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Overview: BlackBerry Enterprise Server

The BlackBerry Enterprise Server is designed to be a secure, centralized link between an organization's wireless network, communications software, applications, and BlackBerry smartphones. The BlackBerry Enterprise Server integrates with your organization’s existing infrastructure to provide smartphone users with mobile access to your organization’s resources.

You can manage the BlackBerry Enterprise Server, smartphones, and user accounts using the BlackBerry Administration Service. You can access the BlackBerry Administration Service web application from any computer that can access the computer that hosts the BlackBerry Administration Service.

You can optionally install BlackBerry Management Studio in your organization’s environment to provide a simplified administrative console for your organization’s helpdesk administrators and an integrated view of the BlackBerry Enterprise Server and other MDM domains. For more information, visit http://www.blackberry.com/go/serverdocs to see the BlackBerry Management Studio Feature and Technical Overview.
BlackBerry Enterprise Server high availability

High availability permits you to provide minimum downtime for BlackBerry services if BlackBerry Enterprise Server components stop responding or if they require maintenance. BlackBerry Enterprise Server high availability consists of a minimum of two BlackBerry Enterprise Server instances and the BlackBerry Configuration Database which is replicated across two database servers. High availability is designed so that no single point of failure exists in the BlackBerry Enterprise Solution that could break the messaging data flow and application data flow to and from BlackBerry devices.

When you configure the BlackBerry Enterprise Server for high availability, you install a primary BlackBerry Enterprise Server and a standby BlackBerry Enterprise Server on different computers within the same network segment. These BlackBerry Enterprise Server instances create a BlackBerry Enterprise Server pair. Both BlackBerry Enterprise Server instances use the same SRP credentials and BlackBerry Configuration Database. You can configure an automatic failover process or a manual failover process.

The standby BlackBerry Enterprise Server connects to the primary BlackBerry Enterprise Server and checks periodically that the primary BlackBerry Enterprise Server is healthy. The health of a BlackBerry Enterprise Server is determined by thresholds that you can configure. If the health of the primary BlackBerry Enterprise Server falls below the failover threshold or if the primary BlackBerry Enterprise Server stops responding, the standby BlackBerry Enterprise Server tries to promote itself. If the messaging server and the BlackBerry Configuration Database remain available during the failover process, the message delays that device users might experience are similar to the delays that users experience when you start a BlackBerry Enterprise Server instance.

BlackBerry Enterprise Server high availability in a small-scale environment

The following diagram shows how you can configure a BlackBerry Enterprise Server for high availability in a small-scale environment. Each primary BlackBerry Enterprise Server instance requires its own standby BlackBerry Enterprise Server instance. You install the primary BlackBerry Enterprise Server instance on different computers. You can install all BlackBerry Enterprise Server components on both computers to minimize the number of computers that the BlackBerry Enterprise Server environment requires.
Both BlackBerry Enterprise Server instances in the BlackBerry Enterprise Server pair include, by default, the BlackBerry Attachment Service, BlackBerry Dispatcher, BlackBerry MDS Connection Service, BlackBerry Messaging Agent, BlackBerry Policy Service, BlackBerry Router, and BlackBerry Synchronization Service. By default, if you choose to install the BlackBerry Collaboration Service with both instances, the BlackBerry Collaboration Service is included in the BlackBerry Enterprise Server pair.

To administer the BlackBerry Enterprise Server pair, you can install the BlackBerry Administration Service with both BlackBerry Enterprise Server instances and configure high availability for the BlackBerry Administration Service separately.

In a large-scale environment, you can add any number of BlackBerry Enterprise Server pairs that use the same BlackBerry Configuration Database.

How the BlackBerry Enterprise Server calculates health scores

Certain BlackBerry Enterprise Server components calculate a health score that indicates how well the component can provide specific services. The components send their health scores to the BlackBerry Dispatcher, which combines the health scores of the components to calculate the overall health score of the BlackBerry Enterprise Server. The BlackBerry Dispatcher writes the information to the BlackBerry Configuration Database, and it provides the information to a BlackBerry Enterprise Server that requests it.
The BlackBerry Enterprise Server components calculate their health scores by examining their operating health, the stability of their connections to other components, and the health scores of the other components.

The health score of the BlackBerry Enterprise Server consists of various health parameters. Each health parameter indicates whether a particular service or feature is available. If you turn on the automatic failover feature for the BlackBerry Enterprise Server, you can configure health parameters so that the BlackBerry Enterprise Server fails over automatically when critical services or features are no longer available.

### Health scores for BlackBerry Enterprise Server high availability

The BlackBerry Enterprise Server health score consists of 17 health parameters that the BlackBerry Dispatcher uses to calculate the health of a BlackBerry Enterprise Server instance. Each health parameter is represented by one bit in a 64-bit health score value. Each health parameter has a range from 0 to 63 that determines the importance of the health parameter when you configure automatic failover.

<table>
<thead>
<tr>
<th>Health parameter</th>
<th>Hex value</th>
<th>Binary bit position</th>
<th>Default level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackBerry Messaging Agent</td>
<td>0x0000000000000001</td>
<td>0</td>
<td>47</td>
</tr>
<tr>
<td>User accounts</td>
<td>0x0000000000000002</td>
<td>1</td>
<td>46</td>
</tr>
<tr>
<td>Connection to the messaging server(s)</td>
<td>0x0000000000000004</td>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>At least one user account</td>
<td>0x0000000000000008</td>
<td>3</td>
<td>44</td>
</tr>
<tr>
<td>Calendar synchronization</td>
<td>0x0000000000000100</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Address lookup</td>
<td>0x0000000000000400</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td>Attachment viewing</td>
<td>0x0000000000001000</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>BlackBerry Policy Service</td>
<td>0x0000000000100000</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>BlackBerry Synchronization Service</td>
<td>0x0000000001000000</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Organizer data synchronization</td>
<td>0x0000000200000000</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>BlackBerry Dispatcher</td>
<td>0x0000010000000000</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>Connection to the BlackBerry Configuration Database</td>
<td>0x0000020000000000</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>Wireless network access</td>
<td>0x0000040000000000</td>
<td>30</td>
<td>57</td>
</tr>
<tr>
<td>Access to web content and application content</td>
<td>0x0000100000000000</td>
<td>32</td>
<td>43</td>
</tr>
</tbody>
</table>
### Health parameters that the BlackBerry Dispatcher calculates

The BlackBerry Dispatcher uses its own health parameters and the health parameters that it receives from other BlackBerry Enterprise Server components to calculate the health score of the BlackBerry Enterprise Server instance that it is associated with.

<table>
<thead>
<tr>
<th>Health parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackBerry Dispatcher</td>
<td>This parameter indicates that the BlackBerry Dispatcher is healthy. The BlackBerry Dispatcher sets this health parameter when it starts running.</td>
</tr>
<tr>
<td>Connection to the BlackBerry Configuration Database</td>
<td>This parameter indicates that the BlackBerry Dispatcher can connect to the BlackBerry Configuration Database. The BlackBerry Dispatcher tests the connection to the BlackBerry Configuration Database at a specific time interval (by default, every 30 seconds).</td>
</tr>
<tr>
<td>Wireless network access</td>
<td>This parameter indicates that the BlackBerry Dispatcher can connect to the wireless network, either directly or through one or more BlackBerry Router instances. The primary BlackBerry Dispatcher sets the parameter when it opens the SRP connection and clears the parameter when it closes the SRP connection.</td>
</tr>
</tbody>
</table>

The standby BlackBerry Dispatcher tests the SRP connection by sending an unauthenticated ping to the BlackBerry Infrastructure. If the standby BlackBerry Dispatcher receives a ping response within two minutes, the standby BlackBerry Dispatcher determines the connection is healthy.

The standby BlackBerry Dispatcher tests the SRP connection when it starts running and once every hour. If the standby BlackBerry Dispatcher receives a request using an RPC command for the health score, the standby BlackBerry Dispatcher can test the SRP connection at most once every 5 minutes. During the automatic failover process, the standby BlackBerry Dispatcher tests the SRP connection. The standby BlackBerry Dispatcher must open an SRP connection before the standby BlackBerry Enterprise Server can become the primary instance.
Health parameters that the BlackBerry Messaging Agent calculates

The BlackBerry Messaging Agent calculates the following health parameters and communicates the values to the BlackBerry Dispatcher.

<table>
<thead>
<tr>
<th>Health parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackBerry Messaging Agent</td>
<td>This parameter indicates that the BlackBerry Messaging Agent is running or, if the BlackBerry Enterprise Server uses multiple BlackBerry Messaging Agent instances, that all BlackBerry Messaging Agent instances are running. The BlackBerry Messaging Agent sets this parameter when it calculates the current health score of the BlackBerry Messaging Agent.</td>
</tr>
<tr>
<td>User accounts</td>
<td>This parameter indicates that a target percentage of user accounts are healthy (by default, the target percentage is 75%). The BlackBerry Dispatcher calculates the percentage of healthy user accounts based on the health score that the BlackBerry Messaging Agent sends to the BlackBerry Dispatcher. The BlackBerry Dispatcher compares the calculated percentage to a target percentage that is stored in the BlackBerry Configuration Database. If the BlackBerry Messaging Agent is not running, the BlackBerry Dispatcher determines that all user accounts that you assigned to the BlackBerry Messaging Agent are unhealthy. The BlackBerry Messaging Agent sets this health parameter if it determines that all user accounts are healthy. If the BlackBerry Messaging Agent determines that some user accounts are unhealthy, the BlackBerry Messaging Agent clears the health parameter value and sends the number of unhealthy user accounts to the BlackBerry Dispatcher.</td>
</tr>
<tr>
<td>Connection to the messaging server(s)</td>
<td>This parameter indicates that a target percentage of messaging servers are healthy (by default, the target percentage is 75%). The BlackBerry Dispatcher calculates the percentage of healthy messaging servers based on the health score that the BlackBerry Messaging Agent sends to the BlackBerry Dispatcher. The BlackBerry Dispatcher compares the calculated percentage to a target percentage that is stored in the BlackBerry Configuration Database. The BlackBerry Messaging Agent sets this health parameter if it can connect to all messaging servers. If the BlackBerry Messaging Agent cannot connect to a messaging server, the BlackBerry Messaging Agent clears the parameter value and sends the number of unavailable messaging servers to the BlackBerry Dispatcher. The BlackBerry Messaging Agent tests the connection to a messaging server every minute if the BlackBerry Messaging Agent is not making other calls to the messaging server.</td>
</tr>
<tr>
<td>Health parameter</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>At least one user account</td>
<td>This parameter indicates that at least one user account that you assigned to the BlackBerry Messaging Agent is healthy.</td>
</tr>
</tbody>
</table>
| Calendar synchronization                     | This parameter indicates that the BlackBerry Messaging Agent can synchronize calendars. If your organization's environment includes the BlackBerry Enterprise Server for Microsoft Exchange, the BlackBerry Messaging Agent sets the health parameter if it can synchronize calendars with the messaging server. The BlackBerry Messaging Agent tests calendar synchronization periodically (by default, every 10 minutes), if it is not synchronizing calendars actively. 
If your organization’s environment includes the BlackBerry Enterprise Server for IBM Domino, the BlackBerry Messaging Agent synchronizes messages and the calendar using the same API. The BlackBerry Messaging Agent always sets this health parameter when it calculates the health score for the current BlackBerry Messaging Agent. |
| Address lookup                               | This parameter indicates that the BlackBerry Messaging Agent can look up addresses. The BlackBerry Messaging Agent tests whether it can look up addresses every minute if it is not actively looking up addresses.                                                                                                                                                          |
| Attachment viewing                           | This parameter indicates that the BlackBerry Attachment Service can process attachments.                                                                                                                                                                                                                                                                                                           |
|                                             | The BlackBerry Messaging Agent sets this parameter if the BlackBerry Attachment Service can load the extension DLL and the BlackBerry Attachment Service reports that it is healthy. The BlackBerry Attachment Service reports that it is healthy by processing attachment viewing requests or when it is requested to report its health through the GetHealthScore function. The BlackBerry Messaging Agent calls the GetHealthScore function every minute if the BlackBerry Attachment Service is not processing attachments actively. |
| Organizer data synchronization               | This parameter indicates that the PIM connector, which is a subcomponent of the BlackBerry Messaging Agent, is healthy.                                                                                                                                                                                                                                                                          |
### Health parameter | Description
--- | ---
| | The BlackBerry Messaging Agent sets this health parameter if it can deliver requests for organizer data synchronization. If the BlackBerry Messaging Agent is not synchronizing organizer data actively, the BlackBerry Messaging Agent tests the health of the PIM connector every 10 minutes by sending a configuration request to the user account that is the least busy of all the user accounts. If your organization's environment includes the BlackBerry Enterprise Server for IBM Domino, the BlackBerry Messaging Agent must connect to the BlackBerry Configuration Database before it can set this parameter.

