BlackBerry Enterprise Server version 2.2 for Lotus Domino

Research In Motion

Contents

Overview

This document provides an overview of the BlackBerry® solution for Lotus® Domino™. It can be used as a tool to assess the suitability of the BlackBerry solution for your Lotus Domino corporate environment.

Mobile computing

Several wireless products attempt to remove the need for mobile professionals to travel with laptops. Although product characteristics vary greatly, these offerings are often fragmented and incomplete.

Market research reveals the following common complaints with wireless solutions, which result from the inability to integrate with existing enterprise systems:

- difficulty assembling components from different vendors to wirelessly access corporate data
- difficulty defining and addressing security issues in multiple-vendor wireless solutions
- difficulty determining a solution's impact on the mail system

The BlackBerry solution

The BlackBerry solution, by Research In Motion (RIM), is the leading wireless solution for accessing corporate email. The BlackBerry solution also enables mobile professionals to access corporate data and personal information management (PIM) applications, such as contacts, appointments, and tasks. The end-to-end solution supports an industry leading security standard called Triple DES encryption and has a low impact on network and mail server resources.

The BlackBerry solution consists of the following components:

- The BlackBerry Enterprise Server manages messaging redirection, enables access to corporate data, provides encryption, and enables administrators to centrally manage their BlackBerry deployment.
- The BlackBerry Wireless Handheld™ provides an intuitive interface to access corporate email and data.
- BlackBerry Desktop Software enables users to synchronize personal data.
- Wireless data and voice services are available from wireless network providers.

The following BlackBerry software versions are required to support the new functionality that is associated with the BlackBerry Enterprise Server version 2.2 for Lotus Domino:

- BlackBerry Desktop Software version 3.6 or later.
- BlackBerry Wireless Handheld Software version 2.6 or later for DataTAC® or Mobitex networks.
- BlackBerry Wireless Handheld Software version 3.6 or later for CDMA2000 1X, GSM™/GPRS, or Nextel® networks.

BlackBerry innovations in wireless connectivity

The BlackBerry solution introduces several innovations in wireless connectivity.

End-to-end security

Unlike most mobile corporate data solutions, the BlackBerry solution provides a secure, end-to-end link between the handheld andBlackBerry Enterprise Server. The BlackBerry solution is the first wireless solution to have a handheld awarded FIPS-140 certification, the US government's standard for wireless data transfer. The BlackBerry solution does not compromise corporate firewalls.

Push architecture

The BlackBerry wireless *push* architecture eliminates the inconvenience of dialling in or initiating a connection to access corporate email or data. In the traditional *pull* model, the user must periodically connect to the information to determine whether anything has changed.

In the BlackBerry solution, when an email message arrives at the user's corporate inbox, a copy is immediately pushed, or sent, to the user's handheld. Similarly, corporate data can be sent to handhelds without the user requesting it. The BlackBerry push model is a significant differentiator because it eliminates the effort that users exert to pull information, and it offers a high return on investment (ROI) by enabling mobile professionals to maintain a virtual presence in the workplace, while on the go.

Email and calendar

Integrated email address

Unlike other wireless connectivity solutions, BlackBerry does not require a separate email address for the wireless handheld; it enables mobile professionals to gain access to their corporate email without a second mailbox to manage.

Wireless email reconciliation

This feature reconciles changes to messages and folders without requiring the user to connect the handheld to the computer. After the user upgrades the handheld to a software version that supports wireless email reconciliation, changes that are made to messages on the user's handheld are reflected on the user's desktop within a short period of time.

Attachment service

Using the attachment service feature, handheld users can open attachments with the following file name extensions: .doc, .xls, .ppt, .pdf, .wpd, and .txt. The attachment service converts the file formats to the Universal Content Stream (UCS) format and delivers the files as email attachments to the handheld. The attachment service generates content, which is received by the handheld based on requests by the handheld user for a table of contents or full content.

The Triple-DES encryption that the BlackBerry Enterprise Server provides also applies to the attachment content.

Wireless calendar synchronization

The BlackBerry solution's push technology keeps users' handheld calendars wirelessly synchronized with their desktop calendars.

Corporate data access

Mobile Data Service

In addition to wireless email and calendar functionality, the BlackBerry Enterprise Server also includes the Mobile Data Service feature, which enables wireless access to corporate data. The Mobile Data Service enables always-on, push-based access to enterprise applications and information using the BlackBerry handheld, the BlackBerry Browser, and software development tools.

The Mobile Data Service has the following major features:

- standard HTTP/HTTPS connectivity
- XML language support
- HTTP data push support
- standard BlackBerry Enterprise Server data compression and connection security
- ability to use Kerberos and NT License Management (NTLM) network authentication

By leveraging the existing architecture and end-to-end security model of BlackBerry Enterprise Server, corporations have the ability to rapidly and securely deploy additional wireless applications to BlackBerry handhelds. The BlackBerry Enterprise Server supports multiple wireless networks using standard protocols and languages (including XML, HTTP, and Java), which means that corporate application developers and independent software vendors (ISVs) can quickly deploy wireless applications without learning new middleware or operating systems.

Push applications

The Mobile Data Service provides capabilities for push applications. Push applications send content from a server to a handheld without being prompted by a handheld user. The centralized push server functionality is part of the Mobile Data Service installation, and can be configured on a single Mobile Data Service. This means that custom push applications that manage data sent from a corporate server only need to communicate with a single BlackBerry Enterprise Server that has the Mobile Data Service feature enabled to push data to the handhelds.

