

Arcserve® Replication and High Availability

BlackBerry Enterprise Server Operation Guide for Windows

r16.5

arcserve®

Pre-release Document, only for reference

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Arcserve Product References

This document references the following Arcserve products:

- Arcserve® Replication
- Arcserve® High Availability (HA)
- Arcserve® Assured Recovery®
- Arcserve® Content Distribution

Contact Arcserve

The Arcserve Support team offers a rich set of resources for resolving your technical issues and provides easy access to important product information.

<https://www.arcserve.com/support>

With Arcserve Support:

- You can get in direct touch with the same library of information that is shared internally by our Arcserve Support experts. This site provides you with access to our knowledge-base (KB) documents. From here you easily search for and find the product-related KB articles which contain field-tested solutions for many top issues and common problems.
- You can use our Live Chat link to instantly launch a real-time conversation between you and the Arcserve Support team. With Live Chat, you can get immediate answers to your concerns and questions, while still maintaining access to the product.
- You can participate in the Arcserve Global User Community to ask and answer questions, share tips and tricks, discuss best practices and participate in conversations with your peers.
- You can open a support ticket. By opening a support ticket online, you can expect a callback from one of our experts in the product area you are inquiring about.

You can access other helpful resources appropriate for your Arcserve product.

Documentation Changes

The following documentation updates have been made since the last release of this documentation:

- Updated to include user feedback, enhancements, corrections, and other minor changes to help improve the usability and understanding of the product or the documentation itself.

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Chapter 1: Introduction

Arcserve RHA (RHA) is a solution based on asynchronous real-time replication and automated application switchover and switchback to provide cost-effective business continuity for BlackBerry Enterprise Server and other application servers on both 32-bit and 64-bit Windows servers.

Arcserve RHA lets you replicate data to a local or remote server, making it possible to recover that data due to server crash or site disaster. You may switch your users to the replica server manually, or automatically, if you licensed High Availability. This Guide presents both Replication and High Availability concepts and procedures.

The procedures covered in this Guide should be followed as is. Customize the steps only if:

- You are familiar with Arcserve RHA and fully understand the potential impact of any changes you make.
- You have fully tested the steps in a lab environment before implementing in a production environment.

This section contains the following topics:

[About BlackBerry Enterprise Server](#) (see page 8)

[About This Guide](#) (see page 8)

[Related Documentation](#) (see page 8)

[Configure BlackBerry for Arcserve RHA](#) (see page 9)

[Server Requirements](#) (see page 10)

About BlackBerry Enterprise Server

BlackBerry Enterprise Server (BES) is becoming a critical component of the enterprise communications infrastructure in support of mobile productivity. Arcserve RHA for BlackBerry Enterprise Server (BES) is a customized solution for BlackBerry high availability (HA) using script-enhanced SQL or File Server switchover solutions with asynchronous real-time replication and automated server switchover and switchback to provide cost-effective business continuity for BlackBerry Server on both 32- and 64-bit Windows servers as well as MSCS clusters.

With version 4.1 SP5, the BlackBerry Enterprise Server architecture changed significantly as compared to earlier service packs. These changes include new services (MDS Integration Service), changes to existing services (MDS Connection Service), changes in how BES queries the SQL database, and on what host the BES database runs.

The Arcserve RHA installation procedure varies depending on whether you have the BlackBerry MDS Integration Service installed, so make sure you follow the proper procedure and understand it thoroughly before you begin.

About This Guide

This document describes how to implement Arcserve RHA solutions for BlackBerry Enterprise Server. Please review each procedure before you begin. It is essential that you have the appropriate resources and permissions to carry out the tasks that apply to your particular configuration.

This guide covers BES All in One and Front End (distributed) Configurations using Arcserve RHA for Applications and Arcserve RHA File Server scenarios enhanced by the provided BlackBerry HA script. Standard SQL HA scenarios (for protecting Back-End Configurations) are not covered in this Guide. This Guide also does not cover e-mail server high availability. High availability for those servers is covered under their own scenarios and documented in separate Operation Guides.

Related Documentation

Use this Guide with the *Arcserve RHA Installation Guide* and the *Arcserve RHA Administration Guide*.