### How the BlackBerry Messaging Agent determines that a user account is healthy

If your organization's environment includes the BlackBerry Enterprise Server for Microsoft Exchange, the BlackBerry Messaging Agent determines that a user account is healthy if the BlackBerry Messaging Agent can log in to the user account’s mailbox and create and start a UserControl object. The BlackBerry Messaging Agent might restart a user account if you change the account information, MAPI failures occur, or the connection to the Microsoft Exchange server fails.

If your organization's environment includes the BlackBerry Enterprise Server for IBM Domino, the BlackBerry Messaging Agent determines that a user account is healthy if the user account initializes or if the user account fails to initialize because the user account no longer exists in the IBM Domino directory. If the user account initializes, the BlackBerry Messaging Agent also determines that a user account is healthy if it can connect to the messaging server that hosts the user account and if the user's mail file is healthy.

The BlackBerry Messaging Agent tests the health of the user’s mail file using the following methods:

- If the IBM Domino version on the computers that host the BlackBerry Enterprise Server and the messaging server is version 6.5.6, 7.0.2, or higher, and you did not turn off the NSFDbModifiedTimeBy_Name function using the Don’tUseModifiedBy_Name registry setting of the BlackBerry Messaging Agent, the BlackBerry Messaging Agent calls the NSFDbModifiedTimeBy_Name API function every minute.
- If the IBM Domino versions on the computers that host the BlackBerry Enterprise Server and messaging server do not support the NSFDbModifiedTimeBy_Name function, or you turned off the NSFDbModifiedTimeBy_Name function, the BlackBerry Messaging Agent determines automatically that the user account’s mail file is healthy.

### Health parameters that the BlackBerry Collaboration Service, BlackBerry MDS Connection Service, BlackBerry Policy Service, and BlackBerry Synchronization Service calculate

The BlackBerry Collaboration Service, BlackBerry MDS Connection Service, BlackBerry Policy Service, and BlackBerry Synchronization Service calculate the following health parameters and communicate the values to the BlackBerry Dispatcher.
<table>
<thead>
<tr>
<th>Health parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackBerry Policy Server</td>
<td>This parameter indicates whether the BlackBerry Policy Service is healthy. The BlackBerry Policy Service sets this parameter when the BlackBerry Policy Service starts running and connects to the BlackBerry Configuration Database. By default, the BlackBerry Policy Service on the standby BlackBerry Enterprise Server is not running. When the standby BlackBerry Dispatcher calculates whether automatic failover should occur, the standby BlackBerry Dispatcher does not include the health score of the BlackBerry Policy Service.</td>
</tr>
<tr>
<td>BlackBerry Synchronization Service</td>
<td>This parameter indicates whether the BlackBerry Synchronization Service is healthy. The BlackBerry Synchronization Service sets the parameter when the BlackBerry Synchronization Service starts running and connects to the BlackBerry Configuration Database. By default, the BlackBerry Synchronization Service on the standby BlackBerry Enterprise Server is not running. When the standby BlackBerry Dispatcher calculates whether automatic failover should occur, the standby BlackBerry Dispatcher does not include the health score of the BlackBerry Synchronization Service.</td>
</tr>
<tr>
<td>Access to web content and application content</td>
<td>This parameter indicates whether the BlackBerry MDS Connection Service can browse the Internet or intranet. The BlackBerry MDS Connection Service sets this parameter when the BlackBerry MDS Connection Service initializes and is running.</td>
</tr>
<tr>
<td>Push application access</td>
<td>This parameter indicates whether the BlackBerry MDS Connection Service can push applications to BlackBerry devices. The BlackBerry MDS Connection Service sets the parameter when it initializes, is running, connects to the BlackBerry Configuration Database, and the application server that the BlackBerry MDS Connection Service uses is running.</td>
</tr>
<tr>
<td>BlackBerry Collaboration Service</td>
<td>This parameter indicates that the BlackBerry Collaboration Service is healthy. The BlackBerry Collaboration Service sets this parameter when the BlackBerry Collaboration Service initializes and is running, and the BlackBerry Collaboration Service connects to the instant messaging server.</td>
</tr>
</tbody>
</table>
Conditions for failover to a standby BlackBerry Enterprise Server

Failover between the primary and standby BlackBerry Enterprise Server instances occurs when the standby BlackBerry Enterprise Server determines that its health score is above the promotion threshold and one or more of the following events occurred:

- The standby BlackBerry Enterprise Server receives a health score from the primary BlackBerry Enterprise Server that is below the failover threshold.
- The standby BlackBerry Enterprise Server reads, in the BlackBerry Configuration Database, a health score for the primary BlackBerry Enterprise Server that is below the failover threshold.
- The standby BlackBerry Enterprise Server does not receive a response when it checks the BlackBerry Dispatcher for the health score of the primary BlackBerry Enterprise Server.
- The standby BlackBerry Enterprise Server pings the BlackBerry Dispatcher on the network but cannot determine whether the primary BlackBerry Enterprise Server is running.

How a primary BlackBerry Enterprise Server self-demotes

After the primary BlackBerry Enterprise Server receives a request from a standby BlackBerry Enterprise Server to self-demote, the primary BlackBerry Enterprise Server performs the following actions:

- closes its SRP connection to the BlackBerry Infrastructure
- stops the flow of all messages
- stops the Novell GroupWise SOAP connector if your organization’s environment includes the BlackBerry Enterprise Server for Novell GroupWise
- demotes its connections to the messaging server and BlackBerry Configuration Database to standby connections
- informs the standby BlackBerry Enterprise Server that it self-demoted
Scenario: What happens after a primary BlackBerry Enterprise Server stops responding

If a primary BlackBerry Enterprise Server stops responding, the standby BlackBerry Enterprise Server performs one of two actions depending on whether its health score is above or below the promotion threshold.

The standby BlackBerry Enterprise Server can perform the following actions if the messaging server, BlackBerry Infrastructure, and BlackBerry Configuration Database are available.

**Action that the standby BlackBerry Enterprise Server performs when its health score is above the promotion threshold**

1. The standby BlackBerry Enterprise Server determines that the primary BlackBerry Enterprise Server stopped responding.
2. The standby BlackBerry Enterprise Server checks its own health score and determines that the health score is above the promotion threshold.
3. The standby BlackBerry Enterprise Server opens active connections to the BlackBerry Configuration Database and messaging server.
4. If your organization’s environment includes the BlackBerry Enterprise Server for Novell GroupWise, the standby BlackBerry Enterprise Server starts the GroupWise SOAP connector.
5. The standby BlackBerry Enterprise Server tries to open an SRP connection to the BlackBerry Infrastructure.
6. When the connection to the BlackBerry Infrastructure is stable, the standby BlackBerry Enterprise Server writes its identity as the primary BlackBerry Enterprise Server to the BlackBerry Configuration Database.

**Action that the standby BlackBerry Enterprise Server performs when its health score is below the promotion threshold**

1. The standby BlackBerry Enterprise Server determines that the primary BlackBerry Enterprise Server stopped responding.
2. The standby BlackBerry Enterprise Server checks its own health score and determines that the health score is below the promotion threshold.

   The standby BlackBerry Enterprise Server cannot become the primary instance. You must resolve any issues before the standby BlackBerry Enterprise Server can recover.
Scenario: What happens after the health score of a primary BlackBerry Enterprise Server falls below the failover threshold

The following scenario can occur if the messaging server, BlackBerry Infrastructure, and BlackBerry Configuration Database are available.

1. The standby BlackBerry Enterprise Server determines that the health score of the primary BlackBerry Enterprise Server fell below the failover threshold.
2. The standby BlackBerry Enterprise Server checks its own health score and determines that its health score is above the promotion threshold and higher than the health score of the primary BlackBerry Enterprise Server.
3. The standby BlackBerry Enterprise Server sends a demotion request to the primary BlackBerry Enterprise Server.
4. The primary BlackBerry Enterprise Server self-demotes.
5. If your organization’s environment includes the BlackBerry Enterprise Server for Novell GroupWise, the primary BlackBerry Enterprise Server stops the Novell GroupWise SOAP connector.
6. The standby BlackBerry Enterprise Server opens active connections to the BlackBerry Configuration Database and messaging server.
7. If your organization’s environment includes the BlackBerry Enterprise Server for Novell GroupWise, the standby BlackBerry Enterprise Server starts the GroupWise SOAP connector.
8. The standby BlackBerry Enterprise Server tries to open an SRP connection to the BlackBerry Infrastructure.
9. The standby BlackBerry Enterprise Server writes its identity as the primary BlackBerry Enterprise Server to the BlackBerry Configuration Database.

Scenario: What happens after a BlackBerry Enterprise Server component stops responding

If a BlackBerry Enterprise Server component that you installed with the primary BlackBerry Enterprise Server stops responding, the response of the primary BlackBerry Enterprise Server depends on whether the health of the component affects the failover threshold.
The following responses assume that the messaging server, BlackBerry Infrastructure, BlackBerry Configuration Database and standby BlackBerry Enterprise Server are available but that the BlackBerry Controller cannot restart the BlackBerry Enterprise Server component.

Response of the primary BlackBerry Enterprise Server when the health of the nonresponsive component affects the failover threshold

1. During a periodic health check, the primary BlackBerry Controller detects the nonresponsive BlackBerry Enterprise Server component.

2. The BlackBerry Controller tries to restart the nonresponsive component but is not successful.

3. The BlackBerry Dispatcher lowers the health score of the BlackBerry Enterprise Server. The health score falls below the failover threshold.

4. The standby BlackBerry Enterprise Server demotes the primary BlackBerry Enterprise Server.

5. The standby BlackBerry Enterprise Server tries to promote itself to become the primary instance.

6. When the connections to the BlackBerry Infrastructure and messaging server are open, the standby BlackBerry Enterprise Server writes its identity as the primary BlackBerry Enterprise Server to the BlackBerry Configuration Database.

Response of the primary BlackBerry Enterprise Server when the health of the nonresponsive component does not affect the failover threshold

1. During a periodic health check, the primary BlackBerry Controller detects the nonresponsive BlackBerry Enterprise Server component.

2. The BlackBerry Controller tries to restart the nonresponsive component but is not successful.

3. The BlackBerry Dispatcher lowers the health score of the primary BlackBerry Enterprise Server.

   The health score does not fall below the failover threshold, and the primary BlackBerry Enterprise Server continues running. You must resolve any issues before the BlackBerry Enterprise Server component can recover.
Scenario: What happens after a standby BlackBerry Enterprise Server loses its connection to the primary BlackBerry Enterprise Server and the BlackBerry Configuration Database

The following scenario assumes that the messaging server is available.

1. The standby BlackBerry Enterprise Server tries to open a connection to the BlackBerry Infrastructure.
2. The BlackBerry Infrastructure pings the primary BlackBerry Enterprise Server to determine whether it is available.
   
   One of the following events occurs:

   • If the primary BlackBerry Enterprise Server does not respond, the BlackBerry Infrastructure opens the connection to the standby BlackBerry Enterprise Server. The standby BlackBerry Enterprise Server assumes that it should become the primary BlackBerry Enterprise Server and promotes itself.

   • If the primary BlackBerry Enterprise Server does respond, the BlackBerry Infrastructure does not open the connection to the standby BlackBerry Enterprise Server. The standby BlackBerry Enterprise Server continues to try to open the connection to the BlackBerry Infrastructure until the connection opens or until the connection to the BlackBerry Configuration Database reopens.
High availability in a distributed environment

If you install multiple BlackBerry Enterprise Server components on different computers to create a distributed environment, you can configure the components for high availability. High availability for a distributed component requires that you install two or more instances of the component in your organization’s environment. When an instance stops responding, the other instances can take over.