Network authentication

Network (handheld-to-server) authentication can be used to limit handheld requests for server interaction to approved web and application servers. Using an extensible platform that adds support for third-party servers through plug-ins, users can access approved web and application servers.

When network authentication is enabled, the handheld uses Triple DES and HTTP authentication to link to the BlackBerry Enterprise Server, as usual. The BlackBerry Enterprise Server, with the Mobile Data Service feature enabled, then proxies the network authentication to a server using the native method of that server.

NTLM and Kerberos network authentication protocols are supported for Internet Information Services (IIS) Web Server. The intranet or IIS grants access authority. NTLM works with Microsoft® NT 4.0 and Microsoft Windows® 2000, and Kerberos works with Microsoft Windows 2000.

BlackBerry Connect License Program

The BlackBerry Connect License™ Program offers users, IT departments, carriers, and licensees access to an open, global platform. It enables mobile device manufacturers to equip their handsets with the integrated ability to connect to the BlackBerry Enterprise Server. Using the secure, push-based BlackBerry wireless architecture and infrastructure, a variety of handsets can be managed and supported in the BlackBerry Server Manager and other BlackBerry Enterprise Server administration and monitoring tools. BlackBerry Connect integrates with the handset's existing hardware and software and leverages the existing user interface while enabling access to an extensible platform that is supported by multiple carriers worldwide.

For more information on the BlackBerry Connect License Program, refer to `http://www.blackberry.com/blackberryconnect`.

BlackBerry synchronization features

Wireless email reconciliation

Wireless email reconciliation includes the following benefits:

- Users can move or delete email messages on either their handheld or their computer and have the changes synchronized wirelessly.
- Users do not have to connect their handheld to their computer to synchronize messages that have been filed or deleted. When users file or delete a message on the handheld, the change is automatically reflected on their desktop and vice versa.
- One-way folder synchronization enables users to create, delete, rename, or move a folder on their computer, and synchronize these changes wirelessly so that they appear on the handheld. When a user deletes a folder, the messages in the folder are also deleted and the deletes are synchronized on the handheld.

If pending changes on the user's handheld require immediate reconciliation, the user can reconcile the email messages on the handheld manually using the **Reconcile Now** option.

Email reconciliation with the BlackBerry Desktop Software

Users who are enabled for wireless email reconciliation can still use the desktop software to reconcile email messages, so that read and unread marks are synchronized between the handheld and desktop. Wireless email reconciliation can also be disabled on the server or on the handheld. When wireless email reconciliation is not enabled, users must use the desktop software to reconcile email.

Wireless calendar synchronization

Changes that are made to the calendar from a user's Lotus Notes desktop email program or BlackBerry handheld are synchronized wirelessly. A user can accept or reject meeting requests from the BlackBerry handheld to quickly convey availability. Because calendar changes are wirelessly synchronized, the user's calendar is always current. On the BlackBerry handheld, the user can create a meeting request, invite attendees from the handheld address book, and send the invitation.

Wireless calendar synchronization is particularly useful for users who have an assistant or co-worker schedule appointments on their behalf. This feature means travelling users can quickly receive calendar adjustments without having to communicate the updates through email messages or phone calls.

PIM synchronization

The BlackBerry solution uses Pumatech™ Intellisync® software to synchronize PIM information between Lotus Notes and the handheld, and provides the following features for memos, tasks, calendar items, and address book entries:

- determines database equivalencies
- performs field mapping and translation
- recognizes and reflects recurring items
- synchronizes only user-selected fields
- detects and reports additions, deletions, conflicts, and duplicates
- enables users to immediately resolve conflicts
- maintains a synchronization history

Managing mail with filters

The BlackBerry push architecture allows for immediate responsiveness, but users might not want to receive all messages on their handheld. Users and system administrators can define which messages are sent to the handheld by assigning the following actions to messages that meet specific filter criteria:

- forward the message to the handheld
- do not forward the message to the handheld
- forward the message with priority to the handheld

Note: Priority messages appear on the handheld differently and users can set specific notifications for them.

User-defined filters

In the BlackBerry Desktop Manager, users can define filters that are stored on the BlackBerry Enterprise Server. Filters provide the following benefits:

- Users can set filters to leave "bulk" mailings on their desktop to view and address at a later time.
- Users can set filters to notify them immediately of messages from their superiors or coworkers.
- Users can set filters to forward only important email to their handheld.

Global filters

The BlackBerry Enterprise Server enables system administrators to set company-wide filters. For example, administrators can set global filters that prevent external junk email from being sent to the handheld or that determine notification priority. If a global filter conflicts with a user-defined filter, the global filter is applied.

BlackBerry security

Few wireless solutions provide reliable security, but because BlackBerry was designed for corporate users, security is a core part of the solution. The BlackBerry solution provides a secure link between the BlackBerry Enterprise Server and the handheld and does not compromise the company's firewall.

Degree of security

BlackBerry uses the US government-created Triple DES encryption algorithm. Using today's technology, sources estimate that it would take billions of years to decode a Triple DES-encrypted message. The National Institute of Standards and Technology awarded BlackBerry handhelds the FIPS 140 certification for their embedded encryption technology, which is an important and often mandatory purchasing criteria for many organizations, especially in the government sector.