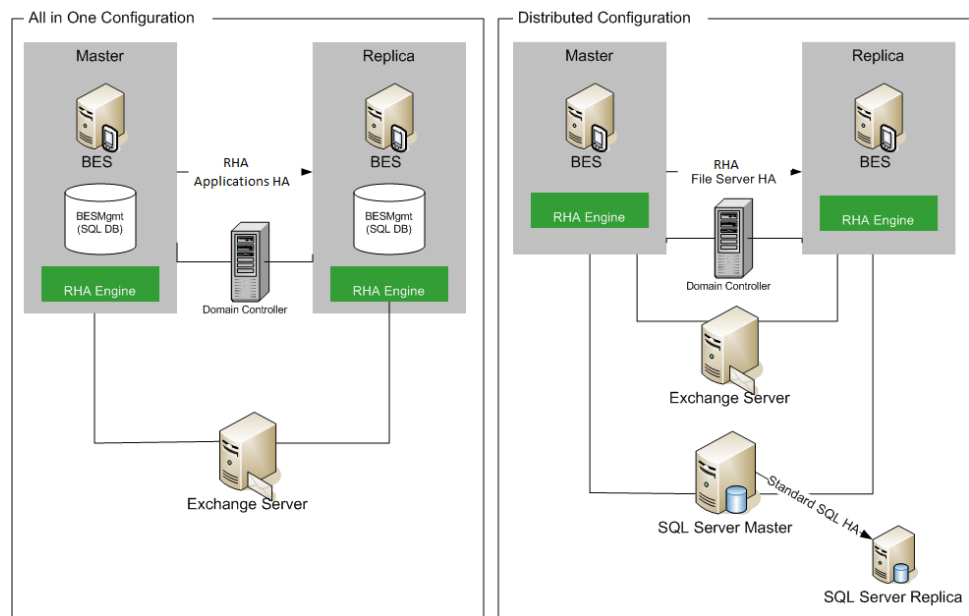
Configure BlackBerry for Arcserve RHA

As most BlackBerry administrators are well aware, configuration information regarding BES is stored almost entirely in the configuration database. This information is critical for proper BES operation, and is also relied upon by Arcserve RHA for a successful switchover. The configuration database could be installed on the same machine as BES or on a different machine, depending on the needs of your environment.

Local or same machine installation creates a dependency between SQL and BES, establishing a platform that is tied together and, in regards to high availability, managed together with Arcserve RHA for Applications. For this reason, we refer to this solution as All in One Configuration.

If the SQL database is installed on a different machine (distributed configuration), you can combine multiple HA scenarios to decide how much protection to implement:

- **Front-End Configuration**--Create File Server HA scenarios modified to use the provided BlackBerry HA script to protect BES in environments where the separate SQL database is already protected.
- **Back-End Configuration**--Create standard SQL Server HA scenarios to protect the SQL server separately from BES. See the Arcserve RHA SQL Operation Guide for more information.



In an environment with two production BES servers and one separate SQL server, you would be required to create three HA scenarios to protect all six servers participating in the scenarios.

Server Requirements

To implement Arcserve RHA, refer to the appropriate list of requirements, depending on the server type you selected. These components are licensed separately. If you do not have the license required to access support for a specific server type, contact Technical Support.

Base Configuration

Base Configuration

BlackBerry Enterprise Server can be configured in two basic ways:

- **All in One Configuration** -- Both BES and database (MSDE or SQL) are running on the same machine (Master server). In an All in One Configuration, you need:
 - 1 Exchange Server
 - 2 Windows Servers (Master and Replica)
 - 1 Domain Controller
- **Distributed Configuration** -- BES and SQL are running on different machines (two Master servers). In a Distributed Configuration, you need:
 - 1 Exchange Server
 - 2 Windows Servers (Master and Replica)
 - 1 SQL Server (If desired, this machine can be protected separately in a back-end SQL scenario. See the Arcserve RHA SQL Operation Guide for more information.)
 - 1 Domain Controller

Install the Arcserve RHA Engine on all servers participating in HA scenarios.

The following conditions also apply:

- The two Windows servers should be running Windows Server 2003, or 2008 with the same level of service packs and hot fixes installed.
- All IP addresses are statically assigned (DHCP-assigned IP addresses on the Master or Replica server are not supported).
- The server to be protected is **not** a domain controller or DNS server.
- The Exchange System Manager is installed on both Windows Servers prior to installing Arcserve RHA.

For SQL 2005 or MSDE in Same Machine Configuration:

- Ensure you have installed a SQL instance on both servers (Master and Replica).
- Ensure both servers have the same SQL version, service packs and hot fixes installed.
- Ensure both servers hold identical SQL Server instances, such as "default" or "named".
- Ensure both servers reside in the same Active Directory forest and are members of the same domain or trusted domains.
- Ensure the drive letters containing database files are identical on both servers.

- Ensure the full path to the default system database of each instance is identical on both servers.
- Verify that the port defined in the Network Configuration TCP/IP properties of the SQL instance(s) is assigned statically and is identical on both servers.

Important! Install BES ONLY on the production server prior to installing Arcserve RHA. If you have already installed BES on the server you intend to use as the Replica, uninstall BES before proceeding.

BlackBerry HA Script

The script referenced by this Operation Guide must be present on both SQL servers (or on all nodes, for SQL MSCS clusters) at the same path. By default, this script is provided in all versions of Arcserve RHA build 65 and above, and no additional action is required. The default location is C:\Program Files\CA\Arcserve RHA\Engine\BBha.vbs. Contact Tech Support if the script is not present.

The BlackBerry HA script controls and monitors BES services via RPC communication ports so make sure all required RPC communication ports are open between the SQL servers and all protected BES servers.

BlackBerry Configuration Database

The BES configuration database (BESMgmt) contains all the BES configuration information. The Arcserve RHA solution for BlackBerry protects and utilizes this database in order to provide BlackBerry high availability. If you use your current BES SQL instance (the one hosting BESMgmt) for any applications other than BES and still wish to provide BES high availability, you must move the BES configuration database to a new dedicated SQL instance. It can be on the same, or a different, server but must be a new dedicated SQL instance just for the BES configuration database. Once installed as a new named instance, Arcserve RHA can be configured to protect only this instance, without affecting other SQL instances or Arcserve RHA scenarios running on the server (BES Servers can be switched over without also disrupting service to other SQL databases or instances on the server). For more information, please review *Independent BlackBerry SQL Instance*.