When you install multiple BlackBerry Enterprise Server components in a distributed environment, each BlackBerry Enterprise Server component implements high availability differently.

<table>
<thead>
<tr>
<th>Component</th>
<th>High availability type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackBerry Administration Service</td>
<td>load balancing using DNS round robin, or a hardware load balancer</td>
<td>When you install two or more BlackBerry Administration Service instances, you can create a BlackBerry Administration Service pool. You can access the BlackBerry Administration Service instances using a single web address. The load is distributed across the instances. If a BlackBerry Administration Service instance stops responding, the pool routes requests to the available instances.</td>
</tr>
<tr>
<td>BlackBerry Attachment Service</td>
<td>load-balancing with primary and secondary groups</td>
<td>When you install two or more BlackBerry Attachment Service instances, you can create a BlackBerry Attachment Service pool for each BlackBerry Enterprise Server instance. You can configure a pool with a primary group of instances and, optionally, a secondary group of instances. The BlackBerry Enterprise Server sends all requests to the primary group. If the primary group cannot convert a specific file format, the BlackBerry Enterprise Server forwards conversion requests for the specific file format to the secondary group.</td>
</tr>
<tr>
<td>BlackBerry Collaboration Service</td>
<td>failover with an active connection to one instance and standby connections to other instances</td>
<td>When you install two or more BlackBerry Collaboration Service instances, you can create a BlackBerry Collaboration Service pool for each BlackBerry Enterprise Server instance. Each BlackBerry Enterprise Server assigns one of the connections to the BlackBerry Collaboration Service instances as the active connection, and the other connections as standby connections. If the BlackBerry Collaboration Service that the active connection is assigned to stops responding, the BlackBerry Enterprise Server</td>
</tr>
<tr>
<td>Component</td>
<td>High availability type</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BlackBerry Configuration Database</td>
<td>database mirroring</td>
<td>If you install the BlackBerry Configuration Database on Microsoft SQL Server 2005 SP2 or later, you can configure database mirroring. If the principal BlackBerry Configuration Database stops responding, the BlackBerry Enterprise Server fails over to the mirror BlackBerry Configuration Database.</td>
</tr>
<tr>
<td>BlackBerry MDS Connection Service</td>
<td>failover with an active connection to one instance and standby connections to other instances</td>
<td>When you install two or more BlackBerry MDS Connection Service instances, you can create a BlackBerry MDS Connection Service pool for each BlackBerry Enterprise Server instance. Each BlackBerry Enterprise Server assigns one of the connections to the BlackBerry MDS Connection Service instances as the active connection, and the other connections as standby connections. If the BlackBerry MDS Connection Service that the active connection is assigned to stops responding, the BlackBerry Enterprise Server assigns the active connection to another BlackBerry MDS Connection Service instance.</td>
</tr>
<tr>
<td>BlackBerry Router</td>
<td>failover</td>
<td>When you install two or more BlackBerry Router instances, you can create a BlackBerry Router pool for each BlackBerry Enterprise Server or BlackBerry Enterprise Server pair. If a BlackBerry Router stops responding, the BlackBerry Enterprise Server selects another instance using information that is stored in the BlackBerry Configuration Database.</td>
</tr>
</tbody>
</table>
BlackBerry Administration Service high availability

To configure high availability for the BlackBerry Administration Service and enhance its performance, you can configure a pool of two or more BlackBerry Administration Service instances.

The BlackBerry Administration Service verifies that sessions between BlackBerry Administration Service clients and a BlackBerry Administration Service instance remain persistent. The clients that communicate with the BlackBerry Administration Service are the BlackBerry Enterprise Server Resource Kit, browsers, and third-party applications that use the BlackBerry Administration Service APIs. If a BlackBerry Administration Service instance stops responding or shuts down, all clients must log in again. Sessions are not reassigned automatically.

To permit browsers to distribute requests across the BlackBerry Administration Service instances and to avoid a single point of failure, you can select one of the following high availability options:

- DNS round robin
- Hardware load balancer

If you configure DNS round robin, the DNS server stores the IP addresses of all of the BlackBerry Administration Service instances and the pool DNS name. All clients must resolve the DNS name into the list of IP addresses and try to connect to each BlackBerry Administration Service instance until a connection opens. If the client is a third-party application, you must turn off DNS caching at the JVM level. Third-party Java applications must maintain a list of available and unavailable BlackBerry Administration Service instances.

How the BlackBerry Administration Service pool manages job tasks, notification tasks, and reconciliation tasks

When you configure a BlackBerry Administration Service pool, one of the BlackBerry Administration Service instances manages job tasks, notification tasks, and reconciliation tasks on behalf of the BlackBerry Administration Service pool. This BlackBerry Administration Service instance is called the singleton. The first BlackBerry Administration Service instance that you start in the BlackBerry Administration Service pool becomes the singleton, regardless of whether you configure high availability using DNS round robin or a hardware load-balancer. If the singleton stops responding or you stop it,
another instance in the BlackBerry Administration Service pool takes over from the singleton automatically and becomes the singleton.

You can determine which BlackBerry Administration Service instance is the singleton by searching for the `CLUSTER: singleton deployment barrier is deploying` message and `CLUSTER: all queues ready barrier is deploying, singleton true` message in the log files for the BlackBerry Administration Service instances. The BlackBerry Administration Service instances that are not the singleton write the `CLUSTER: all queues ready barrier is deploying, singleton false` message in the log files.

If BlackBerry Administration Service instances in the pool cannot communicate with the singleton (for example, if you installed the BlackBerry Administration Service instances in different subnets but did not configure communication between the instances), one of the BlackBerry Administration Service instances tries to become the singleton, even when the current singleton is running. The BlackBerry Administration Service instance tries to become the singleton until the current singleton stops responding or until the BlackBerry Administration Service instance can open communication with the current singleton. If the BlackBerry Administration Service instances in the pool cannot communicate with the singleton, the BlackBerry Administration Service pool does not process job tasks, notification tasks, or reconciliation tasks.

Because of the specific tasks that the singleton performs, you might want to monitor the performance of the computer that hosts the singleton.

For information about how to configure communication between the BlackBerry Administration Service instances when you install them in different subnets, see the *BlackBerry Enterprise Server Administration Guide*.

---

**BlackBerry Administration Service high availability using DNS round robin**

To configure BlackBerry Administration Service high availability, you can install multiple BlackBerry Administration Service instances in a pool and use DNS round robin to permit the BlackBerry Administration Service clients to connect to the available instances.
Best practice: Planning for BlackBerry Administration Service high availability

When you plan for BlackBerry Administration Service high availability, you should consider installing multiple BlackBerry Administration Service instances on different computers.

When you plan for BlackBerry Administration Service high availability, you should consider the performance requirements and system requirements of the BlackBerry Enterprise Server and the BlackBerry Administration Service and choose one of the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install the BlackBerry Administration Service instances with the BlackBerry Enterprise Server pair and configure a BlackBerry Administration Service pool.</td>
<td>If you install the BlackBerry Administration Service instances with the primary and standby BlackBerry Enterprise Server instances, you can create a BlackBerry Administration Service pool that includes the two instances.</td>
</tr>
<tr>
<td>Scenario</td>
<td>Best practice</td>
</tr>
<tr>
<td>----------</td>
<td>---------------</td>
</tr>
<tr>
<td>If you install a BlackBerry Administration Service with the BlackBerry Enterprise Server, the failover process for the BlackBerry Administration Service is independent from the failover process for the BlackBerry Enterprise Server. For example, the BlackBerry Administration Service does not necessarily fail over if the primary BlackBerry Enterprise Server stops responding.</td>
<td>If you install a BlackBerry Administration Service with the BlackBerry Enterprise Server, the failover process for the BlackBerry Administration Service is independent from the failover process for the BlackBerry Enterprise Server. For example, the BlackBerry Administration Service does not necessarily fail over if the primary BlackBerry Enterprise Server stops responding.</td>
</tr>
<tr>
<td>If the BlackBerry Administration Service that you installed with the primary BlackBerry Enterprise Server stops responding, clients can fail over to the BlackBerry Administration Service instance that you installed with the standby BlackBerry Enterprise Server.</td>
<td>If the BlackBerry Administration Service that you installed with the primary BlackBerry Enterprise Server stops responding, clients can fail over to the BlackBerry Administration Service instance that you installed with the standby BlackBerry Enterprise Server.</td>
</tr>
<tr>
<td>Install multiple BlackBerry Administration Service instances on computers that do not host a BlackBerry Enterprise Server and configure a BlackBerry Administration Service pool.</td>
<td>If you install multiple BlackBerry Administration Service instances in your organization’s environment, you can configure a BlackBerry Administration Service pool. The BlackBerry Administration Service pool can support multiple BlackBerry Enterprise Server instances.</td>
</tr>
<tr>
<td>Choose one of the above scenarios and use a hardware load balancer instead of DNS round robin.</td>
<td>You can choose to use a hardware load balancer if you use the BlackBerry Administration Service in a large-scale environment.</td>
</tr>
</tbody>
</table>

**Scenario: What happens after the BlackBerry Administration Service stops responding**

The following responses assume that you have configured DNS round robin.

If you configured a hardware load balancer and a BlackBerry Administration Service stops responding, the hardware load balancer automatically excludes the IP address of the nonresponsive BlackBerry Administration Service instance from the list of available BlackBerry Administration Service instances.

**Response of the BlackBerry Enterprise Server component when the BlackBerry Administration Service instance that it is connected to stops responding**

The following scenario demonstrates what happens to the BlackBerry Enterprise Server components that are BlackBerry Administration Service clients.
1. The BlackBerry Administration Service instance does not respond to requests from the BlackBerry Enterprise Server component.

2. The BlackBerry Enterprise Server component tries to connect to another BlackBerry Administration Service instance.
   
   One of the following events occur:
   
   • If the BlackBerry Enterprise Server component can connect to another BlackBerry Administration Service instance, the BlackBerry Enterprise Server component sends subsequent requests to that BlackBerry Administration Service instance.
   
   • If the BlackBerry Enterprise Server component cannot connect to another BlackBerry Administration Service instance, you must resolve the issue.

Response of the browser when the BlackBerry Administration Service instance that it is connected to stops responding

The following scenario is specific to the browser that an administrator is using. It assumes that the administrator is logged in to the BlackBerry Administration Service instance that stopped responding.

1. The BlackBerry Administration Service does not respond to requests from the browser.

2. The browser loses the open web session.

3. The browser uses the BlackBerry Administration Service pool name to request a list of IP addresses from the DNS server.

4. The DNS server returns the list of IP addresses.

5. The browser tries to connect to one of the IP addresses on the list.

   One of the following events occurs:
   
   • If the browser cannot connect to a BlackBerry Administration Service instance that is running, the browser displays a The page cannot be displayed error.
   
   • If the browser can connect to a BlackBerry Administration Service instance that is running, the BlackBerry Administration Service instance prompts the administrator for login information.

If you cannot resolve the issue, you should delete the nonresponsive instance from the DNS record for best performance.
BlackBerry Attachment Service high availability

To configure BlackBerry Attachment Service high availability, you can create a pool of two or more BlackBerry Attachment Service instances that a BlackBerry Enterprise Server can use. You can create one BlackBerry Attachment Service pool for every BlackBerry Enterprise Server and add any number of BlackBerry Attachment Service instances to the pool.

A pool consists of a primary group of BlackBerry Attachment Service instances and an optional secondary group of BlackBerry Attachment Service instances. The BlackBerry Enterprise Server sends requests to the BlackBerry Attachment Service instances in the primary group. If the BlackBerry Attachment Service instances in the primary group cannot process a request, the BlackBerry Attachment Service instances in the primary group forward the request to the instances in the secondary group.

You can configure a BlackBerry Attachment Service instance to process a specific content type only. If you configure multiple BlackBerry Attachment Service instances within a primary or secondary group to process a specific content type only, the instances work together as a load-balanced subgroup.

The BlackBerry Attachment Service pool maintains a health score that indicates whether the pool can convert all content types. If no BlackBerry Attachment Service instance in a pool can convert a specific content type and the attachment viewing threshold marker is above the failover threshold for the primary BlackBerry Enterprise Server, the primary BlackBerry Enterprise Server starts the failover process.