Confidentiality

As part of the BlackBerry solution, only the user's handheld and the BlackBerry Enterprise Server have copies of the user's Triple DES encryption key. When data is in transit, it is encrypted from the moment that it leaves the handheld to the moment that the BlackBerry Enterprise Server receives it. So, if the data is intercepted in transit, it would take billions of years to decrypt using today's technology.

Authentication

The BlackBerry Enterprise Server is protected from an external attack by the same shared-key encryption that is used to protect information that is sent and received by BlackBerry handhelds. The BlackBerry Enterprise Server has a unique random shared-key with each handheld. The BlackBerry Enterprise Server only accepts datagrams that are encrypted with the correct shared-key, and the BlackBerry Enterprise Server does not accept unencrypted datagrams. Because the shared encryption key is only known to the BlackBerry Enterprise Server and the handheld, if the BlackBerry Enterprise Server can successfully decrypt the command, then it must have come from the correct handheld. Therefore, it is extremely unlikely that a malicious BlackBerry user (or a hacker emulating a BlackBerry user) can cause data to be sent from or forwarded from another BlackBerry user's account because the user or hacker does not have the correct shared-key, and thus, the BlackBerry Enterprise Server ignores the false command.

Data integrity

The end-to-end encryption also protects data integrity. If data is intercepted as it travels between the BlackBerry Enterprise Server and the handheld, an interceptor cannot alter the data. If attempts are made to alter the data in transit, the decryption engine at the receiving end rejects it.

BlackBerry system architecture

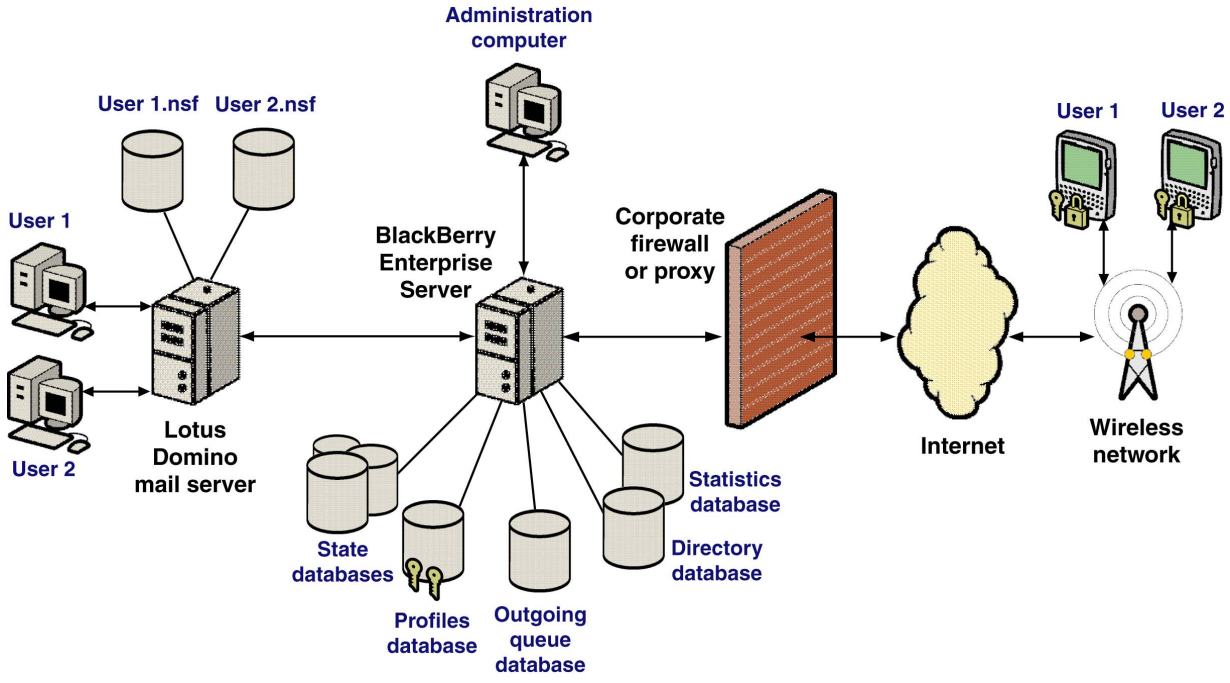
BlackBerry Enterprise Server

Wireless email

The BlackBerry Enterprise Server provides a secure, two-way link to the BlackBerry handheld. The BlackBerry Enterprise Server acts more like a message redirector than repository, because the Lotus Domino Server performs all message storage. The BlackBerry Enterprise Server maintains a link to the messages in the user's Lotus Domino mailbox and offers the following features:

- When a user forwards a message from the handheld, the entire original message is forwarded, including all attachments.
- After the first portion of the message is delivered to the handheld, the user can request more of the message to be delivered (up to 32 KB). The first portion of the message ranges from 1.5 KB to 3 KB depending on the wireless network and handheld software version.
- When a user includes the original message in a reply on the handheld, the entire original message is appended to the reply.

The illustration below provides an overview of the BlackBerry system architecture. The main system components include the BlackBerry handheld, the BlackBerry Enterprise Server, the Lotus Domino Server, the user's desktop computer, and the wireless network.



