messages to determine if and how the message will be relayed to the user's BlackBerry Wireless Handheld.
- Compresses and encrypts new messages and pushes them to the BlackBerry Wireless Handheld via the Internet and wireless network.
- Receives, via the Internet, messages composed on the BlackBerry Wireless Handheld, then decrypts and decompresses the messages and places them in the user's Outbox for the corporate Microsoft® Exchange Server to deliver.

The BlackBerry Enterprise Server provides a secure, two-way link between the user's Microsoft Exchange account and the user's BlackBerry Wireless Handheld. Consider the BlackBerry Enterprise Server as a conduit rather than a mail server or message repository – all message storage is still left to the Microsoft Exchange Server. By maintaining a link to the messages in the user's Microsoft Exchange mailbox, the BlackBerry Enterprise Server provides several advanced features:

- When forwarding a message from the handheld, the BlackBerry software forwards the complete original message from the user's Microsoft Exchange account, including all attachments that are appended to the message. Although attachments cannot be viewed on the handheld, they can still be forwarded to other email addresses.
- When receiving a message from the handheld, the first 2K of a message are pushed to the handheld. The user is able to request more of the message to be delivered in 2K blocks up to a maximum of 32K.

When "replying with text" from the handheld, the BlackBerry software will append the entire original message to the reply, not just the 2K that was sent to the handheld.

The BlackBerry Enterprise Server is a Windows® NT service that can monitor many users at once over a single administrative connection to the Microsoft Exchange Server. The BlackBerry Enterprise Server uses a direct TCP/IP connection to the wireless network. Achieving this direct connection requires a one-time configuration of the company firewall and results in a considerable speed advantage. Figure 1 provides an overview of the system architecture. At the heart of this wireless email solution is the BlackBerry Enterprise Server (A). The BlackBerry Enterprise Server is administered through extensions to the standard Microsoft Exchange Administrator (B). The configuration information is placed in the data store of an Administration account (C) that must be set up for the BlackBerry Enterprise Server. This account must have privileges to read and write to the message stores of the users it serves.

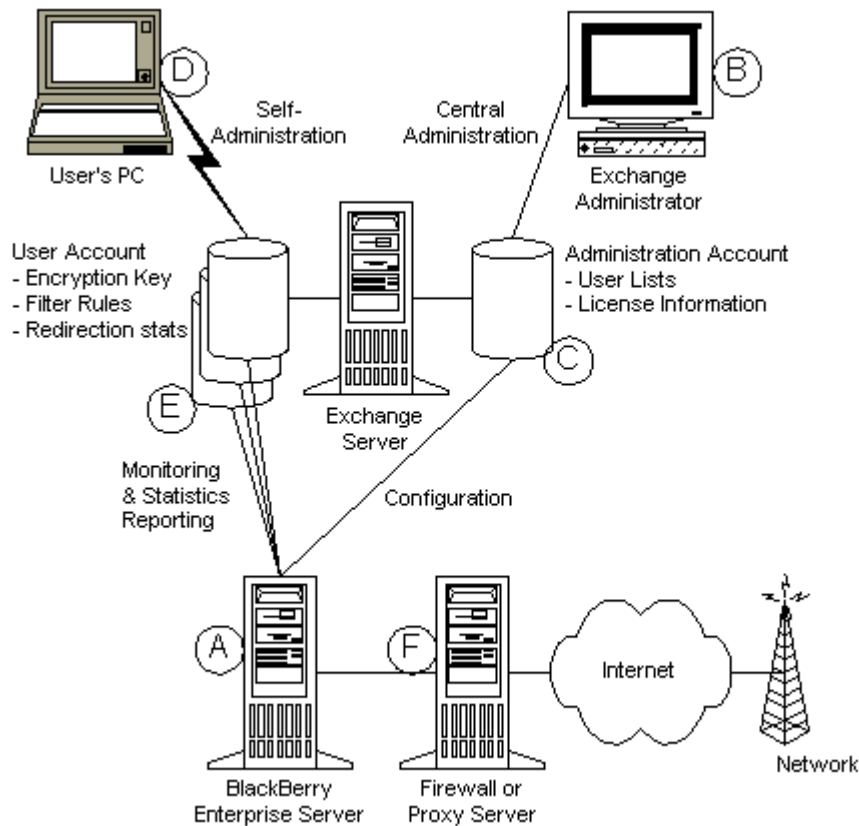


Figure 1. Architecture using BlackBerry Enterprise Server

The BlackBerry Enterprise Server maintains a constant direct TCP/IP level connection (Server Routing Protocol or SRP) to the wireless network. The firewall must be configured to allow the BlackBerry Enterprise Server to connect through port 3101. This is not a “hole” in the firewall because only an outbound originated connection is required.