To move the BlackBerry configuration database, please follow the official instructions provided on the RIM Technical Support website at [http://na.blackberry.com/eng/support: How To Move the BlackBerry Configuration Database from one server to another](http://na.blackberry.com/eng/support:How%20To%20Move%20the%20BlackBerry%20Configuration%20Database%20from%20one%20server%20to%20another); Article Number: KB-03112.

This operation requires a brief restart for some BES services, so it is recommended that this procedure is performed alongside the BES server configuration to reduce the total amount of downtime required.

When you edit the configuration file, ensure you change 'SERVER' to the new SQL instance dedicated to the configuration database. For example, suppose your new dedicated SQL instance is called 'xobessql' and is on a server called 'xoperations.' The configuration file should be modified as follows:

Example

```
; Name of Server to install the db
; Local machine can be specified as local
;
SERVER=xoperations\xobessql
```

After moving the BESMgmt database (finishing the above referenced KB) to the new server, you must restart the BlackBerry Manager before it will reconnect if it was open during the move process.

Log On Account Conditions

The Arcserve RHA Engine service must satisfy certain account conditions for successful communication with other components. If these requirements are not met, scenarios may not run. If you lack the permissions required, contact your local IS team.

- It is a member of the Domain Admins group. If the Domain Admins group is not a member of the built-in domain local group Administrators you must use an account that is.
- It is a member of the local computer Administrators Group. If the Domain Admins group is not a member, add the account manually.
- For servers in a workgroup, use the Local System account. If you have used Redirect DNS redirection method in a HA scenario, then use the local administrator account.
Note: In MS SQL server 2012, Local System (NT AUTHORITY\SYSTEM) is not automatically provisioned in the sysadmin server role. See Microsoft documents on how to provision the sysadmin server role to the NT AUTHORITY\SYSTEM account. Alternatively, use Administrator account to install and log in to the engine service.
- When your SQL servers are in a workgroup, enable "sa" account on Master and Replica server before you run the scenario.

About MSDE

While this Operation Guide refers to a full-featured SQL Server as the underlying database infrastructure, BES also supports working with a local MSDE installation by default. If this is the case with your configuration, simply regard all SQL references as MSDE references.

Servers Operating in a Workgroup

For servers in a workgroup, set the Arcserve RHA Engine service account to Local System (unless you have added any custom scripts that require higher level permissions). Servers in a workgroup can use Redirect DNS only with DNS servers that allow non-secure updates. You can use Move IP, switch computer name, and custom redirection scripts normally.

Register Arcserve RHA Licenses

The Arcserve RHA licensing policy is based on a combination of several parameters which include the following:

- the operating systems involved
- the required solution
- the supported application and database servers
- the number of participating hosts
- additional modules (for example, Assured Recovery)

The license key that is generated for you is therefore tailored to your exact needs.

After logging in for the first time, or if your old license has expired, you must register the Arcserve RHA product using your license key. To register the product, you need to open the Manager, which does not depend on the existence of a valid registration key. After the Manager opens, a License Warning message appears, prompting you to register the product. A License Warning message also appears when your license is about to expire during the next 14 days.

When you are creating a scenario, some of the options might be disabled following the terms of your license. However, you can create any number of scenarios, since the validity of your license key is confirmed, before you try to run a specific scenario. Only when you click the Run button, the system checks whether you are allowed to run the selected scenario according to your license key. If the system determines that you do not have the required license for running this scenario, the scenario will not run and a message will appear on the Event pane informing you of the type of license you need.

To register Arcserve RHA using the license key

1. Open the Manager.

The Welcome message appears, followed by a License Warning message informing you that your product is not registered. You are prompted to register it.

2. Click OK to close the message.
3. Open the Help menu and select the Register option.

The Register Arcserve RHA dialog opens.

4. Complete the following fields:
 - Registration Key field - enter your registration key.
 - [Optional] In the Company Name field - enter your company name
5. Click the Register button to register the product and close the dialog.

You can now start working with the Arcserve RHA Manager according to your license permissions.

Chapter 2: Setting up the Arcserve RHA Servers

This section describes how to set up a BlackBerry Enterprise Server for use with Arcserve RHA.

You can install BlackBerry Enterprise Server on the same machine as SQL Server or MSDE (All in One Configuration), or on a different machine (Distributed Configuration). Note that Arcserve High Availability supports both configurations, but additional modifications are required on the SQL server in a distributed configuration.

Further, the installation procedures vary if you are running BES with or without MDS Integration Service. This service is required only if you wish to run enterprise applications on BlackBerry devices. Installing this service also installs the BlackBerry MDS Application Repository on the database server machine.