BlackBerry Enterprise Server system architecture

Message processing flow

Message flow to a handheld

1. **New message arrives:** The Lotus Notes router delivers a new message to the user's Lotus Notes mailbox.
2. **Mailbox polled:** The BlackBerry Enterprise Server for Lotus Domino polls the user's mailbox and detects the new message. The default, and recommended, polling interval is 20 seconds, which is defined by the **Polling Interval** field in the BlackBerry Server Manager Server Information dialog box.
3. **Filters applied:** The BlackBerry Enterprise Server checks the message fields against global filter rules and filters the messages that meet the filter criteria. After it applies the global filter rules, the BlackBerry Enterprise Server applies any user-defined filters to messages that meet the filter criteria.
4. **State database**: The BlackBerry Enterprise Server creates an entry in the user's state database that associates the Unid (applied to the message in Lotus Notes) with a randomly generated Reference ID (RefId) and tag. If the message is a meeting invitation or calendar item, the BlackBerry Enterprise Server appends calendar information to the message.
5. **Compressed and encrypted:** The BlackBerry Enterprise Server encrypts the first portion of the message with the user's encryption key, compresses it, and places it in the outgoing database for delivery to the handheld. The outgoing database shows the message status, which is also written to the Lotus console and Notes log.
6. **Sent to the wireless network:** The BlackBerry Enterprise Server sends the first portion of the message through port 3101 to the wireless network, which verifies that the PIN belongs to a valid handheld that is registered on the wireless network. The size of the first part of the message that is delivered to the handheld ranges from 1.5 KB to 3 KB, depending on the wireless network and handheld software version.
7. **Confirmation returned:** The wireless network locates the user's BlackBerry handheld and delivers the message. The handheld sends delivery confirmation to the BlackBerry Enterprise Server. If the BlackBerry Enterprise Server does not receive confirmation within four hours, it resubmits the message to the wireless network.
8. **Arrives on the handheld:** The handheld decrypts and decompresses the message so that the user can view it and notifies the user of the message’s arrival.

Message flow from a handheld

1. **Sent from handheld:** The user sends a message from the handheld. On the handheld, the message is assigned a RefId. If the message is a meeting invitation or calendar item, the handheld appends the calendar information to the message.
2. **Compressed and encrypted:** The handheld compresses and encrypts the entire message using Triple DES encryption.
3. **Sent to the BlackBerry Enterprise Server:** The message is sent over the wireless network, through port 3101, to the BlackBerry Enterprise Server.
4. **Decrypted and decompressed:** The BlackBerry Enterprise Server uses the encryption key from the user’s profile document to decrypt the message and then decompresses the message. If the message cannot be decrypted using the user's unique Triple DES encryption key, the BlackBerry Enterprise Server ignores the message and sends an error to the user’s handheld.
5. **State database:** If the message is new, the BlackBerry Enterprise Server creates an entry, which provides a link to the original message, in the user’s state database. If the message is a reply with text or forwarded message, the BlackBerry Enterprise Server performs a lookup using the BlackBerry state database to correlate the incoming message to the original message in the user's mail file. Because only the first portion of a message is redirected to the handheld, the BlackBerry Enterprise Server must locate and retrieve the full message text to forward or reply with text.
6. **Delivered to mail.box:** The BlackBerry Enterprise Server places the message in `mail.box` for the Notes router to deliver to the recipient.

7. **Copied in Sent folder:** The BlackBerry Enterprise Server places a copy of the message in the user's Lotus Notes Sent folder. This step does not take place if the **Don't save a copy to the Sent Items folder** option in a user's desktop software is selected and the BlackBerry Enterprise Server on which the user resides does not have the `RIMForceSaveInSent` option enabled in the `notes.ini` file.
8. **Routed to recipients:** The Lotus Domino Server router task routes the message to the recipient. As a result, a message that is sent from the handheld is the same as a message that is sent from the desktop; messages originate at the user's corporate email address, and a copy is placed in the user's Sent folder.

Calendar items

When the BlackBerry Enterprise Server polls the user's mailbox for new messages, it also detects new calendar items and forwards them to the handheld over the wireless network. When the user creates calendar items on the handheld, they are sent over the wireless network to the BlackBerry Enterprise Server and delivered to `mail.box` for the Notes router to deliver to the user's Notes mailbox. After the user configures wireless calendar synchronization, all calendar synchronization occurs over the wireless network.

Wireless email reconciliation

A message's state database entry includes information about the folder in which the message is stored. If the message is moved to a new handheld or desktop folder, the BlackBerry Enterprise Server either receives notification from the handheld or detects the change when it polls the mailbox. When a message is moved or deleted on the handheld or the desktop, the BlackBerry Enterprise Server writes the change to the relevant state database entry and reconciles that change on the handheld or the desktop. These changes are batched to save battery life and network bandwidth.

Attachments

When a user requests to view an attachment on the handheld, the BlackBerry Enterprise Server attachment service feature retrieves the attachment in binary format from the Lotus Domino mail server. The attachment service feature extracts the document content, layout and appearance, and navigation information, formats the document for the handheld and then converts it to Universal Content Stream (UCS) format. The attachment service submits the UCS content to the BlackBerry Enterprise Server, which compresses and encrypts the content, and sends it to the handheld over the wireless network.