Figure 2. BlackBerry Desktop Manager window

Users have control over their own filter rules and encryption key information using the BlackBerry Desktop Manager (Figure 2) that runs on their own desktop (D).

2.2 System Requirements

Because the BlackBerry Enterprise Server functions like a conduit, the system requirements are quite minimal and driven more by Windows NT than by the BlackBerry Enterprise Server software.

OS: Windows NT 4.0 (Service Pack 3 or higher), Windows 2000.

Memory: 128MB

CPU: Pentium® processor or compatible (200 MHz or higher).

Disk Storage: 2MB in addition to the minimum Windows NT requirements. Because the BlackBerry Enterprise Server does not store or even queue messages locally, disk requirements are minimal. However, if logging is enabled, more disk space will be required.

Network Adapter: Must be compatible with OS requirements. Information can be found at Microsoft's "Hardware Compatibility" web site.

Software: Microsoft Outlook or Exchange client. This client ensures that the MAPI drivers are installed and is useful for testing the connection to the Administration account used by the BlackBerry Enterprise Server.

2.3 Architecture – Serving Multiple Exchange Servers

The basic architecture illustrated in this document does not apply to all Microsoft Exchange installations as it is common to see multiple Microsoft Exchange Servers deployed in larger installations. The BlackBerry Enterprise Server is extremely flexible and thrives in these environments. Figure 3 gives an example of a single BlackBerry Enterprise Server serving users on two different Microsoft Exchange Servers. The key is to ensure that the administration account that the BlackBerry Enterprise Server connects to has the permission to read and write to the message store of the user on the other Microsoft Exchange Server. The BlackBerry Enterprise Server can redirect email for any Microsoft Exchange user listed in the Microsoft Exchange Global Address List. Although unlikely, every user being served by the BlackBerry Enterprise Server could conceivably be on a different Microsoft Exchange Server.

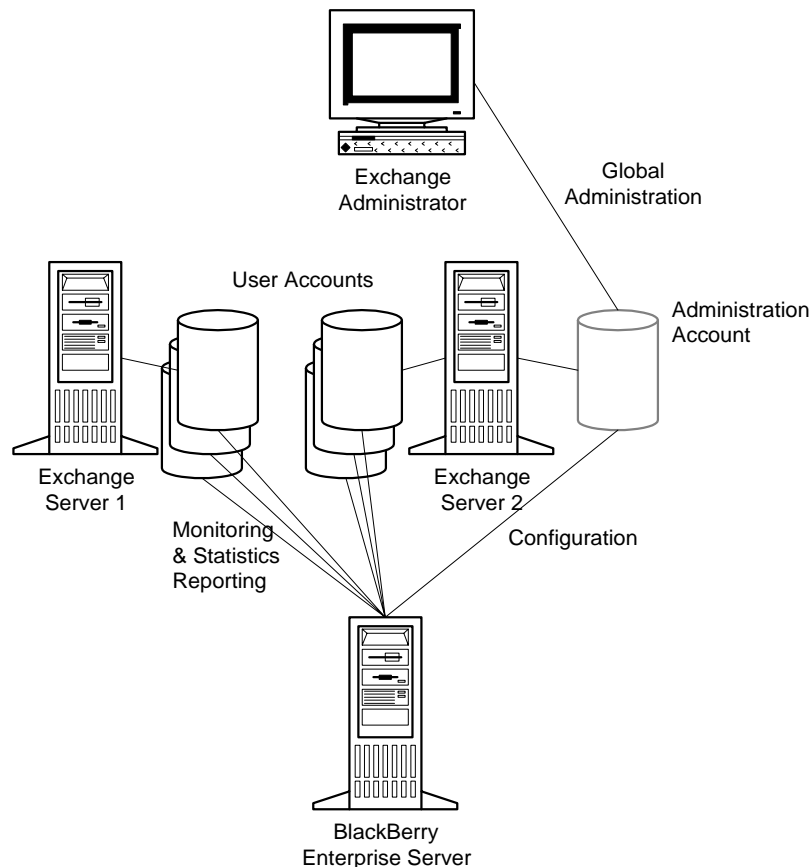


Figure 3. Single BlackBerry Enterprise Server connected to multiple Microsoft Exchange Servers