BlackBerry Attachment Service high availability in a small-scale environment

In a small-scale environment, you can install the BlackBerry Attachment Service with the primary and standby BlackBerry Enterprise Server instances to minimize the number of computers that your organization requires to run the BlackBerry Domain.
BlackBerry Attachment Service high availability in a large-scale environment

To configure BlackBerry Attachment Service high availability when your organization's environment includes many users who access attachments from their BlackBerry devices, you can configure the BlackBerry Attachment Service pool for a large-scale environment. You can configure the BlackBerry Attachment Service instances in primary and secondary groups within a pool.
Best practice: Planning for BlackBerry Attachment Service high availability

To configure BlackBerry Attachment Service high availability, you can install and configure two or more BlackBerry Attachment Service instances. You can install the BlackBerry Attachment Service instances with the primary and standby BlackBerry Enterprise Server instances and on separate computers.

When you plan for BlackBerry Attachment Service high availability, you should consider the performance requirements and system requirements of the BlackBerry Enterprise Server and BlackBerry Attachment Service and choose one of the following scenarios:
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install BlackBerry Attachment Service instances with the BlackBerry</td>
<td>If you install BlackBerry Attachment Service instances with the primary and standby BlackBerry Enterprise Server instances, you can create a BlackBerry Attachment Service pool that includes both BlackBerry Attachment Service instances. You can configure the BlackBerry Attachment Service instance that installs with the primary BlackBerry Enterprise Server as the instance in the primary group, and the BlackBerry Attachment Service instance that installs with the standby BlackBerry Enterprise Server as the instance in the secondary group.</td>
</tr>
<tr>
<td>Enterprise Server pair and configure a BlackBerry Attachment Service pool</td>
<td>The primary BlackBerry Enterprise Server sends conversion requests only to the BlackBerry Attachment Service instance that you install with the primary BlackBerry Enterprise Server.</td>
</tr>
<tr>
<td>that includes a primary group and secondary group.</td>
<td>If the BlackBerry Attachment Service instance that you installed with the primary BlackBerry Enterprise Server stops responding, the primary BlackBerry Enterprise Server can use the BlackBerry Attachment Service instance that you installed with the standby BlackBerry Enterprise Server.</td>
</tr>
<tr>
<td>Install BlackBerry Attachment Service instances with the BlackBerry</td>
<td>If you install the BlackBerry Attachment Service instances with the primary and standby BlackBerry Enterprise Server instances, you can create a pool that includes both BlackBerry Attachment Service instances. You can configure both BlackBerry Attachment Service instances to be part of the primary group.</td>
</tr>
<tr>
<td>Enterprise Server pair and configure a BlackBerry Attachment Service pool</td>
<td>The primary BlackBerry Enterprise Server sends conversion requests to both BlackBerry Attachment Service instances.</td>
</tr>
<tr>
<td>with a primary group only.</td>
<td>If one of the BlackBerry Attachment Service instances stops responding, the primary BlackBerry Enterprise Server can continue to send requests to the other BlackBerry Attachment Service instance.</td>
</tr>
<tr>
<td>Install the BlackBerry Attachment Service instances with the BlackBerry</td>
<td>If you install multiple BlackBerry Attachment Service instances on different computers, you can configure one or more BlackBerry Attachment Service and configure primary and secondary groups for each pool. You can configure each BlackBerry Attachment Service pool to support multiple BlackBerry Enterprise Server pairs.</td>
</tr>
<tr>
<td>Enterprise Server pair or on different computers, and configure a</td>
<td>If you want to configure a BlackBerry Attachment Service pool on computers that do not host the BlackBerry Enterprise Server pair, you can turn off the BlackBerry Attachment Service instances that you installed with the BlackBerry Enterprise Server, or you can configure these BlackBerry Attachment Service instances as a secondary group if the primary group stops responding.</td>
</tr>
<tr>
<td>BlackBerry Attachment Service pool with primary and secondary groups.</td>
<td></td>
</tr>
</tbody>
</table>
Scenario: What happens after the BlackBerry Attachment Service stops responding

If a BlackBerry Attachment Service stops responding, the primary BlackBerry Enterprise Server responds differently if it can connect to another BlackBerry Attachment Service instance in the pool.

These responses assume that the health of the BlackBerry Attachment Service is above the failover threshold, the BlackBerry Enterprise Server is still running, and the BlackBerry Attachment Service cannot restore itself.

Response of the primary BlackBerry Enterprise Server when it can connect to another BlackBerry Attachment Service

1. The primary BlackBerry Enterprise Server tries unsuccessfully to reopen the connection to the BlackBerry Attachment Service instance that it was using when it lost the connection.
2. The primary BlackBerry Enterprise Server tries to connect to another BlackBerry Attachment Service in the pool.

The primary BlackBerry Enterprise Server can connect to another BlackBerry Attachment Service, and attachment viewing is restored.

Response of the primary BlackBerry Enterprise Server when it cannot connect to another BlackBerry Attachment Service

1. The primary BlackBerry Enterprise Server tries unsuccessfully to reopen the connection to the BlackBerry Attachment Service instance that it was using when it lost the connection.
2. The primary BlackBerry Enterprise Server tries unsuccessfully to connect to another BlackBerry Attachment Service in the pool.
3. The primary BlackBerry Enterprise Server lowers its health score.
   The health score of the BlackBerry Enterprise Server falls below the failover threshold.
4. The standby BlackBerry Enterprise Server checks its health score to determine if it is above the promotion threshold.
   One of the following events occurs:
   • If the health score of the standby BlackBerry Enterprise Server is above the promotion threshold, the standby BlackBerry Enterprise Server demotes the primary BlackBerry Enterprise Server and tries to promote itself to become the primary instance.
• If the health score of the standby BlackBerry Enterprise Server is below the promotion threshold, the standby BlackBerry Enterprise Server cannot promote itself and you must resolve the issue.
BlackBerry Collaboration Service high availability

To configure BlackBerry Collaboration Service high availability so that instant messaging is not impacted if a BlackBerry Collaboration Service stops responding, you can configure a BlackBerry Collaboration Service pool of two or more BlackBerry Collaboration Service instances. The BlackBerry Enterprise Server and BlackBerry Collaboration Service instances can connect to each other.

After you configure a pool, the BlackBerry Enterprise Server assigns one of the connections to the BlackBerry Collaboration Service instances as the active connection, and the other connections as standby connections. Multiple BlackBerry Enterprise Server instances can use a single BlackBerry Collaboration Service pool and assign an active connection to different BlackBerry Collaboration Service instances. You can configure manual or automatic failover.

Each BlackBerry Collaboration Service instance writes its health information to the BlackBerry Dispatcher. If the BlackBerry Collaboration Service cannot connect to the primary BlackBerry Dispatcher instance, the BlackBerry Dispatcher can promote another BlackBerry Collaboration Service instance by changing the standby connection to an active connection. When the BlackBerry Collaboration Service with the active connection to the BlackBerry Enterprise Server stops responding, all open instant messaging sessions are lost.

If multiple BlackBerry Collaboration Service instances with standby connections to the BlackBerry Enterprise Server exist, the BlackBerry Dispatcher uses the health score of the BlackBerry Collaboration Service instances to determine which BlackBerry Collaboration Service it assigns the active connection to. The BlackBerry Enterprise Server assigns the active connection to the BlackBerry Collaboration Service instance with the highest score.

BlackBerry Collaboration Service high availability in a small-scale environment

To minimize the number of computers that the BlackBerry Domain environment requires, you can install the BlackBerry Collaboration Service with the BlackBerry Enterprise Server in a small-scale environment.
BlackBerry Collaboration Service high availability in a large-scale environment

To configure BlackBerry Collaboration Service high availability in a large-scale environment, you can configure each BlackBerry Collaboration Service instance to support up to four BlackBerry Enterprise Server instances. For example, in the following diagram, failover pairs 1 and 2 of the BlackBerry Enterprise Server assigned the active connection to the same BlackBerry Collaboration Service instance. In failover pair 3, the primary BlackBerry Enterprise Server assigned the active connection to a different BlackBerry Collaboration Service instance.
Best practice: Planning for BlackBerry Collaboration Service high availability

To plan for BlackBerry Collaboration Service high availability, you can install BlackBerry Collaboration Service instances with the BlackBerry Enterprise Server and on separate computers.

When you plan for BlackBerry Collaboration Service high availability, you should consider the performance requirements and system requirements of the BlackBerry Enterprise Server and the BlackBerry Collaboration Service and choose one of the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install the BlackBerry Collaboration Service instances with the BlackBerry Enterprise Server pair and configure a</td>
<td>If you install the BlackBerry Collaboration Service with the primary and standby BlackBerry Enterprise Server instances, you can create a BlackBerry Collaboration Service pool that includes both instances. You can configure the</td>
</tr>
<tr>
<td>Scenario</td>
<td>Best practice</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BlackBerry Collaboration Service pool that can fail over automatically.</td>
<td>primary BlackBerry Enterprise Server to assign the active connection to the BlackBerry Collaboration Service instance that you installed with it, and to assign a standby connection to the BlackBerry Collaboration Service that you installed with the standby BlackBerry Enterprise Server. You can configure automatic failover for the BlackBerry Collaboration Service instances. If the BlackBerry Collaboration Service that you installed with the primary BlackBerry Enterprise Server stops responding, the primary BlackBerry Enterprise Server can fail over to the BlackBerry Collaboration Service instance that you installed with the standby BlackBerry Enterprise Server.</td>
</tr>
<tr>
<td>Install the BlackBerry Collaboration Service instances with the BlackBerry Enterprise Server pair and configure a BlackBerry Collaboration Service pool that does not fail over automatically.</td>
<td>If you install the BlackBerry Collaboration Service with the primary and standby BlackBerry Enterprise Server instances, you can create a BlackBerry Collaboration Service pool that includes both instances. You can configure the primary BlackBerry Enterprise Server to assign an active connection to the BlackBerry Collaboration Service that you installed with it, and a standby connection to the BlackBerry Collaboration Service that you installed with the standby BlackBerry Enterprise Server. You can choose not to configure automatic failover for the BlackBerry Collaboration Service instances. If the BlackBerry Collaboration Service that you installed with the primary BlackBerry Enterprise Server stops responding, you must fail over the BlackBerry Enterprise Server to the standby BlackBerry Collaboration Service instance manually.</td>
</tr>
<tr>
<td>Install multiple BlackBerry Collaboration Service instances with the BlackBerry Enterprise Server or on different computers and configure a BlackBerry Collaboration Service pool that can automatically fail over</td>
<td>If you install multiple BlackBerry Collaboration Service instances, you can configure all the BlackBerry Collaboration Service instances to work in a pool. Each instance can support multiple primary BlackBerry Enterprise Server instances. You can configure automatic failover for the BlackBerry Collaboration Service instances and select which BlackBerry Collaboration Service is assigned the active connection for each BlackBerry Enterprise Server. If the BlackBerry Collaboration Service that is assigned to the active connection stops responding, the BlackBerry Enterprise Server can fail over to a different BlackBerry Collaboration Service instance.</td>
</tr>
</tbody>
</table>
Scenario: What happens after the BlackBerry Collaboration Service stops responding

The following responses demonstrate what happens to the primary BlackBerry Enterprise Server when the BlackBerry Collaboration Service with the active connection stops responding. The primary BlackBerry Enterprise Server responds differently if it can promote a different BlackBerry Collaboration Service.

The following responses assume that the health score for the BlackBerry Collaboration Service is above the failover threshold.

If you install a BlackBerry Collaboration Service instance with the primary BlackBerry Enterprise Server, and either the primary BlackBerry Enterprise Server or BlackBerry Collaboration Service stops responding, all of the components fail over to the standby BlackBerry Enterprise Server and standby BlackBerry Collaboration Service.

Response of the primary BlackBerry Enterprise Server when it can promote a different BlackBerry Collaboration Service

1. The primary BlackBerry Enterprise Server loses its active connection with a BlackBerry Collaboration Service.

2. If the primary BlackBerry Enterprise Server connects to other BlackBerry Collaboration Service instances, the BlackBerry Enterprise Server promotes one of the connections to the BlackBerry Collaboration Service instances to active. The BlackBerry Enterprise Server determines which connection to promote by checking the health scores of the instances, and choosing the BlackBerry Collaboration Service instance with the highest health score.