Corporate data processing flow

Content is requested from the handheld

1. **Content requested:** A user requests intranet or Internet content on the handheld.
2. **Request sent:** The request is sent over port 3101 to the BlackBerry Enterprise Server on which the user resides. The BlackBerry Enterprise Server sends the request to the Mobile Data Service over port 3201.
3. **Content retrieved:** The Mobile Data Service creates an HTTP session for the user and retrieves the requested content.
4. **Content submitted:** The Mobile Data Service converts the content for viewing on the handheld and sends it over port 3201 to the BlackBerry Enterprise Server.
5. **Compressed and encrypted:** The BlackBerry Enterprise Server encrypts the content with the user's encryption key, compresses it, and places it in the outgoing database for delivery to the handheld.
6. **Sent to the wireless network:** The BlackBerry Enterprise Server sends the content through port 3101 to the wireless network, which verifies that the PIN belongs to a valid handheld that is registered on the wireless network.
7. **Confirmation returned:** The wireless network locates the user's BlackBerry handheld and delivers the content. The handheld sends delivery confirmation to the BlackBerry Enterprise Server. If the Mobile Data Service does not receive confirmation within the flow control timeout limit, it sends a cancellation to the wireless network for the pending content.

8. **Arrives on handheld:** The handheld decrypts and decompresses the content so that the user can view it. The Blackberry Browser detects the content and displays it.

Content is pushed to the handheld

1. **Request sent:** A custom push application, which resides on a server behind the corporate firewall, sends an HTTP POST request to the Mobile Data Service centralized push server on the web server listen port (default 8080). The application specifies the BlackBerry Enterprise Server host name and the Mobile Data Service web server connection listen port.
2. **BlackBerry directory lookup:** The centralized Mobile Data Service push server searches the BlackBerry directory for the following information about the recipients that are defined in the push application:
   - the BlackBerry Enterprise Server on which the recipient's account resides
   - the PIN that is associated with the recipient's email address
   - whether the recipient's account is enabled
   - whether the recipient's account was soft-deleted

   Note: Recipients who do not appear in the BlackBerry directory, or recipients who have a disabled or soft-deleted BlackBerry account, do not receive push content.
3. **Response returned:** The Mobile Data Service responds to the push application to acknowledge that it is processing the request, and closes the connection.
4. **Routed to recipients:** The Mobile Data Service centralized push server routes the content over the push server connection listen port (default 81) to the Mobile Data Service feature on the BlackBerry Enterprise Servers on which the recipients reside.
5. **Content submitted:** The Mobile Data Service converts the content for viewing on the handheld and sends it over port 3201 to the BlackBerry Enterprise Server.
6. **Compressed and encrypted:** The BlackBerry Enterprise Server encrypts the content with the user's encryption key, compresses it, and places it in the outgoing queue database for delivery to the handheld.
7. **Sent to the wireless network:** The BlackBerry Enterprise Server sends the content through port 3101 to the wireless network, which verifies that the PIN belongs to a valid handheld that is registered on the wireless network.
8. **Confirmation returned:** The wireless network locates the user's BlackBerry handheld and delivers the content. The handheld sends delivery confirmation to the BlackBerry Enterprise Server. If the Mobile Data Service does not receive confirmation within the flow control timeout limit, it sends a cancellation to the wireless network for the pending content.
9. **Content detected:** The BlackBerry Browser or the third-party handheld application that listens on the port number that is specified in the push application (for example, the BlackBerry Browser listens for push application connections on port 7874) detects the inbound content and displays it when the user invokes it.

BlackBerry Enterprise Server databases

Two databases are created when the BlackBerry Enterprise Server is installed: the profiles database and the outbound queue database. If the Mobile Data Service feature is also installed with the BlackBerry Enterprise Server, the BlackBerry directory database and the statistics database are also created. Users who are added to the BlackBerry Enterprise Server are associated with a unique BlackBerry State Database. These databases are created on each BlackBerry Enterprise Server.

Profiles database

`BlackBerryProfiles.nsf` is generated when the BlackBerry Enterprise Server add-in task is started for the first time. It stores the following information for each user:

- link to the user's state database
- current Triple DES encryption key
- personal identification number (PIN)
- filter settings
- auto signature
- return email address
- in-cradle status and default behavior
- status (enabled or disabled)
- network type (for example, CDMA2000 1X, DataTAC, General Packet Radio Service [GPRS], Mobitex, Nextel®)

Note: The profile documents are not editable in the native database format; only the BlackBerry Desktop Manager and BlackBerry Server Manager applications can modify the values in these documents.

Outbox database

`BlackBerryOutbox.nsf` is stored locally on the BlackBerry Enterprise Server and provides information on the status of messages as they are delivered to the BlackBerry handheld. As a message travels through the different delivery stages, the documents in the database are updated with the current message status. When the message is delivered to the BlackBerry handheld, the document is deleted from the database. Each message that is sent to a BlackBerry handheld results in a new document in the database.

Each entry contains the following information for each message:

- message ID: for email reconciliation, forwarding, and replying with text
- PIN of the handheld that sent the message
- date: the time at which the message enters the BlackBerry Enterprise Server
- last try: the last attempt to deliver the message to the BlackBerry handheld
- message tag: used to track the message to the wireless network and determine its status
- status
  - sent: sent to the wireless network
  - new message: waiting to be sent to the handheld
  - delivered/failed: the message was either delivered to the handheld or it failed
- from: Simple Mail Transfer Protocol (SMTP) address
- recipient: SMTP address
- destination: Lotus Notes Canonical Name format CN=/OU=/O=

If a message remains in the BlackBerry outbox for more than four hours, the BlackBerry Enterprise Server resubmits the message for delivery. If the user deletes the message from Lotus Notes, or the message remains in the BlackBerry outbox database for more than seven days (the maximum amount of time that the wireless network holds a message for delivery to a BlackBerry handheld), the BlackBerry Enterprise Server deletes the document from the BlackBerry outbox database and sends a cancellation notice to the wireless network.