2.4 Architecture – Scaling

Another variation on the architecture occurs when many users on the same Microsoft Exchange Server want to become BlackBerry users. This may require the use of multiple BlackBerry Enterprise Servers connecting to a single Microsoft Exchange Server (see Figure 4.). The key feature of this configuration is that BlackBerry maintains a single point of contact for administration.

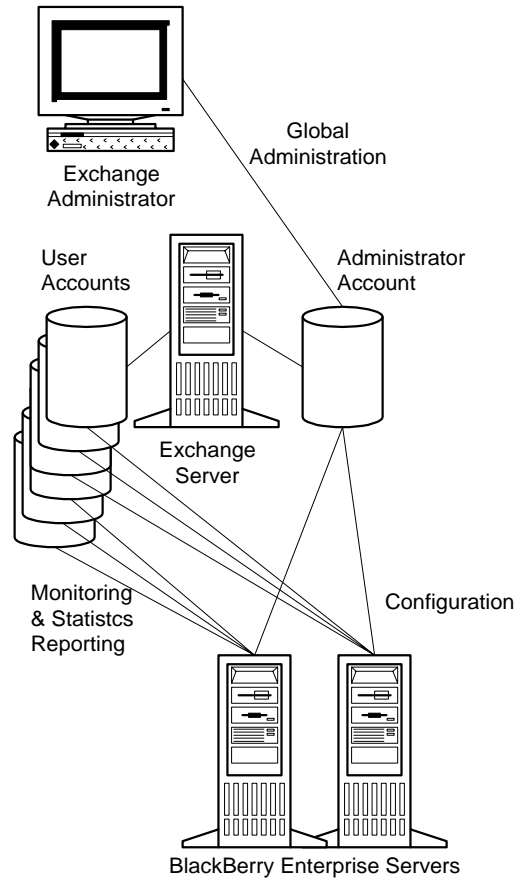


Figure 4. Multiple BlackBerry Enterprise Servers connecting to a single Microsoft Exchange Server

3. Installation

Installing the BlackBerry Enterprise Server is a three-step process:

1. Installing the software is a two-part procedure. The first part involves installing the BlackBerry Enterprise Server software on a Windows NT machine. The second part involves installing the administration software. Administration is accomplished by using DLLs that extend the user interface of the standard Microsoft Exchange Administrator application. These DLLs are installed centrally on the Microsoft Exchange Server so that every remote installation of the Microsoft Exchange Administrator can be enabled to administer the BlackBerry Enterprise Server in a single installation step.
2. A Windows NT account is created and administrative privileges are granted such that this account will have unlimited access to the mailboxes of the BlackBerry Wireless Handheld users.
3. A Microsoft Exchange mailbox (see (C) in Figure 1) is created which is associated with the account. BlackBerry Enterprise Server configuration information will be contained in this mailbox. Finally, a profile is created that connects this mailbox on the machine designated to run the BlackBerry Enterprise Server.
4. The new BlackBerry Enterprise Server is added and configured using the administration software installed in step 1.

3.1 Firewall / Proxy Server Configuration

To simplify its impact on network topology, the BlackBerry Enterprise Server can sit anywhere on the LAN and route its TCP/IP traffic through the firewall or proxy server in the same manner as any web browsing PC on the network. The only requirement is that the firewall or proxy server allows the BlackBerry Enterprise Server to connect to port 3101. Like Microsoft Internet Explorer's http connection to port 80, this is an outbound originated connection. No inbound connection "holes" are created, thereby alleviating any risk of unauthorized access to the corporate network.

The BlackBerry Enterprise Server is responsible for opening the connection to the wireless network that is kept open for bi-directional traffic. This connection is authenticated in both directions to ensure the BlackBerry Enterprise Server is not connecting to an unauthorized party.