This section contains the following topics:

[Installation for All in One Configurations](#) (see page 17)

[Installation for Distributed Configurations](#) (see page 23)

[Install and Configure the Replica BlackBerry Server](#) (see page 31)

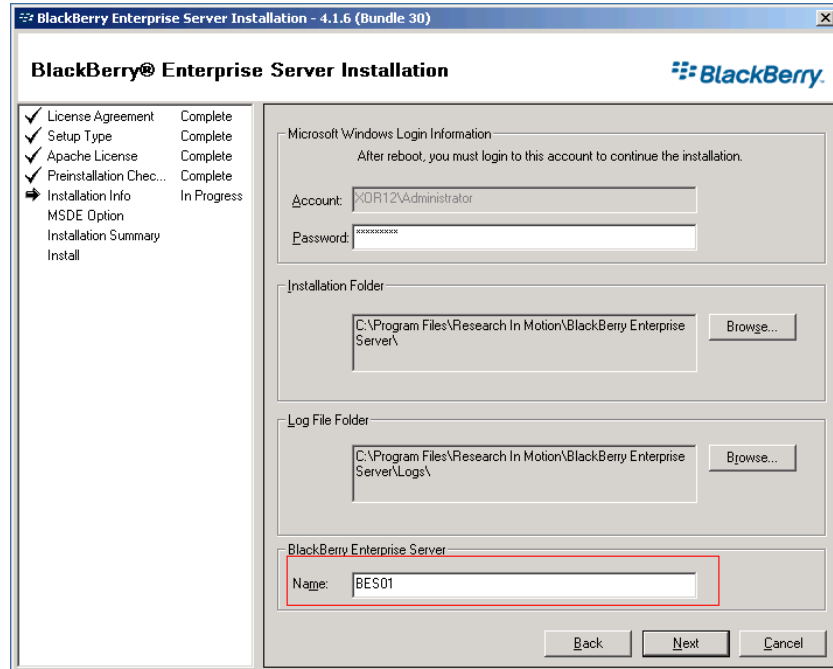
Installation for All in One Configurations

The following topics describe the procedures for setting up the Master server in BlackBerry Enterprise Server environments in which the database is installed on the same machine as BES.

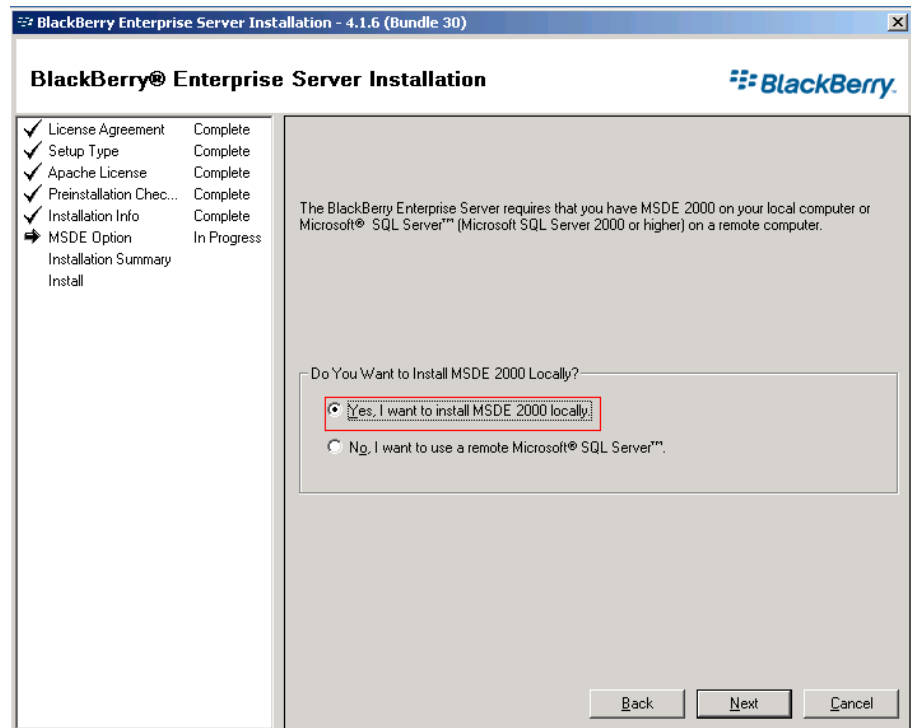
Install BES on the Master without MDS-All in One Config

To install BES without MDS

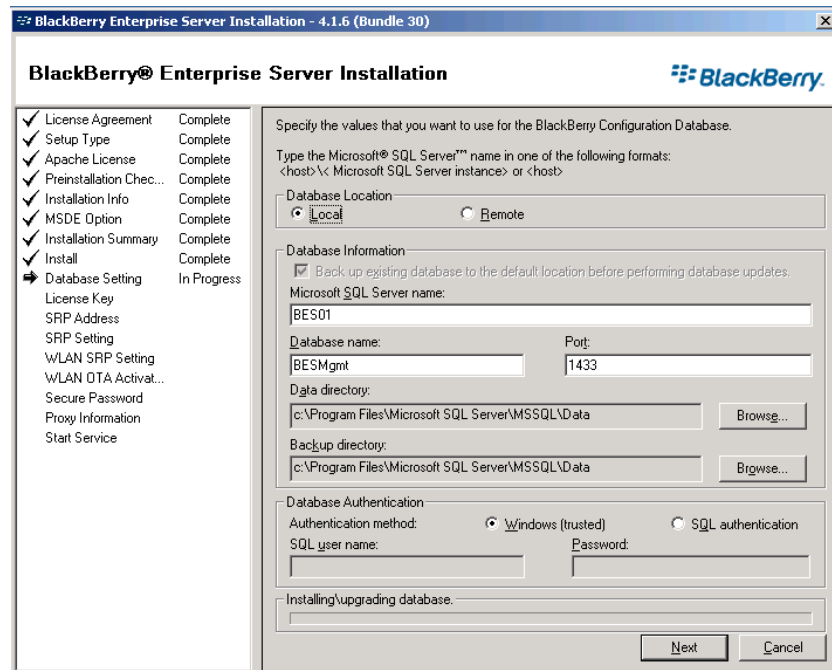
1. Select the BlackBerry Enterprise Server option from the Installation dialog and click Next. This option installs all BES components except MDS Integration Service.
2. Enter the name of the Master BES Server in the BlackBerry Enterprise Server name field and click Next.