3. The primary BlackBerry Enterprise Server writes the new information to the BlackBerry Configuration Database.

You must resolve the issue before the nonresponsive BlackBerry Collaboration Service instance can recover.

Response of the primary BlackBerry Enterprise Server when it cannot promote a different BlackBerry Collaboration Service

1. The primary BlackBerry Enterprise Server loses its active connection with the BlackBerry Collaboration Service.

2. If the primary BlackBerry Enterprise Server connects to other BlackBerry Collaboration Service instances, the BlackBerry Enterprise Server tries to promote one of the connections to the BlackBerry Collaboration Service instances to active, but cannot promote a connection successfully.

3. The primary BlackBerry Enterprise Server lowers its health score. The health score of the BlackBerry Enterprise Server falls below the failover threshold.

4. The standby BlackBerry Enterprise Server checks its health score to determine if it is above the promotion threshold.
5. If the health score of the standby BlackBerry Enterprise Server is above the promotion threshold, the BlackBerry Enterprise Server tries to change the connection to a BlackBerry Collaboration Service instance from a standby connection to an active connection.

One of the following events occurs:

- If the standby BlackBerry Enterprise Server can change the connection to an active connection, the standby BlackBerry Enterprise Server demotes the primary BlackBerry Enterprise Server and promotes itself to become the primary instance.
- If the standby BlackBerry Enterprise Server cannot change the connection to an active connection, it cannot become the primary instance. You must resolve the issue before the BlackBerry Enterprise Server pair can recover.

Scenario: What happens after the primary BlackBerry Dispatcher promotes a connection to a BlackBerry Collaboration Service

This scenario assumes that the primary BlackBerry Enterprise Server remains available and has an active connection to a BlackBerry Collaboration Service instance that is running, but the health score of the BlackBerry Collaboration Service instance fell below the failover threshold.

1. The BlackBerry Dispatcher sends a request to a BlackBerry Collaboration Service with an acceptable health score to promote its standby connection to an active connection.
2. The BlackBerry Collaboration Service with the acceptable health score promotes the connection to active.
3. The BlackBerry Dispatcher sends a request to the BlackBerry Collaboration Service instance with the low health score to demote the active connection to a standby connection.
4. When the BlackBerry Collaboration Service with the low health score receives the request, it finishes processing the packets that the BlackBerry Dispatcher sent to it previously.
5. The BlackBerry Collaboration Service with the low health score checks whether the standby BlackBerry Enterprise Server was promoted to the primary instance. In this scenario, it has not.
6. The BlackBerry Collaboration Service with the low health score sends a message to all open BlackBerry Collaboration Service sessions to log out.
7. The BlackBerry Collaboration Service with the active connection sends a message to all open sessions with collaboration clients to log in.

One of the following events occurs:
• If password caching is turned off, users must log in to the collaboration client manually. The session connects to the BlackBerry Collaboration Service with the active connection.
• If password caching is turned on, users are logged in automatically. The sessions connect to the BlackBerry Collaboration Service with the active connection.
BlackBerry Configuration Database high availability

The type of BlackBerry Configuration Database high availability that you can configure depends on the type of database server that is in your organization's environment.

If your organization's environment includes Microsoft SQL Server 2005 SP2 or later, you can configure database mirroring. Database mirroring requires a principal database, a mirror database, and a witness. Although the BlackBerry Enterprise Server can contact the mirror database, it opens active connections to the principal database only. If the principal database stops responding, the BlackBerry Enterprise Server opens an active connection to the mirror database automatically. Database mirroring provides fault tolerance for the BlackBerry Enterprise Solution.

If your organization's environment includes a version of Microsoft SQL Server that is earlier than version 2005 SP2, you can configure transactional replication of the BlackBerry Configuration Database and create a replicated BlackBerry Configuration Database. If the BlackBerry Configuration Database stops responding, you must fail over the BlackBerry Enterprise Server to the replicated BlackBerry Configuration Database manually.

For more information about database mirroring, visit www.microsoft.com.

BlackBerry Configuration Database mirroring

The following diagram shows how you can configure the BlackBerry Configuration Database with principal and mirror instances and a witness for high availability. The BlackBerry Enterprise Server connects to the principal BlackBerry Configuration Database directly, and can fail over to the mirror BlackBerry Configuration Database if the principal BlackBerry Configuration Database stops responding.
The primary BlackBerry Enterprise Server connects to the principal BlackBerry Configuration Database and accesses data from it. The name of the mirror BlackBerry Configuration Database is stored in the Windows registry of the computers that hosts the primary and standby BlackBerry Enterprise Server instances. The BlackBerry Enterprise Server instances do not connect to the mirror BlackBerry Configuration Database until after the principal BlackBerry Configuration Database stops responding.

The primary BlackBerry Enterprise Server connects to the messaging server and processes the messaging data that it sends to and receives from BlackBerry devices.

The standby BlackBerry Enterprise Server opens standby connections to the principal BlackBerry Configuration Database and the messaging server.
Scenario: What happens after the principal BlackBerry Configuration Database stops responding

If a principal BlackBerry Configuration Database stops responding, the response of the primary BlackBerry Enterprise Server depends on whether it can connect to the mirror BlackBerry Configuration Database.

The following responses assume that the messaging server and BlackBerry Infrastructure are available.

Response of a primary BlackBerry Enterprise Server that can connect to the mirror BlackBerry Configuration Database

1. The primary BlackBerry Enterprise Server loses its connection to the principal BlackBerry Configuration Database.
2. The primary BlackBerry Enterprise Server connects to the mirror BlackBerry Configuration Database.
3. The primary BlackBerry Enterprise Server remains the primary instance.

Response of a primary BlackBerry Enterprise Server that cannot connect to the mirror BlackBerry Configuration Database

1. The primary BlackBerry Enterprise Server loses its connection to the principal BlackBerry Configuration Database.
2. The primary BlackBerry Enterprise Server tries to connect to the mirror BlackBerry Configuration Database, but is unsuccessful.
3. The primary BlackBerry Enterprise Server lowers its health score and continues to provide limited services.

One of the following events occurs:

- If the standby BlackBerry Enterprise Server can open a connection to the principal or mirror BlackBerry Configuration Database, it demotes the primary BlackBerry Enterprise Server and promotes itself to become the primary instance.
- If the standby BlackBerry Enterprise Server cannot open a connection to the principal or mirror BlackBerry Configuration Database, it cannot promote itself. You must resolve any issues before the BlackBerry Enterprise Server pair can recover.
Scenario: What happens after the BlackBerry Configuration Database and BlackBerry Infrastructure stop responding

If the BlackBerry Configuration Database and BlackBerry Infrastructure stop responding, the response of the primary BlackBerry Enterprise Server depends on whether it can reconnect to the BlackBerry Infrastructure.

The following responses assume that the messaging server is available and the health parameter for the BlackBerry Configuration Database is above the failover and promotion threshold.

Response of a primary BlackBerry Enterprise Server that can reconnect to the BlackBerry Infrastructure

1. The primary BlackBerry Enterprise Server loses its SRP connection and its connection to the BlackBerry Configuration Database.
2. The primary BlackBerry Enterprise Server reopens the SRP connection.
3. The primary BlackBerry Enterprise Server tries to reconnect to the BlackBerry Configuration Database.
   One of the following events occurs:
   - If the primary BlackBerry Enterprise Server can reconnect to the BlackBerry Configuration Database, it remains the primary BlackBerry Enterprise Server.
   - If the primary BlackBerry Enterprise Server cannot reconnect to the BlackBerry Configuration Database, it lowers its health score. If the standby BlackBerry Enterprise Server can open a database connection, it tries to promote itself to become the primary instance. If the standby BlackBerry Enterprise Server also cannot connect to the BlackBerry Configuration Database, you must resolve any issues before the BlackBerry Enterprise Server pair can recover.

Response of a primary BlackBerry Enterprise Server that cannot reconnect to the BlackBerry Infrastructure

1. The primary BlackBerry Enterprise Server loses its SRP connection and its connection to the BlackBerry Configuration Database. It tries to reopen the SRP connection, but is not successful.
2. The primary BlackBerry Enterprise Server lowers its health score.
3. The health score falls below the failover threshold. One of the following events occurs:
• If the standby BlackBerry Enterprise Server can open an SRP connection, it tries to promote itself to become the primary instance.
• If the standby BlackBerry Enterprise Server cannot open an SRP connection, you must resolve any issues before the BlackBerry Enterprise Server pair can recover.
BlackBerry MDS Connection Service high availability

To configure BlackBerry MDS Connection Service high availability, you can configure a pool of two or more BlackBerry MDS Connection Service instances. Once you configure a BlackBerry MDS Connection Service pool, the BlackBerry Enterprise Server assigns one of the connections to the BlackBerry MDS Connection Service instances as the active connection, and the others as standby connections. Multiple BlackBerry Enterprise Server instances can use a single BlackBerry MDS Connection Service pool, and assign active connections to different BlackBerry MDS Connection Service instances. You can configure manual or automatic failover.

Each BlackBerry MDS Connection Service instance writes its health information to the BlackBerry Dispatcher. If the BlackBerry MDS Connection Service cannot connect to the BlackBerry Dispatcher, the BlackBerry Dispatcher lowers the health score of the BlackBerry MDS Connection Service to zero and fails over.

If multiple BlackBerry MDS Connection Service instances exist, the BlackBerry Dispatcher uses the health score of the instances to determine which BlackBerry MDS Connection Service it assigns the active connection to.

High availability for the BlackBerry MDS Connection Service central push server

To configure high availability for BlackBerry MDS Connection Service central push servers, you must configure at least two BlackBerry MDS Connection Service instances in the pool to be central push servers so that failover can occur. A BlackBerry MDS Connection Service that also is a central push server receives content push requests from server-side applications that are located on an application server or a web server.

To make sure that the central push server can access user information, the central push server caches the user information from all of the BlackBerry Enterprise Server instances that the BlackBerry MDS Connection Service pool connects to. When a central push server receives content from push applications, it routes the data to the BlackBerry MDS Connection Service with the active connection to the BlackBerry Enterprise Server that the user account is assigned to.
BlackBerry MDS Connection Service high availability in a small-scale environment

To minimize the number of computers that the BlackBerry Domain requires in a small-scale environment, you can install the BlackBerry MDS Connection Service with the primary and standby BlackBerry Enterprise Server instances.

BlackBerry MDS Connection Service high availability in a large-scale environment

In a large-scale environment, by default you can configure each BlackBerry MDS Connection Service instance to support up to six primary BlackBerry Enterprise Server instances. In the following diagram, failover pairs 1 and 2 of the BlackBerry Enterprise Server assigned active connections to the same BlackBerry MDS Connection Service instance. In failover pair 3, the primary BlackBerry Enterprise Server assigned an active connection to a different BlackBerry MDS Connection Service instance. Two BlackBerry MDS Connection Service instances are configured to act as central push servers.
Best practice: Planning for BlackBerry MDS Connection Service high availability

To plan for BlackBerry MDS Connection Service high availability, you can install BlackBerry MDS Connection Service instances with the BlackBerry Enterprise Server and on separate computers.

If you install one or two BlackBerry Enterprise Server pairs, you must configure at least two BlackBerry MDS Connection Service instances in a pool. If you install more than three BlackBerry Enterprise Server pairs, you must either configure two BlackBerry MDS Connection Service instances in a pool or configure a pool that includes the same number of BlackBerry
MDS Connection Service instances as there are BlackBerry Enterprise Server pairs. In all scenarios, if your organization’s environment includes push applications, you must configure at least two of the instances as central push servers.