4. Manageability

4.1 Overview of Administration Tools

Like other Microsoft Exchange add-on products, administration of the BlackBerry Enterprise Server is accomplished through user-interface extensions to the Microsoft Exchange Administrator. These extensions are DLLs that are installed on the Microsoft Exchange Server and are automatically distributed by Microsoft Exchange to all Microsoft Exchange Administrator installations. The result is there are no other administration programs to learn or install and the BlackBerry Enterprise Server takes advantage of all the remote administration capabilities of Microsoft Exchange.

From any Microsoft Exchange Administrator, the BlackBerry Servers Properties window (Figure 5) is accessible. This is where administration of the BlackBerry solution is controlled. To administer, the BlackBerry Enterprise Server is selected from the drop-down menu at the top of the window. (See Figure 5 for an architecture diagram of a multiple BlackBerry Enterprise Server installation.) Below this menu is the license information.

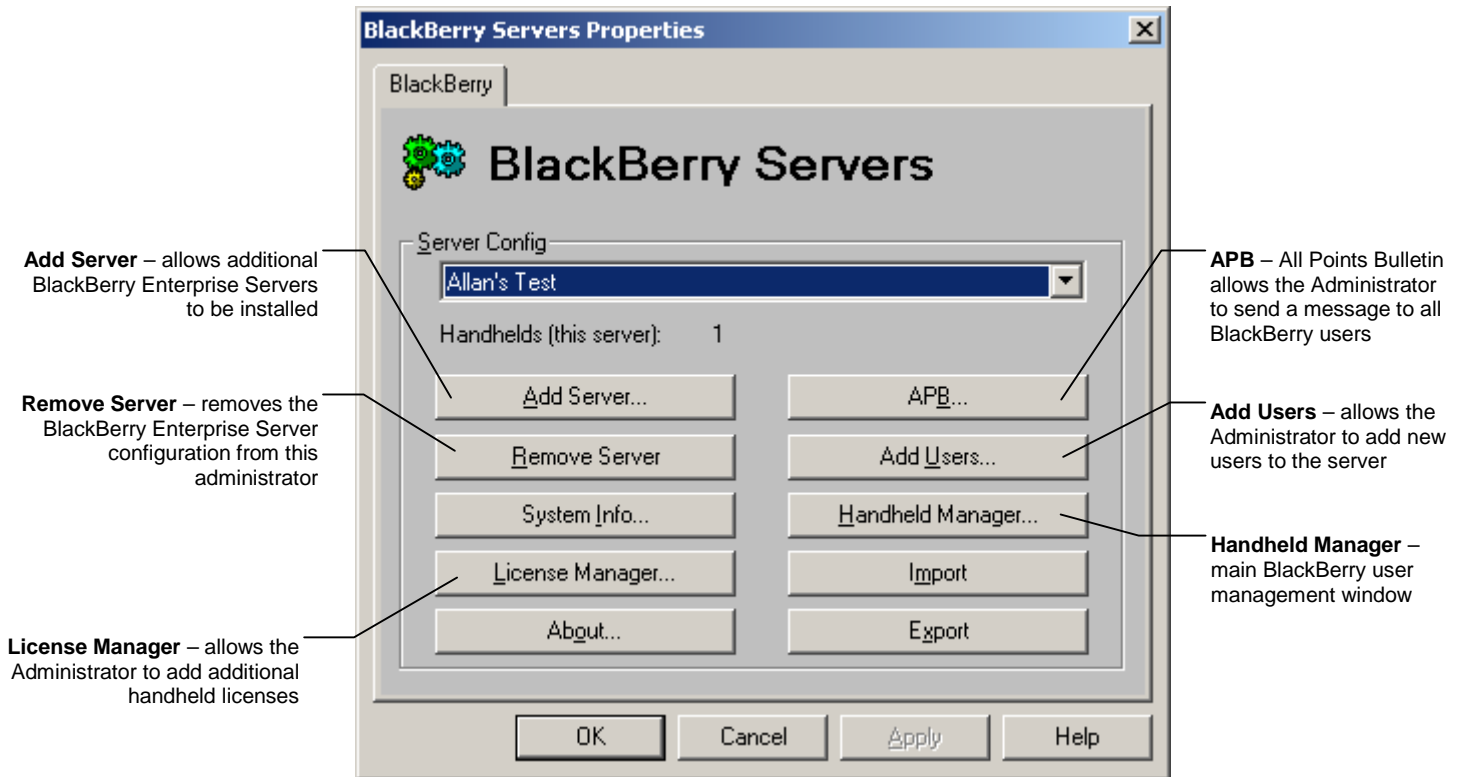



Figure 5. BlackBerry Servers Properties window

The following window (Figure 6) appears when the “Add Server...” button is selected in the BlackBerry Servers Properties window:



The dialog box titled "BlackBerry Enterprise Server System Info" contains the following fields and buttons:

- Server Name: [Text Field]
- [Import...]
- SRP Identifier: [Text Field]
- SRP Authentication Key: [Text Field]
- Host Routing Info (Warning: only provide a value for this field if one is specified on your installation CD label): [Text Field]
- Admin Mailbox: [Text Field] [Select Mailbox] [Check Name]
- [OK] [Cancel] [Help]

Figure 6. BlackBerry Enterprise Server System Info window

The following information is required for each BlackBerry Enterprise Server that is installed:

- **Server Name:** This field distinguishes this BlackBerry Enterprise Server installation from any others that may be running against the same Microsoft Exchange Server. Any string is acceptable.
- **SRP Identifier:** This field, along with the SRP Authentication Key, is required for authenticating the connection to the wireless network.
- **SRP Authentication Key:** This field, along with the SRP Identifier, is required for authenticating the connection to the wireless network.
- **Admin Mailbox:** This field identifies the Microsoft Exchange Administrator account that connects to the BlackBerry Enterprise Server to store configuration information (Shown as (C) in Figure 1).

The following window (Figure 7), in which messages can be composed and sent to all BlackBerry users, appears when the “APB...” button in the BlackBerry Servers Properties window is selected:

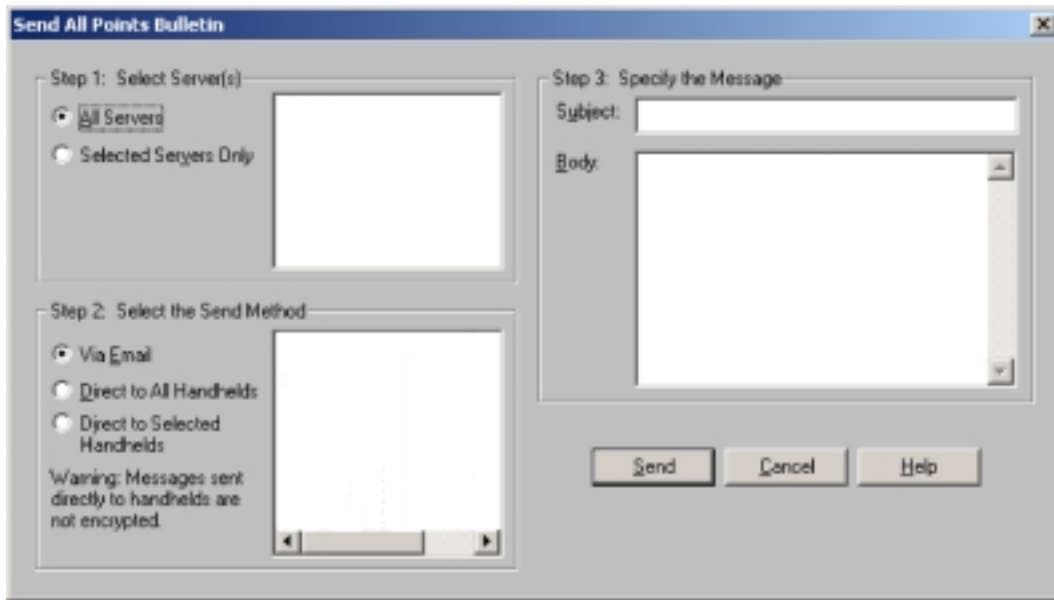


Figure 7. All Points Bulletin (APB) window

The following window (Figure 8), which lists all users on the server, appears when the “Handheld Manager...” button in the BlackBerry Servers Properties window is selected:

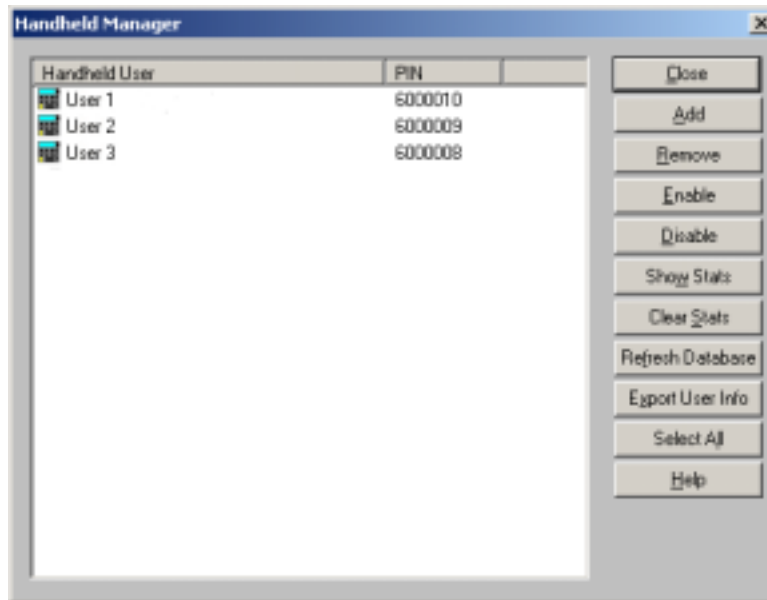


Figure 8. Handheld Manager window

4.2 Setting Up New Users

There are two different scenarios in which administrators may need to add new BlackBerry users.

Scenario 1: The administrator has the BlackBerry Wireless Handheld in their possession and wishes to set up the wireless connection and give the connected handheld to the user.

The administrator can add new BlackBerry users via:

- The Microsoft Exchange Administrator window, under the Configuration tree - BlackBerry tab (Figure 9)

or

- The Microsoft Exchange Administrator window, under the Recipients tree - BlackBerry Servers Properties window.

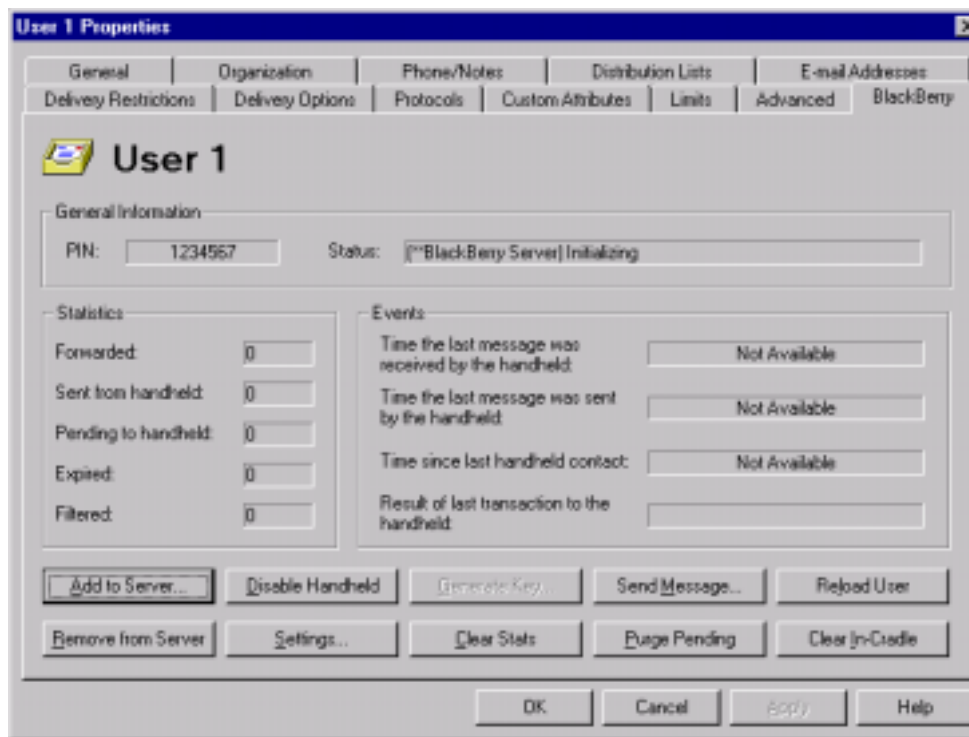


Figure 9. Microsoft Exchange Administrator (under the Configuration directory) – BlackBerry tab

When the “Add to Server...” button is selected, the ‘Add Handheld to a BlackBerry Enterprise Server’ window (Figure 10) appears and a new user can be added to the BlackBerry Enterprise Server.