3. Select local install option and click Next.



4. Reboot the machine, when prompted. After the machine reboots, configure the BES database.



5. When you are prompted to create the BES database, click Yes.
6. Provide the CAL Key, SRP ID and SRP Key.

Note: This information must be the same on both Master and Replica.

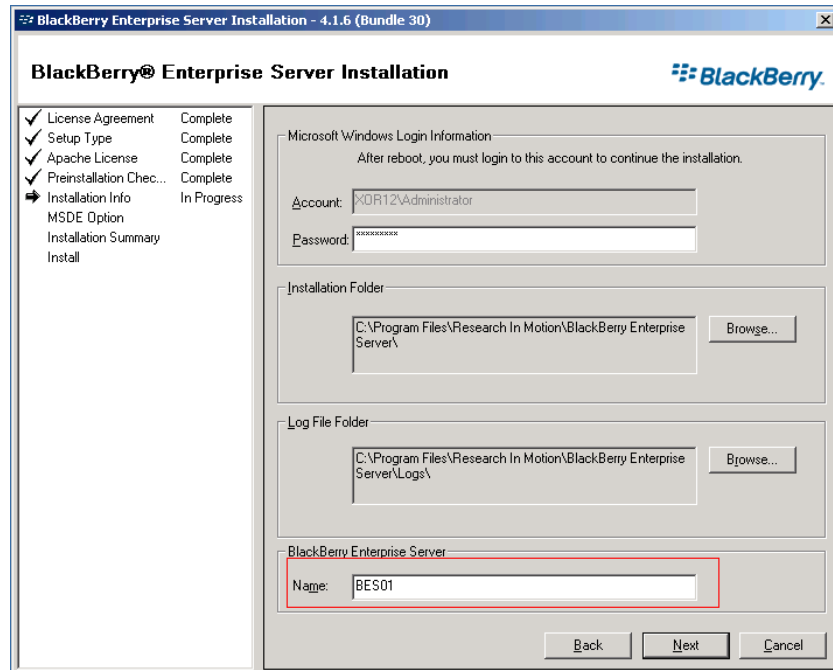
You must also provide a Microsoft Exchange User with Send as/Receive as rights within the Exchange organization. See the BlackBerry Enterprise Server documentation for more information.

Start Services. Open the BlackBerry Manager and verify the BlackBerry name used. This must be the same name used on the Replica installation.

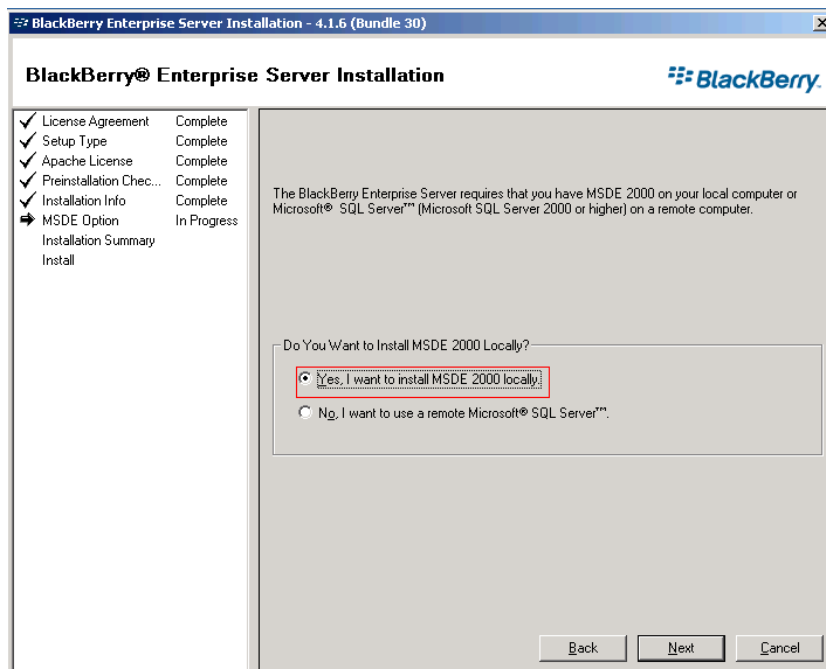
Install BES on the Master with MDS-in All in One Configuration