When you plan for BlackBerry MDS Connection Service high availability, you should consider the performance requirements and system requirements of the BlackBerry Enterprise Server and BlackBerry MDS Connection Service and choose one of the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install the BlackBerry MDS Connection Service instances with the BlackBerry Enterprise Server pair and configure a BlackBerry MDS Connection Service pool that can automatically fail over.</td>
<td>If you install BlackBerry MDS Connection Service instances with the primary and standby BlackBerry Enterprise Server, you can create a BlackBerry MDS Connection Service pool that includes both instances. You can configure the primary BlackBerry Enterprise Server to assign an active connection to the BlackBerry MDS Connection Service that you installed on the same computer, and to assign a standby connection to the BlackBerry MDS Connection Service that you installed with the standby BlackBerry Enterprise Server. You can configure automatic failover for the BlackBerry MDS Connection Service instances. If the BlackBerry MDS Connection Service that you installed with the primary BlackBerry Enterprise Server stops responding, the primary BlackBerry Enterprise Server can fail over to the BlackBerry MDS Connection Service instance that you installed with the standby BlackBerry Enterprise Server. By default, the BlackBerry Enterprise Server includes the BlackBerry MDS Connection Service.</td>
</tr>
<tr>
<td>Install the BlackBerry MDS Connection Service instances with the BlackBerry Enterprise Server pair and configure a BlackBerry MDS Connection Service pool that does not fail over automatically.</td>
<td>If you install BlackBerry MDS Connection Service instances with the primary and standby BlackBerry Enterprise Server, you can create a BlackBerry MDS Connection Service pool that includes both instances. You can configure the primary BlackBerry Enterprise Server to assign an active connection to the BlackBerry MDS Connection Service that you installed on the same computer, and to assign a standby connection to the BlackBerry MDS Connection Service that you installed with the standby BlackBerry Enterprise Server. You can choose not to configure automatic failover for the BlackBerry MDS Connection Service instances but you can configure the threshold parameter for the BlackBerry MDS Connection Service to be above the failover threshold. If the BlackBerry MDS Connection Service that you installed with the primary BlackBerry Enterprise Server stops responding, the primary BlackBerry Enterprise Server and the BlackBerry MDS Connection Service fail over to the standby BlackBerry Enterprise Server and BlackBerry MDS Connection Service.</td>
</tr>
<tr>
<td>Install multiple BlackBerry MDS Connection Service instances with the BlackBerry Enterprise Server or on different computers and configure a BlackBerry MDS Connection Service pool that can automatically failover.</td>
<td>If you install multiple BlackBerry MDS Connection Service instances, you can configure a BlackBerry MDS Connection Service pool. Each BlackBerry MDS Connection Service instance can support multiple primary BlackBerry Enterprise Server instances. You can configure automatic failover for the BlackBerry MDS Connection Service instances and select which BlackBerry MDS Connection Service has the active connection to each primary BlackBerry Enterprise Server.</td>
</tr>
<tr>
<td>Scenario</td>
<td>Best practice</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>If the BlackBerry MDS Connection Service with the active connection stops responding, the BlackBerry Enterprise Server can fail over to a different BlackBerry MDS Connection Service instance.</td>
<td></td>
</tr>
</tbody>
</table>

**Scenario: What happens after the BlackBerry MDS Connection Service stops responding**

If the BlackBerry MDS Connection Service with the active connection to the primary BlackBerry Enterprise Server stops responding, the response of the primary BlackBerry Enterprise Server is based on whether it can promote a different BlackBerry MDS Connection Service.

These responses assume that the health score for the BlackBerry MDS Connection Service is above the failover threshold.

If you choose to install BlackBerry MDS Connection Service instances with the BlackBerry Enterprise Server pair, and either the primary BlackBerry Enterprise Server or the BlackBerry MDS Connection Service stops responding, all of the BlackBerry Enterprise Server components fail over to the standby BlackBerry Enterprise Server and BlackBerry MDS Connection Service.

**Response of a primary BlackBerry Enterprise Server when it can promote a different BlackBerry MDS Connection Service**

1. The primary BlackBerry Enterprise Server loses its active connection to the BlackBerry MDS Connection Service.
2. If users are browsing, the session information is lost. If the web site that the users browsed to required authentication, and the BlackBerry devices cached the password and cookies, users are not affected.
3. If the primary BlackBerry Enterprise Server is connected to other BlackBerry MDS Connection Service instances, the BlackBerry Enterprise Server promotes the connection to one of the BlackBerry MDS Connection Service instances to active. It determines which instance to promote by checking the health scores.
4. The primary BlackBerry Enterprise Server writes the new information to the BlackBerry Configuration Database.

You must resolve any issues before the nonresponsive BlackBerry MDS Connection Service instance can recover.

**Response of a primary BlackBerry Enterprise Server when it cannot promote a different BlackBerry MDS Connection Service**

1. The primary BlackBerry Enterprise Server loses its active connection to the BlackBerry MDS Connection Service.
2. If users are browsing, the session information is lost. If the web site that the users browsed to required authentication, and BlackBerry devices cached the password and cookies, users are not affected.
3. If the primary BlackBerry Enterprise Server is connected to other BlackBerry MDS Connection Service instances, the BlackBerry Enterprise Server tries to promote the connection to one of the BlackBerry MDS Connection Service instances to active. It determines which instance to promote by checking the health scores.

   The primary BlackBerry Enterprise Server cannot promote any BlackBerry MDS Connection Service.

4. The primary BlackBerry Enterprise Server lowers its health score.

   The health score of the primary BlackBerry Enterprise Server falls below the failover threshold.

5. The standby BlackBerry Enterprise Server checks its health score to determine if it is above the promotion threshold.

6. If the health score of the standby BlackBerry Enterprise Server is above the promotion threshold, it tries to promote the connection to one of the BlackBerry MDS Connection Service instances from a standby connection to an active connection.

   One of the following events occur:

   - If the standby BlackBerry Enterprise Server can promote the connection to an active connection, it demotes the primary BlackBerry Enterprise Server and promotes itself to become the primary instance.
   - If the standby BlackBerry Enterprise Server cannot promote the connection to an active connection, it cannot become the primary instance. You must resolve any issues before the BlackBerry Enterprise Server pair can recover.

**Scenario: What happens after the BlackBerry MDS Connection Service central push server stops responding**

1. The push application loses its connection to the BlackBerry MDS Connection Service central push server.

2. The push application checks the list of available BlackBerry MDS Connection Service central push servers. It received the list in an HTTP header from a previous push operation.

3. The push application tries to connect to another BlackBerry MDS Connection Service central push server in the list.

4. If the BlackBerry MDS Connection Service central push server starts running again, it becomes the standby instance and forwards the push messages it receives to the primary BlackBerry MDS Connection Service central push server.
Scenario: What happens after the primary BlackBerry Dispatcher promotes a connection to a BlackBerry MDS Connection Service

This scenario assumes that the BlackBerry Enterprise Server is available and has an active connection to a BlackBerry MDS Connection Service that is running, but the health score of the BlackBerry MDS Connection Service fell below the failover threshold.

1. The BlackBerry Dispatcher sends a request to a BlackBerry MDS Connection Service with an acceptable health score to promote its standby connection to an active connection.
2. The BlackBerry MDS Connection Service with the acceptable health score promotes the connection to active.
3. The BlackBerry Dispatcher sends a request to the BlackBerry MDS Connection Service with the low health score to demote the active connection to a standby connection.
4. When the BlackBerry MDS Connection Service with the low health score receives the request, it finishes processing the packets that the BlackBerry Dispatcher sent to it previously.
5. The BlackBerry MDS Connection Service with the low health score checks whether the standby BlackBerry Enterprise Server was promoted to the primary instance. In this scenario, it has not.
6. The BlackBerry MDS Connection Service with the low health score opens all IPPP sessions and sends error messages to open sessions.
7. The BlackBerry MDS Connection Service with a low health score sends a message to all open sessions to log out.
8. The BlackBerry MDS Connection Service with the active connection sends a message to all open sessions to log in.
BlackBerry Router high availability

To configure BlackBerry Router high availability, you can configure a pool of two or more BlackBerry Router instances.

To configure a BlackBerry Router pool, you must add the identities of all BlackBerry Router instances to each BlackBerry Enterprise Server that uses the same BlackBerry Configuration Database.

If you install two or more BlackBerry Router instances and a primary BlackBerry Enterprise Server loses its connection to the BlackBerry Router instance that it is using, it tries to connect to another BlackBerry Router instance in the pool. If the BlackBerry Enterprise Server can connect, it resends the service books to update the BlackBerry devices.

BlackBerry Router high availability in a small-scale environment

In a small-scale environment, you can install the BlackBerry Router with the BlackBerry Enterprise Server to minimize the number of computers that the BlackBerry Domain requires.
BlackBerry Router high availability in a large-scale environment

In a large-scale environment, you can install a BlackBerry Router pool on computers that do not host the BlackBerry Enterprise Server instances, and configure the BlackBerry Enterprise Server with a list of available BlackBerry Router instances using the BlackBerry Administration Service.
## Best practice: Planning for BlackBerry Router high availability

To plan for BlackBerry Router high availability, you can install two or more BlackBerry Router instances within the same network segment. You can install the BlackBerry Router instances with the primary and standby BlackBerry Enterprise Server instances and on separate computers. The method that you use to configure the BlackBerry Router impacts how it fails over.

When you plan for BlackBerry Router high availability, you should consider the performance requirements and system requirements of the BlackBerry Enterprise Server and the BlackBerry Router and choose one of the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install the BlackBerry Router instances with the BlackBerry Enterprise Server pair and include the BlackBerry Router with the BlackBerry Enterprise Server failover process.</td>
<td>If you install the BlackBerry Router with the primary and standby BlackBerry Enterprise Server, you can include the BlackBerry Router with the failover process of the BlackBerry Enterprise Server. If the BlackBerry Router or the primary BlackBerry Enterprise Server stops responding, the primary BlackBerry Enterprise Server and the BlackBerry Router fail over to the standby BlackBerry Enterprise Server with the other BlackBerry Router. By default, the BlackBerry Enterprise Server installation process installs the BlackBerry Router.</td>
</tr>
<tr>
<td>Install the BlackBerry Router instances with the BlackBerry Enterprise Server pair or on different computers and configure a BlackBerry Router pool.</td>
<td>If you want the primary BlackBerry Enterprise Server to use the BlackBerry Router installed with the standby BlackBerry Enterprise Server, or if you install the BlackBerry Router instances on computers that do not host the BlackBerry Enterprise Server, you can configure a BlackBerry Router pool. The primary BlackBerry Enterprise Server can connect to any of the BlackBerry Router instances. If a BlackBerry Router instance stops responding, the primary BlackBerry Enterprise Server connects to another BlackBerry Router in the pool. You can create a BlackBerry Router pool in the DMZ. If you create a BlackBerry Router pool in the DMZ, and you want to install the BlackBerry Router in the protected network, you can create another BlackBerry Router pool in the protected network. If you want to create a BlackBerry Router pool on computers that do not host the BlackBerry Enterprise Server pair, turn off the BlackBerry Router instances that you installed with the BlackBerry Enterprise Server pair.</td>
</tr>
</tbody>
</table>
Scenario: What happens after the BlackBerry Router stops responding

If the BlackBerry Router stops responding, the primary BlackBerry Enterprise Server responds differently if it can connect to another BlackBerry Router in the pool.

These responses assume that you have configured a BlackBerry Router pool, that the BlackBerry Enterprise Server and the BlackBerry Infrastructure are running, and that the BlackBerry Router instance cannot restore itself:

**Response of the primary BlackBerry Enterprise Server when it can connect to another BlackBerry Router**

1. The primary BlackBerry Enterprise Server loses its SRP connection.
2. BlackBerry devices that connect to the BlackBerry Router using serial bypass (least cost routing) lose their connection.
3. Wi-Fi enabled BlackBerry devices that connect to the BlackBerry Router over the Wi-Fi network lose their connection.
4. The primary BlackBerry Enterprise Server tries unsuccessfully to reopen the connection to the BlackBerry Router instance that it was using when the connection was lost.
5. The primary BlackBerry Enterprise Server tries to connect to another BlackBerry Router instance in the pool.
   - The primary BlackBerry Enterprise Server can connect to another BlackBerry Router and the connection to the BlackBerry Infrastructure is restored.
6. The primary BlackBerry Enterprise Server resends service books to update the BlackBerry devices.