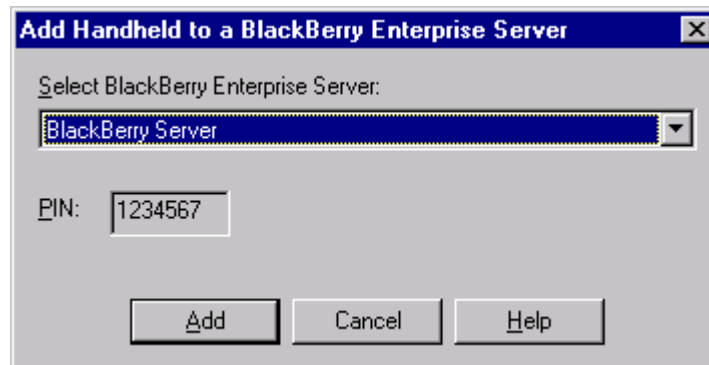


Figure 10. Add Handheld to a BlackBerry Enterprise Server window

Alternatively, the “Add Users” button may be selected in the BlackBerry Servers Properties window. The following window (Figure 11) appears, allowing the administrator to add users.

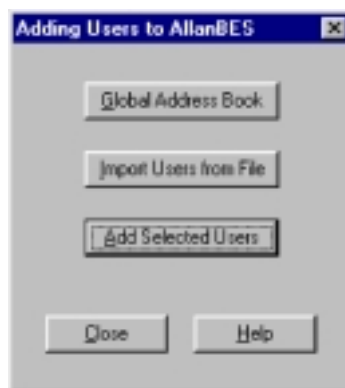


Figure 11. Add Users window

The administrator can add users from the provided list. Alternatively, in the case of adding a large group of users at one time, the administrator can select the “Import Users from File” button. The user names are imported from the selected text file.

The administrator can also add user names from the Global Address List (Figure 12) by selecting on the “Global Address List” button.

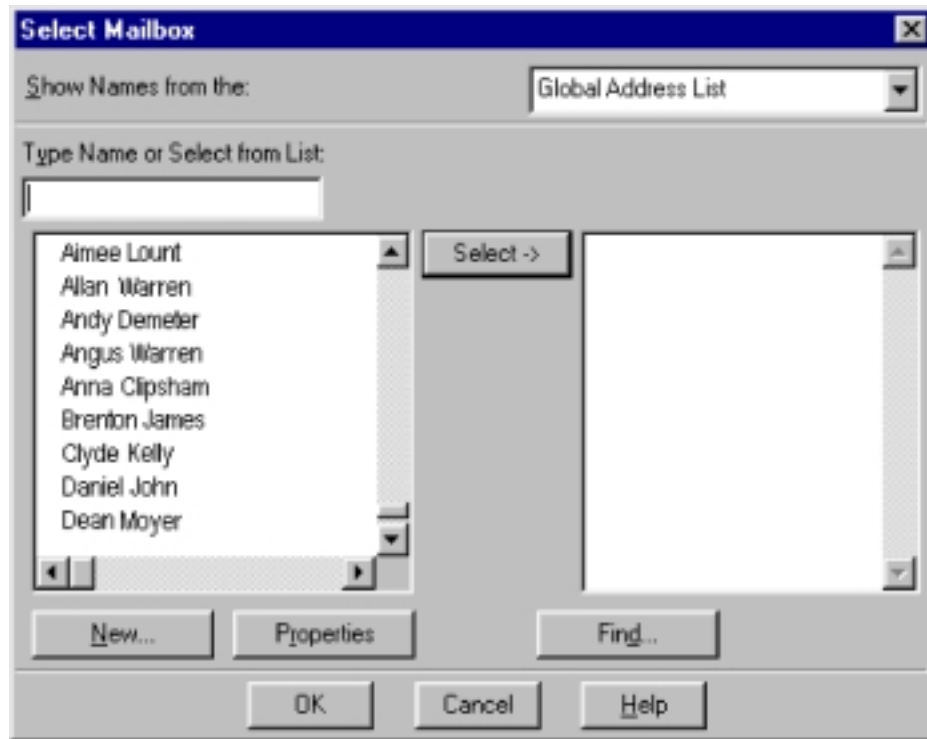


Figure 12. Global Address List window

Scenario 2: The end-user has taken delivery of the BlackBerry Wireless Handheld directly and wishes to be added to the BlackBerry Enterprise Server.