To install BES on the Master with MDS

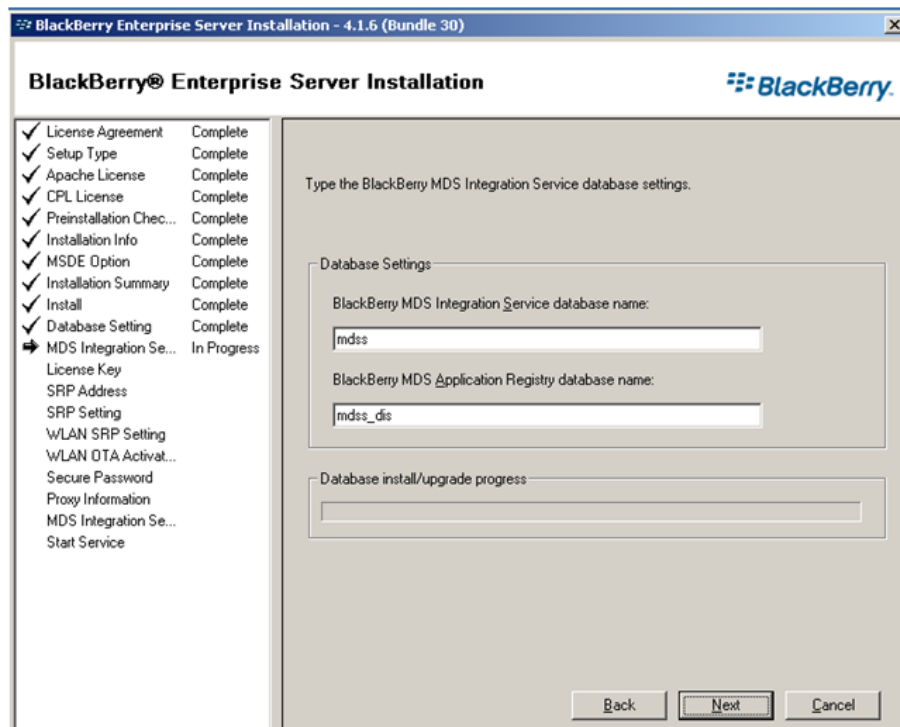
1. Select the BlackBerry Enterprise Server with MDS Integration option from the Installation dialog and click Next. This option installs all BES components including the MDS Integration Service.
2. Enter the name of the Master BES Server in the BlackBerry Enterprise Server name field and click Next. Make sure you note the name used here.



3. Select local install option and click Next.



4. Reboot the machine, when prompted. After the machine reboots, configure the BES database.
5. When you are prompted to create the BES database, click Yes.
6. Provide the BlackBerry MDS Integration Service database settings:



7. When you are prompted to create the MDS database, click Yes.
8. When you are prompted to create the Application Registry database, click Yes.
9. Provide the CAL Key, SRP ID and SRP Key.

Note: This information must be the same on both Master and Replica.

You must also provide a Microsoft Exchange User with Send as/Receive as rights within the Exchange organization. See the BlackBerry Enterprise Server documentation for more information.

Start Services. Open the BlackBerry Manager and verify the BlackBerry name used. This must be the same name used on the Replica installation.

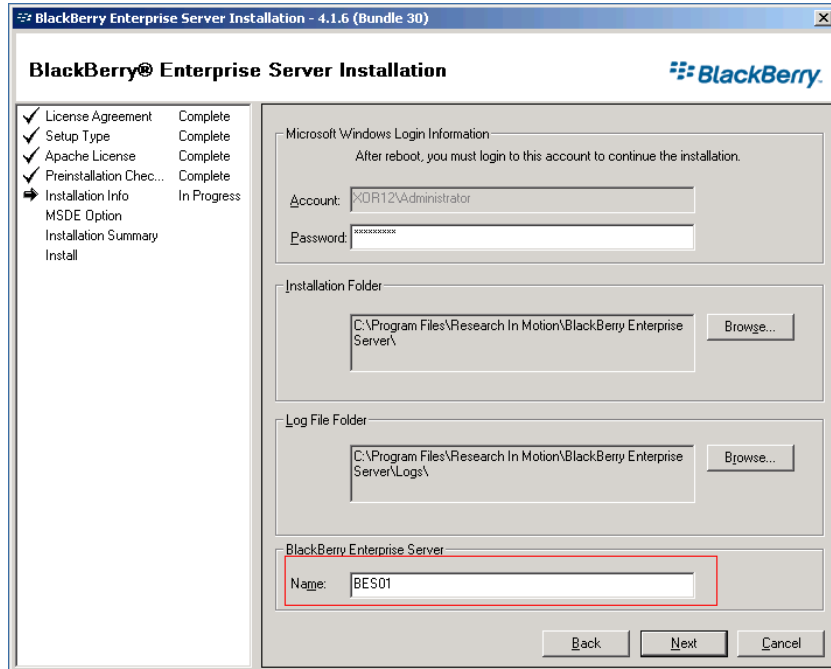
Installation for Distributed Configurations

The following topics describe the procedures for setting up the Master server in BlackBerry Enterprise Server environments in which the database and BES are installed on separate machines.