**Response of the primary BlackBerry Enterprise Server when it cannot connect to another BlackBerry Router**

1. The primary BlackBerry Enterprise Server loses its SRP connection.
2. BlackBerry devices that connect to the BlackBerry Router using serial bypass (least cost routing) lose their connection.
3. Wi-Fi enabled BlackBerry devices that connect to the BlackBerry Router over the Wi-Fi network lose their connection.
4. The primary BlackBerry Enterprise Server tries unsuccessfully to reopen the connection to the BlackBerry Router instance that it was using when the connection was lost.
5. The primary BlackBerry Enterprise Server tries to connect to another BlackBerry Router instance in the pool unsuccessfully.
6. The primary BlackBerry Enterprise Server lowers its health score.
   - The health score of the BlackBerry Enterprise Server falls below the failover threshold.
7. The standby BlackBerry Enterprise Server checks its health score to determine if it is above the promotion threshold.
One of the following events occurs:

- If the health score of the standby BlackBerry Enterprise Server is above the promotion threshold, the standby BlackBerry Enterprise Server tries to open a connection to a BlackBerry Router instance and promote itself.
- If the health score of the standby BlackBerry Enterprise Server is below the promotion threshold, the standby BlackBerry Enterprise Server cannot promote itself and you must resolve the issue.
Configuring disaster recovery for the BlackBerry Enterprise Server across data centers

If your organization’s environment includes more than one data center, you can configure disaster recovery for the BlackBerry Enterprise Server instances by configuring a primary BlackBerry Enterprise Server in one data center, and a standby BlackBerry Enterprise Server in the other data center.

When you configure disaster recovery across data centers, you must consider potential latency issues that can result when the messaging servers, databases, and other third-party applications that the BlackBerry Enterprise Server accesses are not located in close physical proximity to the BlackBerry Enterprise Server. You must also consider how the BlackBerry Enterprise Server should fail over if the local messaging server stops responding. For example, if you configure disaster recovery for messaging servers in two data centers, you must configure the BlackBerry Enterprise Server to fail over automatically when the local messaging server fails over to the messaging server in the remote data center.

In the following diagram, two BlackBerry Enterprise Server pairs in a BlackBerry Domain are configured across two data centers:
In this scenario, you connect the primary BlackBerry Enterprise Server in data center one to the standby BlackBerry Enterprise Server in data center two to create a BlackBerry Enterprise Server pair. Similarly, you connect the primary BlackBerry Enterprise Server in data center two to the standby BlackBerry Enterprise Server in data center one to create a BlackBerry Enterprise Server pair.

You can connect all of the BlackBerry Enterprise Server instances to the BlackBerry Configuration Database in data center one. You can also connect all BlackBerry Enterprise Server instances in one data center to the messaging server that is located in the same data center. If the BlackBerry Configuration Database stops responding, the BlackBerry Enterprise Server instances can connect to the mirror BlackBerry Configuration Database.
Using BlackBerry Enterprise Server components that you installed with a standby BlackBerry Enterprise Server in the same data center

You can create pools for BlackBerry Enterprise Server components such as the BlackBerry Administration Service, BlackBerry Attachment Service, BlackBerry Collaboration Service, BlackBerry MDS Connection Service, or BlackBerry Router in the same data center. When you create pools in the same data center, you avoid the network latency issues that can occur when you create pools of components across data centers.

If you configure multiple BlackBerry Enterprise Server pairs and if you configure the primary and standby instances for the BlackBerry Enterprise Server pairs in different data centers, you can configure the primary BlackBerry Enterprise Server to use the components that you installed with the standby BlackBerry Enterprise Server that is located in the same data center. The primary BlackBerry Enterprise Server can use the components that you install with the standby BlackBerry Enterprise Server instead of the components of the primary BlackBerry Enterprise Server, or, if you create pools, in addition to the components of the primary BlackBerry Enterprise Server.

The following diagram displays all of the BlackBerry Enterprise Server components installed in data center one:
Planning Guide

Configuring disaster recovery for the BlackBerry Enterprise Server across data centers

Data center one

Data center two

BlackBerry Administration Service

BlackBerry Administration Service pool

BlackBerry Policy Service

BlackBerry Synchronization Service

BlackBerry MDS Connection Service

BlackBerry Messaging Agent

BlackBerry Controller

BlackBerry Attachment Service

BlackBerry Dispatcher

BlackBerry Router

Messaging server

Primary BlackBerry Enterprise Server

Standby BlackBerry Enterprise Server

Mirror BlackBerry Configuration Database

BlackBerry Configuration Database
In this scenario, you can configure the primary BlackBerry Enterprise Server in data center one to use the BlackBerry Attachment Service, BlackBerry MDS Connection Service, and BlackBerry Router instances that you installed with the standby BlackBerry Enterprise Server in data center one.

If a failover event occurs, the primary BlackBerry Enterprise Server in data center one can fail over to the standby BlackBerry Enterprise Server in data center two.

Creating pools of BlackBerry Enterprise Server components that are located in different data centers

You can create pools of BlackBerry Attachment Service, BlackBerry Collaboration Service, BlackBerry MDS Connection Service, or BlackBerry Router instances that you installed in different data centers.

If your organization’s environment includes Microsoft Exchange, you must consider the potential latency that might occur when the BlackBerry Enterprise Server connects to a messaging server that is located in a different data center.

If you create a BlackBerry Attachment Service pool for a BlackBerry Enterprise Server, you can configure a primary group of BlackBerry Attachment Service instances that are located in the same data center as the BlackBerry Enterprise Server, and a secondary group of BlackBerry Attachment Service instances that are located in a different data center. The BlackBerry Enterprise Server uses the local BlackBerry Attachment Service instances if they are running.

If you create a BlackBerry Collaboration Service pool or BlackBerry MDS Connection Service pool with automatic failover turned on, you installed some of the BlackBerry Collaboration Service and BlackBerry MDS Connection Service instances in different data centers, and the BlackBerry Collaboration Service instance or the BlackBerry MDS Connection Service instance with the active connection to the BlackBerry Enterprise Server stops responding, the BlackBerry Enterprise Server might not assign the active connection to another BlackBerry Collaboration Service or BlackBerry MDS Connection Service instance that is located in the same data center.
Configuring Hosted BlackBerry services

If small to medium-sized businesses move from POP3 and web-based email applications to Microsoft Exchange, IBM Domino, or Novell GroupWise so that they can support mobile devices and use messaging and collaboration services, they can gain new revenue opportunities and reduce the cost of their operations. Some small to medium-sized businesses might not want to install and run a messaging environment that is complex and requires management of spam email messages, virus protection, storage and archiving, and compliance regulations so they can use the hosted messaging services that your organization can offer instead. Your organization can install and run a messaging environment for the small to medium-sized businesses.

If you configure Hosted BlackBerry services, you can offer BlackBerry services to the small to medium-sized businesses that are your organization’s customers. You can configure Hosted BlackBerry services on a BlackBerry Enterprise Server in your organization’s environment so that your organization’s customers can subscribe to the services that the BlackBerry Enterprise Server provides. Hosted BlackBerry services permits your organization’s customers to offer BlackBerry services to the BlackBerry device users in their environment without installing a BlackBerry Enterprise Server.

Choosing who manages the BlackBerry Enterprise Server

If you configure Hosted BlackBerry services for your organization’s customers, you can manage the BlackBerry Enterprise Server on behalf of your organization’s customers or you can permit your organization’s customers to manage the BlackBerry Enterprise Server.

If you manage the BlackBerry Enterprise Server on behalf of your organization’s customers, your organization’s customers must pay for the BlackBerry devices and the Hosted BlackBerry services but they do not pay for the computers, software, or licenses. BlackBerry device users must pay monthly fees to the wireless service provider for access to the wireless network. Your organization’s customers can add user accounts to the BlackBerry Enterprise Server and remove user accounts from the BlackBerry Enterprise Server.

If you permit your organization’s customers to manage the BlackBerry Enterprise Server, your organization’s customers can manage their own environments. The customers’ environments might be located in the customers’ data center or in your organization’s data center. In this scenario, your organization’s customers pay for the computers, software, and licenses, and can configure the Hosted BlackBerry services.
Subscribing to Hosted BlackBerry services

Your organization's customers can subscribe to the Hosted BlackBerry services that you configure so that they can offer BlackBerry services to the BlackBerry device users in their organization's environment.

Advantages to your organization's customers that subscribe to Hosted BlackBerry services include:

- Customers can install third-party applications on BlackBerry devices and manage the applications.
- Customers can use collaboration services such as the Microsoft Office Live Communications Server.
- Users can access and assign services to BlackBerry devices.
- Customers can develop applications for BlackBerry devices.

Disadvantages to your organization's customers that subscribe to Hosted BlackBerry services include:

- If your organization's customers cannot manage the BlackBerry Enterprise Server, support for BlackBerry device users might be limited.
- The BlackBerry Enterprise Server might provide fewer features for BlackBerry device users than if your organization's customer installed their own BlackBerry Enterprise Server. For example, the BlackBerry Enterprise Server might not support BlackBerry MDS Runtime Applications, attachments, and contact lookups in the contact list.

Integrating the BlackBerry Enterprise Server with Hosted BlackBerry services

You can integrate a BlackBerry Enterprise Server with your organization's existing infrastructure which might include messaging and collaboration components, calendar and contact information, wireless Internet and intranet access, and third-party applications to provide BlackBerry device users with mobile access to your organization's resources.

When you configure Hosted BlackBerry services, you must install the BlackBerry Enterprise Server in the data center that the messaging server is located in to optimize the performance of the BlackBerry Enterprise Server. The BlackBerry Enterprise Server and messaging servers can host messaging and application components for one or more customers.

To configure Hosted BlackBerry services, you must purchase a BlackBerry Client Access License for the BlackBerry Enterprise Server that permits you to use Hosted BlackBerry services.

For information about the hardware that you require to run a BlackBerry Enterprise Server with Hosted BlackBerry services, see the BlackBerry Enterprise Server Capacity Calculator.
## Messaging and collaboration components that you use with Hosted BlackBerry services

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackBerry Enterprise Server</td>
<td>The BlackBerry Enterprise Server sends email messages to and receives email messages from BlackBerry devices.</td>
</tr>
<tr>
<td>BlackBerry Enterprise Server Resource Kit</td>
<td>The BlackBerry Enterprise Server Resource Kit is a group of command line tools that monitor, analyze, administer, and report BlackBerry Enterprise Server events.</td>
</tr>
<tr>
<td>BlackBerry Java Development Environment</td>
<td>The BlackBerry JDE is an application design tool that permits developers to create applications for based BlackBerry devices that meet the requirements of your organization’s customers.</td>
</tr>
<tr>
<td>BlackBerry Mobile Data System</td>
<td>The BlackBerry MDS extends the BlackBerry Enterprise Server messaging capabilities. It permits you to send data, such as weather information and stock quotes, to BlackBerry devices.</td>
</tr>
<tr>
<td></td>
<td>The BlackBerry MDS controls data that flows to and from application servers and BlackBerry devices.</td>
</tr>
<tr>
<td></td>
<td>The BlackBerry MDS permits you to create software configurations to specify the applications that a BlackBerry device user can install on a BlackBerry device and permits you to control the applications.</td>
</tr>
<tr>
<td>Component</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>messaging server</td>
<td>The messaging server stores email messages and integrates with other components that support messaging.</td>
</tr>
<tr>
<td></td>
<td>In a Microsoft Exchange environment, you require the following components to support messaging:</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Exchange servers that you configured for Microsoft Outlook Web Access service, RPC over HTTP, and incoming and outgoing email messages</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Active Directory domain controllers</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Exchange servers that include user mailboxes</td>
</tr>
<tr>
<td>Microsoft Internet Security &amp;</td>
<td>The Microsoft Internet Security &amp; Acceleration Server can provide firewall security and is designed to provide security for MAPI publishing if</td>
</tr>
<tr>
<td>Acceleration Server (if required)</td>
<td>users do not use RPC over HTTP.</td>
</tr>
<tr>
<td>Microsoft SQL Server</td>
<td>The Microsoft SQL Server hosts the databases for the provisioning environment and BlackBerry Enterprise Server.</td>
</tr>
<tr>
<td>provisioning server</td>
<td>The provisioning server permits BlackBerry device users to create user accounts and activate BlackBerry devices. You can use a provisioning</td>
</tr>
<tr>
<td></td>
<td>server that you obtain from any vendor.</td>
</tr>
<tr>
<td></td>
<td>You can use the Microsoft Solution for Hosted Messaging and Collaboration which includes tools that you can integrate with Microsoft Exchange</td>
</tr>
<tr>
<td></td>
<td>and Microsoft Active Directory. If you use the Microsoft Solution for Hosted Messaging and Collaboration, your organization must design and develop</td>
</tr>
<tr>
<td></td>
<td>a provisioning environment.</td>
</tr>
</tbody>
</table>

**Features that you can use with Hosted BlackBerry services**

You can implement the following features if you use Hosted BlackBerry services:

- distributed environment for BlackBerry Enterprise Server components
- BlackBerry Enterprise Server component monitoring using the BlackBerry Monitoring Service
- control over third-party applications
- activation of BlackBerry devices over the wireless network
You can perform the following actions using Hosted BlackBerry services features:

- search contact lists
- specify IT policies
- send IT administration commands
- track BlackBerry devices
- back up data over the wireless network

For more information about features you can use with Hosted BlackBerry services, see the BlackBerry Enterprise Server Feature and Technical Overview.