Note: The message header information, not the message body, is stored in this database.

State database

Each user has a uniquely named BlackBerry State Database in which the BlackBerry Enterprise Server stores information about messages that are sent from or received on the BlackBerry Wireless Handheld.

The BlackBerry Enterprise Server writes a new entry to the user's state database each time it receives a message that is sent from the handheld or redirects a message to the handheld. The entry links the message in the mail file and the message on the handheld by storing the message's reference ID.

The BlackBerry State Databases are critical to BlackBerry Enterprise Server operation. The database information supports functionality such as replying with text, message forwarding, filing, and email reconciliation. These databases also store filtered messages to prevent the messages from being reprocessed.

The BlackBerry State Database enables laptop users to use the BlackBerry Desktop Manager to reconcile their email when they are disconnected from the network, provided that a local replica exists of both the mail file and the BlackBerry State Database.

Directory database

`BBDir.nsf` contains the configuration and user information that the Mobile Data Service feature of the BlackBerry Enterprise Server requires to provide wireless access to the Internet and corporate applications. The values in the database can not be modified directly.

The BlackBerry directory database is generated when a BlackBerry Enterprise Server that is identified as the primary (or centralized push) Mobile Data Service server is installed. After the centralized push server is defined, the directory database is automatically replicated to new BlackBerry Enterprise Servers that are installed with the Mobile Data Service. Changes to the directory database are replicated to all directory databases on BlackBerry Enterprise Servers that use the defined centralized push server.

Configuration information

The Mobile Data Service configuration information is defined when you install the BlackBerry Enterprise Server with the Mobile Data Service feature. This information includes the following settings:

- host, port, and connection
- Hypertext Transfer Protocol (HTTP) proxy support
- Online Certificate Status Protocol (OCSP) support
- Transport Layer Security (TLS) support
- Hypertext Transfer Protocol over Secure Socket Layer (HTTPS) support

You can modify the Mobile Data Service configuration information in the BlackBerry Server Manager. Refer to the BlackBerry Enterprise Server for Lotus Domino Administration Guide for more information.

User information

The user information that is stored in the directory database enables the Mobile Data Service centralized push server to send push application content to users that reside on multiple BlackBerry Enterprise Servers. The directory database contains the following information for each user:

- name
- PIN
- email address

- BlackBerry Enterprise Server on which the user is registered

User information is copied from the profiles database to the directory database through a population agent, which populates the directory database from the user profiles database and updates the directory database to reflect changes that are made to the profiles database. The agent, RIM - Update BlackBerry Directory, runs every five minutes.

The directory database also contains user status information that tells the centralized push server which users are not active and should not receive push content on their handheld (because email redirection is disabled, the account is disabled, or the account is soft-deleted). The directory database contains the following status information for each user:

- whether the user has disabled email redirection
- whether the administrator has disabled the user's account
- whether the administrator has soft-deleted the user's account

Statistics database

`BBStats.nsf` contains statistics information for the Mobile Data Service. The BlackBerry Enterprise Server formats the information and presents it to be retrieved over SNMP.

BlackBerry Enterprise Server management

The BlackBerry Server Manager is the primary administrative tool in the BlackBerry solution. It enables administrators to perform the following tasks:

- create, delete, and modify user accounts
- import multiple user accounts
- define global filters
- monitor user statistics
- monitor server statistics
- monitor the incoming and outgoing queues for system performance

Logging

The Lotus Domino logging functions place system information in a Lotus Domino database, which administrators can view and analyze. BlackBerry users can view these databases, but they can only access information that is specific to their account.

Monitoring

In addition to the BlackBerry Server Manager tool, administrators can use the following monitoring tools:

- **BESMonitor:** monitors the BlackBerry Enterprise Server connection to the wireless network
- **BESAlert:** informs (either through email or a console message) defined users when events at the specified level are logged to the Windows NT Event Log

Administrators can monitor the state of the BlackBerry Enterprise Server and its services in four ways:

- viewing the system debug log files
- viewing logs in the Event Viewer
- using an SNMP agent
- viewing the Mobile Data Service monitor page

SNMP agent

Simple Network Management Protocol (SNMP) counters and traps are included with the BlackBerry Enterprise Server, and are supported with Microsoft Windows NT® 4.0 Server. The BlackBerry Enterprise Server values include Mobile Data Service and Mobile Data Service event-driven traps.

Using SNMP, administrators can easily assess the configuration and status of the BlackBerry Enterprise Server and its users. The BlackBerry Enterprise Server stores information about its configuration and current state that can be accessed by querying with SNMP values. The BlackBerry Enterprise Server supports functions including `Get` requests, `Get Next` requests, `Walk` requests, and `Trap` messages.

An SNMP agent requires a running SNMP service and an SNMP browser. SNMP read-only support is automatically added as part of the BlackBerry Enterprise Server installation to enable users to view server redirection statistics.

Mobile Data Service monitor page

Administrators can verify Mobile Data Service status and monitor Mobile Data Service activity through an HTML page that displays configurable information from the Mobile Data Service computer's Web Server Listen Port. Administrators can view the Mobile Data Service monitoring page with the browser on the handheld or desktop.