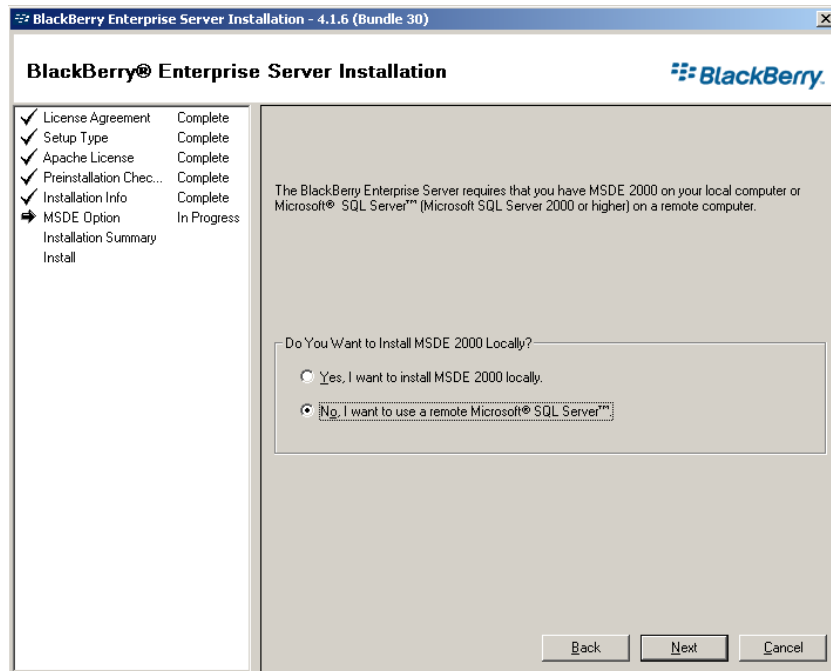
Install BES on the Master without MDS-Distributed Configuration

To install BES without MDS

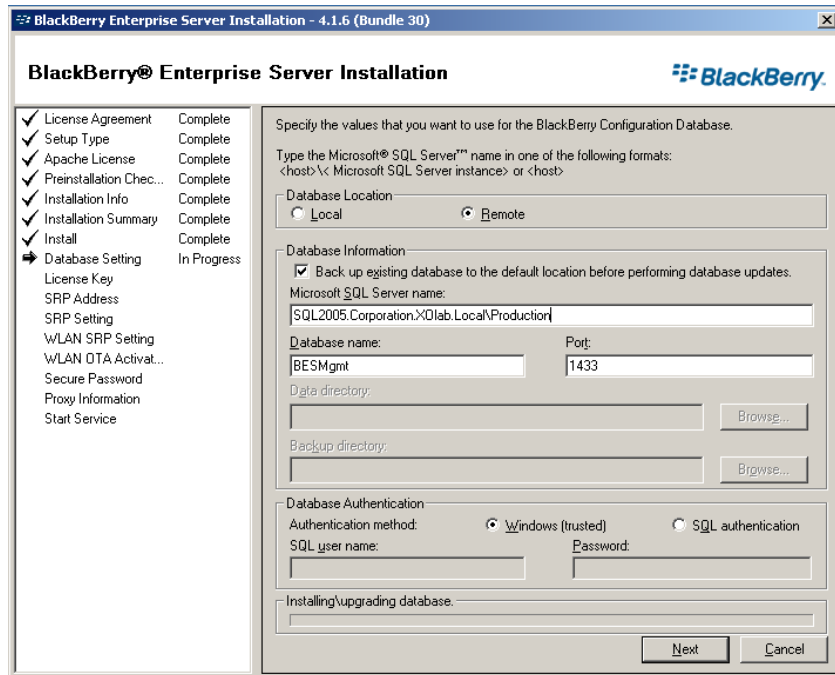
1. Select the BlackBerry Enterprise Server option from the Installation dialog and click Next. This option installs all BES components except MDS Integration Service.
2. Enter the name of the Master BES Server in the BlackBerry Enterprise Server name field and click Next. Note the name you enter here for later.



3. Select "No, I want to use a remote Microsoft SQL Server" and click Next.



4. Reboot the machine, when prompted. After the machine reboots, configure the BES database.
 - a. Click Start, Administrative Tools, Data Source (ODBC).
 - b. Choose the System DSN tab and click Add.
 - c. When prompted to provide a name for the data source, make sure you use the SQLFQDN\Instance.
 - d. Ensure this instance connects to the Master database.
 - e. Verify successful connection and continue installation.



5. When you are prompted to create the BES database, click Yes.
6. Provide the CAL Key, SRP ID and SRP Key.

Note: This information must be the same on both Master and Replica.