Searching the contact list

If your organization hosts a BlackBerry Enterprise Server and multiple organizations subscribe to Hosted BlackBerry services, you must customize the BlackBerry Enterprise Server so that BlackBerry device users can access only their organization’s contact list and restrict users from accessing the contact information of other organizations that also subscribe to the Hosted BlackBerry services.

In a Microsoft Exchange environment, if your organization permits customers to have limited access or read-only access to the Microsoft Active Directory, you can configure the BlackBerry Enterprise Server to use MAPI, LDAP, or both to retrieve recipients’ email addresses. If your organization permits customers to have full control of subtrees in Microsoft Active Directory and you configured Microsoft Active Directory for multi-tenancy, you can configure the BlackBerry Enterprise Server to limit the scope of the LDAP search.

For more information, see the BlackBerry Enterprise Server Administration Guide.

Tracking BlackBerry devices

Using the BlackBerry Administration Service, you can monitor BlackBerry devices. Use the following BlackBerry device information:

- model name and number
- flash memory
- phone number (if applicable)
- state of the BlackBerry device password (for example, whether the BlackBerry device password is expired)
- versions of BlackBerry device applications
- third-party applications

The BlackBerry Administration Service permits you to add and remove user accounts, associate user accounts with BlackBerry Enterprise Server instances, manage groups, software configurations, and licenses, and activate multiple BlackBerry devices at the same time.
Process flow: Activating a BlackBerry device using an administration console

1. A BlackBerry device user contacts a help desk representative. Your organization or your organization's customers can provide the help desk services for the user.
2. The help desk representative adds the user account to the BlackBerry Enterprise Server and provides the BlackBerry device user with an activation password.
3. The user types the email address and activation password on the BlackBerry device.
4. The BlackBerry device and BlackBerry Enterprise Server exchange device transport keys.
5. The BlackBerry Enterprise Server sends applications to the BlackBerry device automatically. The BlackBerry Enterprise Server synchronizes the user's calendar, contact list, tasks (also known as posted all day appointments), memos (also known as posted messages), and up to 750 email messages from the messaging server to the BlackBerry device.
6. The user can start using BlackBerry device.

Process flow: Activating a BlackBerry device using a provisioning server

1. A BlackBerry device user contacts a help desk representative.
2. The help desk representative provides the BlackBerry device user with the web address for the provisioning server console. This console uses the BlackBerry Enterprise Server User Administration Tool to access the BlackBerry Enterprise Server and activate the BlackBerry device.
3. The user specifies an activation password. A background process for the provisioning server adds the user account to the BlackBerry Enterprise Server and starts the activation process.
4. The user types the email address and activation password on the BlackBerry device.
5. The BlackBerry device and BlackBerry Enterprise Server exchange device transport keys.
6. The BlackBerry Enterprise Server sends applications to the BlackBerry device automatically. The BlackBerry Enterprise Server synchronizes the user's calendar, contact list, tasks (also known as posted all day appointments), memos (also known as posted messages), and up to 750 email messages from the messaging server to the BlackBerry device.
7. The user can start using BlackBerry device.
Tools that organizations require to manage Hosted BlackBerry services

Billing, reporting, and requisition tools

You must make billing, reporting, and requisition tools available to your organization’s customers so that they can track and manage BlackBerry devices. Optionally, a wireless service provider can purchase all BlackBerry devices for your organization’s customers so that the wireless service provider can manage reporting and billing for them.

Provisioning tools

You must permit your organization’s customers to create user accounts and activate BlackBerry devices using provisioning tools and the provisioning server console. Typically, your customers have help desk representatives who create the email accounts and user accounts in your organization’s environment.

You can consider making the Microsoft Solution for Hosted Messaging and Collaboration available to your organization’s customers so that they can create and manage a provisioning environment that includes Microsoft Exchange. You can also make third-party provisioning tools available so that they can create email accounts and user accounts.

You can also consider using the BlackBerry Enterprise Server Resource Kit to develop a tool that permits help desk representatives to view or change lists of user accounts, add user accounts, and delete user accounts and a provisioning server console that permits users to create their own activation passwords when they activate BlackBerry devices, turn off services, or delete user accounts.

BlackBerry Enterprise Server Resource Kit tools

The BlackBerry Enterprise Server User Administration Tool, which is a part of the BlackBerry Enterprise Server Resource Kit, is a command line tool that you can use to create administrative consoles for help desk representatives. The BlackBerry Enterprise Server User Administration Tool can perform the following actions:

- manage multiple user accounts (for example, add, move, find, remove, or change user account information)
- change activation passwords
- configure IT policies
- issue IT administration commands
- display available IT policies
retrieve user account statistics
- enforce role-based administration privileges
- manage groups and software configurations

You can use the BlackBerry System Log Monitoring and Reporting Tool to summarize error messages in a log file and provide status information such as the version of the BlackBerry Enterprise Server and MAPI, wireless coverage area information, pending email messages, email message flows, delayed notifications, system logs, receipt confirmations for email messages, and CDO errors.

You can also use tools from the BlackBerry Enterprise Server Resource Kit to report BlackBerry Enterprise Server usage trends such as the number of email messages that users send, historical statistics, BlackBerry Mobile Data System data, and user traffic.

For more information, visit http://na.blackberry.com/eng/support/server_resourcekit.jsp.

Sizing tools

You can use tools such as the BlackBerry Enterprise Server Capacity Calculator to manage the size of your organization’s BlackBerry Enterprise Server environment and to determine your organization’s hardware requirements. The BlackBerry Enterprise Server Capacity Calculator permits you to calculate the hardware requirements for your organization.

For more information, visit http://docs.blackberry.com/en/admin/?userType=2 to read the BlackBerry Enterprise Server Capacity Calculator and BlackBerry Enterprise Server Performance Benchmarking Guide.

Monitoring tools

You can use the BlackBerry Monitoring Service, BlackBerry Enterprise Server Alert Tool, and third-party tools to monitor the BlackBerry Enterprise Server and configure alerts to notify administrators about specific conditions that occur in the BlackBerry Enterprise Server. The BlackBerry Monitoring Service and BlackBerry Enterprise Server Alert Tool perform the following actions:

- provide alerts about critical events, errors, system failures, services that disconnect, and so on
- monitor email message flow, patterns of users that frequently send and receive email messages, and email messages that BlackBerry device users send and receive over the wireless network
- send notifications to administrators
- monitor system logs for specific events
- provide tools for disaster recovery

Troubleshooting tools

You can use the troubleshooting tools that are a part of the BlackBerry Enterprise Server Resource Kit or you can outsource help desk services to support BlackBerry device users.
<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>Description</td>
</tr>
<tr>
<td>This tool is an auditing tool that reads the ServerConfigHistory table in the BlackBerry Configuration Database and displays any configuration changes in a .csv file. For example, this tool can display changes such as when you add user accounts or apply policy settings or security settings. The tool records the date and time of each change and the name of the administrator who made the change.</td>
<td>BlackBerry Enterprise Activation Status Reporting Tool</td>
</tr>
<tr>
<td>This tool generates a report of the activation stages for specific BlackBerry device users or all of the users that are associated with a BlackBerry Enterprise Server. You can use this tool to report to your organization’s administrators about the activation status of a BlackBerry device and to troubleshoot activation issues.</td>
<td>BlackBerry Enterprise Server Log Monitoring Tool</td>
</tr>
<tr>
<td>This tool monitors the text that is written to the end of a text file. You can use this tool to monitor a text file for one or more events by specifying numeric event IDs or text strings at the command prompt or using an input file.</td>
<td>BlackBerry Message Receipt Confirmation Tool</td>
</tr>
<tr>
<td>This tool verifies that the BlackBerry Enterprise Server is sending email messages to BlackBerry devices.</td>
<td>BlackBerry System Log Monitoring and Reporting Tool</td>
</tr>
<tr>
<td>This tool monitors the BlackBerry Enterprise Server log files when the BlackBerry Enterprise Server components write events to the log files. You can configure which BlackBerry Enterprise Server to monitor, the events that the BlackBerry System Log Monitoring and Reporting Tool tracks, and the types of notifications and reports that the BlackBerry System Log Monitoring and Reporting Tool sends to intended recipients.</td>
<td>Log analysis tools</td>
</tr>
<tr>
<td>These tools check the BlackBerry Enterprise Server log files and provide output files that contain information about user accounts, email message flow, and BlackBerry Enterprise Server performance. These tools also provide output files that contain historical statistics so that you can analyze and audit the data.</td>
<td></td>
</tr>
</tbody>
</table>
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES</td>
<td>Advanced Encryption Standard</td>
</tr>
<tr>
<td>API</td>
<td>application programming interface</td>
</tr>
<tr>
<td>BlackBerry Domain</td>
<td>A BlackBerry Domain consists of the BlackBerry Configuration Database with its users and any BlackBerry Enterprise Server instances that connect to it.</td>
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<tr>
<td>BlackBerry MDS</td>
<td>BlackBerry Mobile Data System</td>
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<tr>
<td>CDO</td>
<td>Collaboration Data Object</td>
</tr>
<tr>
<td>DMZ</td>
<td>A demilitarized zone (DMZ) is a neutral subnetwork outside of an organization's firewall. It exists between the trusted LAN of the organization and the untrusted external wireless network and public Internet.</td>
</tr>
<tr>
<td>DNS</td>
<td>A Domain Name System (DNS) is an Internet database that translates domain names that are meaningful and recognizable by people into the numeric IP addresses that the Internet uses.</td>
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<tr>
<td>HTTP</td>
<td>Hypertext Transfer Protocol over Secure Sockets Layer</td>
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<tr>
<td>IP address</td>
<td>An Internet Protocol (IP) address is an identification number that each computer or mobile device uses when it sends or receives information over a network, such as the Internet. This identification number identifies the specific computer or mobile device on the network.</td>
</tr>
<tr>
<td>IPPP</td>
<td>Internet Protocol Proxy Protocol</td>
</tr>
<tr>
<td>IT</td>
<td>information technology</td>
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<tr>
<td>JDE</td>
<td>Java Development Environment</td>
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<tr>
<td>JVM</td>
<td>Java Virtual Machine</td>
</tr>
<tr>
<td>LDAP</td>
<td>Lightweight Directory Access Protocol</td>
</tr>
<tr>
<td>MAPI</td>
<td>Messaging Application Programming Interface</td>
</tr>
<tr>
<td>messaging server</td>
<td>A messaging server sends and processes messages and provides collaboration services, such as updating and communicating calendar and address book information.</td>
</tr>
<tr>
<td>mirror database</td>
<td>In database mirroring, a mirror database is a standby copy of a principal database.</td>
</tr>
<tr>
<td>PIM</td>
<td>personal information management</td>
</tr>
<tr>
<td>POP</td>
<td>Post Office Protocol</td>
</tr>
<tr>
<td>principal database</td>
<td>In database mirroring, a principal database is the database that starts the mirroring session.</td>
</tr>
<tr>
<td><strong>RPC</strong></td>
<td>remote procedure call</td>
</tr>
<tr>
<td><strong>SOAP</strong></td>
<td>Simple Object Access Protocol</td>
</tr>
<tr>
<td><strong>SQL</strong></td>
<td>Structured Query Language</td>
</tr>
<tr>
<td><strong>SRP</strong></td>
<td>Server Routing Protocol</td>
</tr>
<tr>
<td><strong>Triple DES</strong></td>
<td>Triple Data Encryption Standard</td>
</tr>
<tr>
<td><strong>witness</strong></td>
<td>In database mirroring, a witness is a Microsoft SQL Server instance that permits the mirror database to know when to promote itself.</td>
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</table>
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