The Mobile Data Service monitoring page provides statistics on the operational state and condition of the Mobile Data Service, such as whether the service is running, currently in use, or experiencing any errors. Statistics on this page can be purged.

BlackBerry Enterprise Server deployment

Minimum system requirements

To run the BlackBerry Enterprise Server version 2.2 for Lotus Domino, the following components are required:

Component	Description
Operating System	Windows NT Server 4.0 (Service Pack 6a or later) or Windows 2000 (Server or Advanced Server edition)
Memory	256 MB RAM ◆ the Mobile Data Service requires an additional 256 MB RAM ◆ the attachment service requires an additional 300 MB RAM
CPU	Intel® Pentium® 2 processor or higher (233 MHz or higher)
Disk storage	1 GB in addition to the Windows NT or Windows 2000 requirements (more space is required for logging.
Software	must be installed on a Lotus Domino 5.03 or later server connects to Lotus Domino 4.6 or later mail server

Note: If the BlackBerry Server Manager is installed on a computer on which Windows NT is installed, it cannot connect to a USB handheld.

Firewall and proxy server configuration

The BlackBerry Enterprise Server can be located anywhere on the LAN and routes its TCP/IP traffic through a firewall or proxy server in the same manner as any computer on the network with web-browsing capabilities. The only requirement is that the firewall, or proxy server, must enable the BlackBerry Enterprise Server to connect to port 3101. Similar to a web browser's Hypertext Transfer Protocol (HTTP) connection to port 80, this is an outbound-initiated connection. No inbound connection "holes" are required that would create a risk of unauthorized access to the corporate network.

The BlackBerry Enterprise Server is responsible for opening the connection to the wireless network that remains open for two-way traffic. Both sides of the connection authenticate the connection, so that the BlackBerry Enterprise Server does not connect to an intervening party.

Serving multiple Lotus Domino Servers

The BlackBerry Enterprise Server adapts well when multiple Lotus Domino Servers are deployed in larger installations. The following diagram illustrates one BlackBerry Enterprise Server monitoring users on multiple Lotus Domino Servers. It is recommended that the BlackBerry Enterprise Server reside in the same Lotus Domino domain and Lotus Notes Named Network (NNN) as the Lotus Domino Servers in which the potential BlackBerry users reside.

The Lotus Domino Server that runs the BlackBerry Enterprise Server Software behaves similarly to an SMTP gateway by buffering the main corporate servers from wireless traffic, but retaining the ability to deliver mail to these servers. The BlackBerry Enterprise Server uses the mail routing capability of Lotus Domino; therefore, the router can send mail to, or receive mail from, the wireless network and the Lotus Domino Servers.

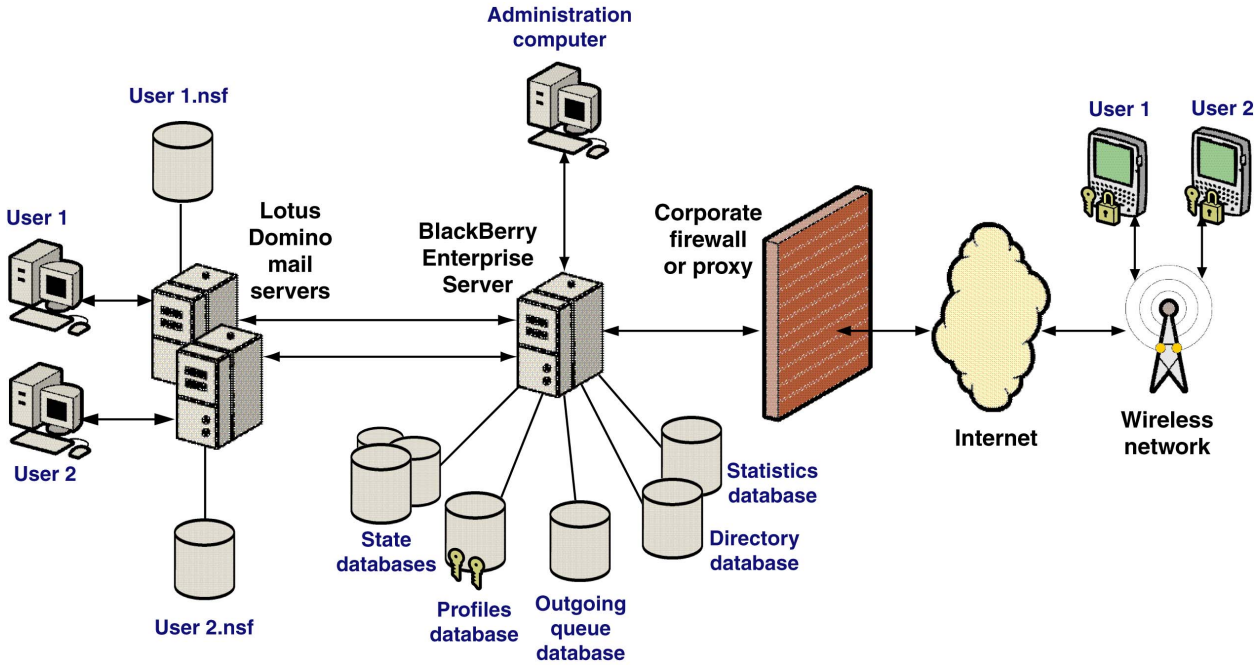


Figure 2: Single BlackBerry Enterprise Server serving multiple Lotus Domino Servers

Scaling

Performance studies suggest that a single BlackBerry Enterprise Server for Lotus Domino can support approximately 2000 users. However, the following factors might affect this figure:

- users' latency tolerance
- network topology
- message flow characteristics

Multiple BlackBerry Enterprise Servers can support thousands of users. Each BlackBerry Enterprise Server processes and stores information for only its users. Administrators can move users between BlackBerry Enterprise Servers in the same Lotus Domino domain.