In this situation, the administrator selects the user who then completes the set-up by installing the desktop software and connecting the handheld to their desktop (or laptop connected to the LAN). This procedure generates the encryption key and identifies the handheld PIN (Personal Identification Number of the handheld hardware). Once the handheld is connected, the user selects which server to be added to from the drop-down menu (Figure 13).

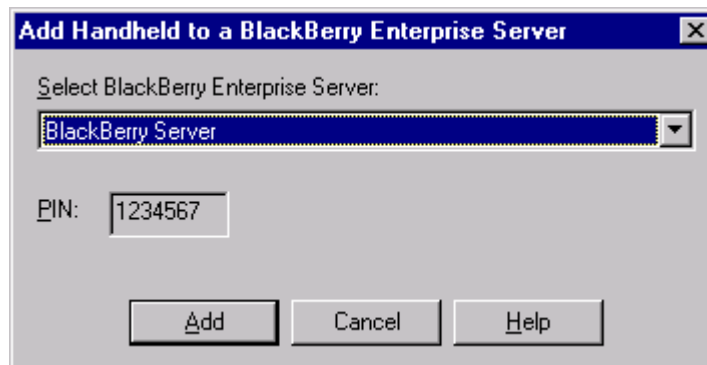


Figure 13. Automatic User Addition window

4.3 Monitoring

The BlackBerry Enterprise Server logs to the Windows NT event log so administrators can perform server-level monitoring using the standard event log monitoring tools.

Global statistics for a BlackBerry Enterprise Server can be monitored using system monitoring tools such as Windows NT PerfMon and third party SNMP applications.

User-level monitoring is available from the BlackBerry tab in the user's property sheet in the Microsoft Exchange Administrator. User statistics can also be exported to a comma-delimited text file from the Handheld Manager in the BlackBerry Servers section of Microsoft Exchange Administrator. These statistics are useful for tracking assets and utilization.

4.4 IT Policy

By modifying the Policy .inf file and using it to create a Policy .bin file, the IT administrator can change the default settings and enforce mandatory settings for all BlackBerry users. Policy files can be used to configure handheld settings, BlackBerry Desktop Manager settings and Microsoft Exchange settings. IT Policy files are typically stored on a central file server. Some of the settings that can be controlled by the IT administrator include password length and age, owner information, automatic backup, autosignature and filter rules.

5. Effect of Deployment

A common concern is the effect of deploying BlackBerry Enterprise Servers.

5.1 On Microsoft Exchange Performance

As mentioned earlier, a BlackBerry Enterprise Server function is very simple. It monitors a user's mailbox for incoming email. When email arrives, it retrieves the first 2K of the message and pushes it to the handheld. The mailbox monitoring mechanism is similar to that used by Microsoft Outlook. The BlackBerry Enterprise Server is more efficient since it only requires the Microsoft Exchange Server to maintain a single MAPI login, whereas each Microsoft Outlook client performs a separate MAPI login. Therefore, the monitoring demand is no worse than if each of the mobile users had a copy of Microsoft Outlook running on their desktop PC.

5.2 On Network Performance

A common misconception is that a BlackBerry Enterprise Server doubles network traffic because it replicates Microsoft Exchange email to the client. This mistaken impression overlooks the fact that only the first 2K of each message are retrieved from the Microsoft Exchange Server. If the user gets 50 emails per day, only 100K of throughput is spread throughout an 8 hour day on a typical 10 Mbps or 100 Mbps Ethernet connection between the BlackBerry Enterprise Server and the Microsoft Exchange Server.

While the customer's link to the Internet is likely a lower capacity T1 or T3, only 1K per message post compression is transmitted from the BlackBerry Enterprise Server over this link. To put this in perspective, this is almost equivalent to the bandwidth load of a web browser receiving a single web page – with the exception that the BlackBerry load is spread over an entire day.

6. Conclusion

The BlackBerry Enterprise Server consolidates all BlackBerry users' accounts into a central location and places them within the control of the organization's IT department. The BlackBerry architecture is flexible enough to fit into any organization's Microsoft Exchange solution, providing a tightly integrated platform for wireless email access.

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