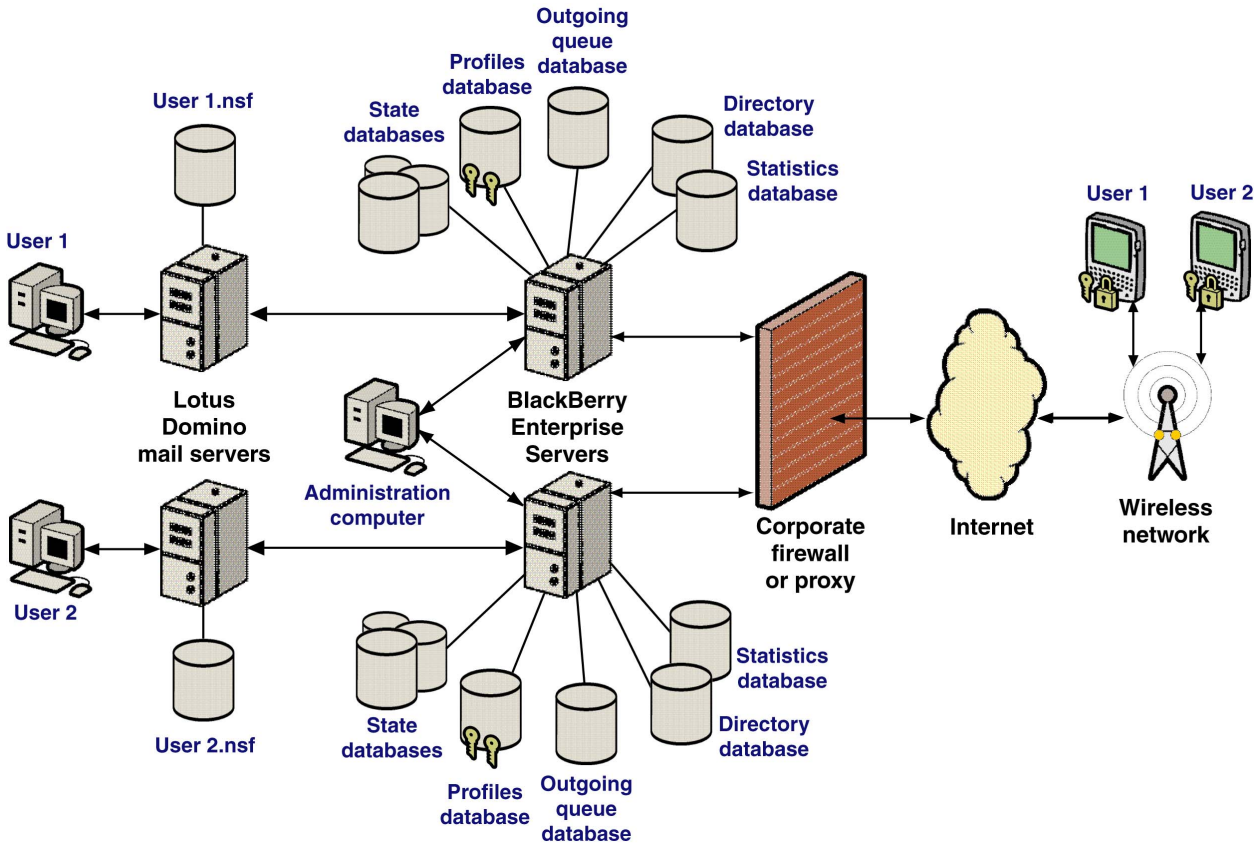


Figure 3: Multiple BlackBerry Enterprise Servers serving multiple Lotus Domino Servers

Multiple-platform support

The BlackBerry Enterprise Server for Lotus Domino runs on a Lotus Domino Server that is configured on a Windows NT® Server and communicates to other Lotus Domino Servers using Notes Remote Procedures Call (NRPC). This architecture enables the BlackBerry Enterprise Server to integrate with Lotus Domino Servers, regardless of their platform (such as Windows NT, UNIX, AS400, and so on). A single BlackBerry Enterprise Server can be installed to manage users on each of these multiple platforms. Alternatively, multiple BlackBerry Enterprise Servers can be installed, each to manage particular platforms and to balance the load.

Clustering

The BlackBerry Enterprise Server can service a clustered Lotus Domino mail server. However, the BlackBerry Enterprise Server cannot be a member of a Lotus Domino cluster.

BlackBerry Enterprise Server disaster recovery plan

Disaster recovery planning for the BlackBerry solution is a natural extension of the planning that organizations must undertake for their Microsoft Windows NT, Windows 2000, and Lotus Domino environments.

Because the Lotus Domino Server is a required component in the BlackBerry for Lotus Domino solution, a complete Lotus Domino Server disaster recovery plan process should exist, be documented, and be tested regularly. In addition to requiring a disaster recovery plan process for the Lotus Domino Server, BlackBerry Enterprise Server installations also require a disaster recovery plan process for the Windows NT or Windows 2000 Server.

Part number: WPE-00035-001