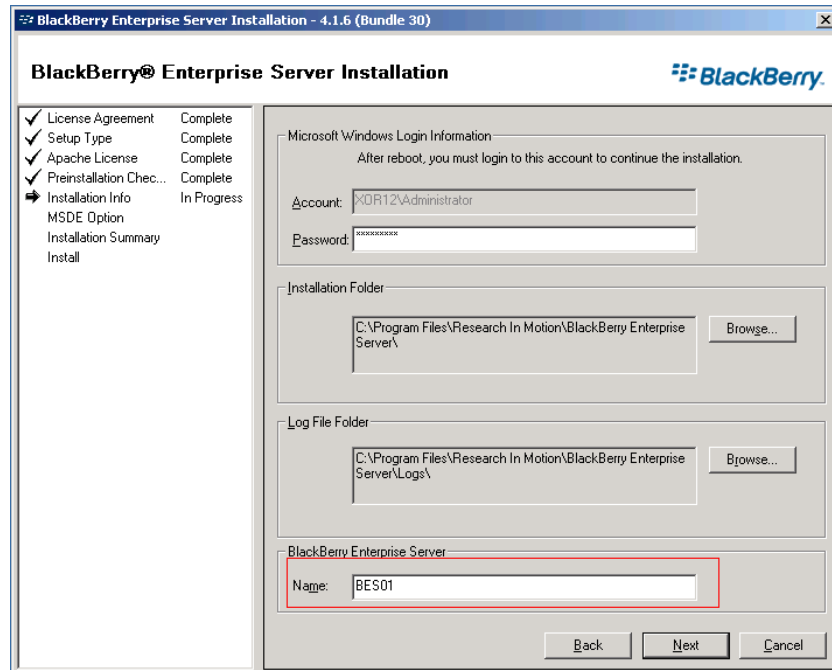
You must also provide a Microsoft Exchange User with Send as/Receive as rights within the Exchange organization. See the BlackBerry Enterprise Server documentation for more information.

Start Services. Open the BlackBerry Manager and verify the BlackBerry name used. You must use the same name on the Replica installation.

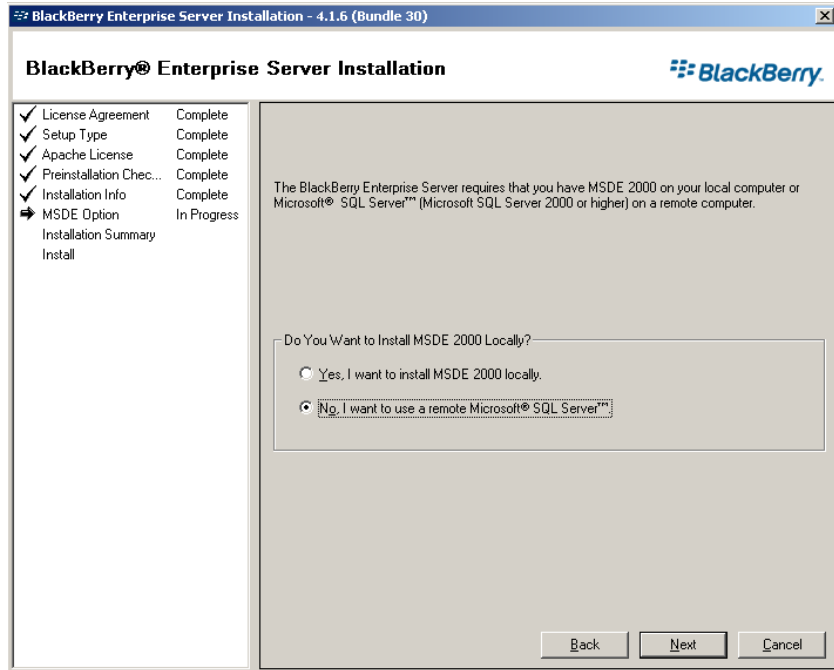
Install BES on the Master with MDS-in Distributed Configuration

To install BES with MDS

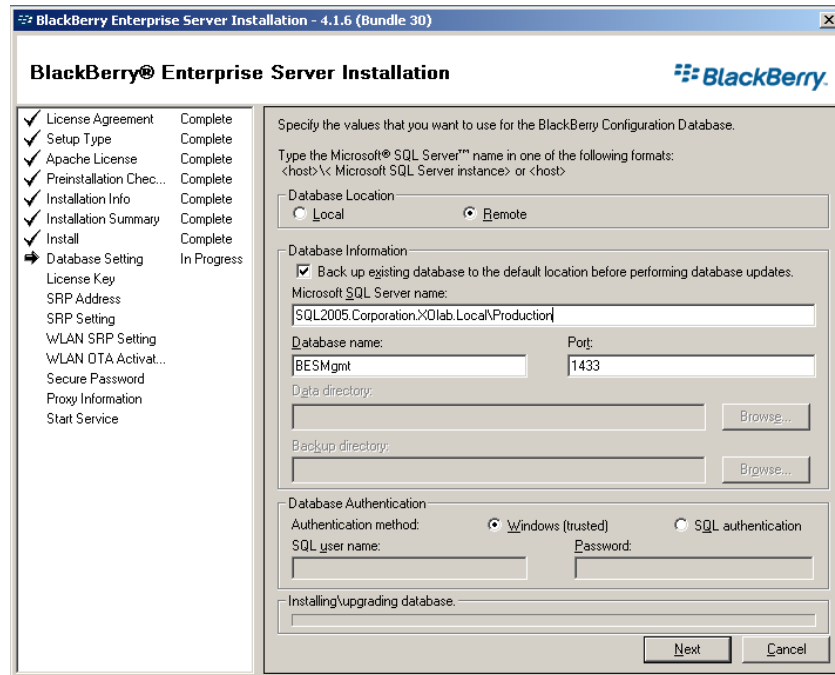
1. Select the BlackBerry Enterprise Server with MDS Integration option from the Installation dialog and click Next. This option installs all BES components including the MDS Integration Service.
2. Enter the name of the Master BES Server in the BlackBerry Enterprise Server name field and click Next. Note the name you enter here for later.



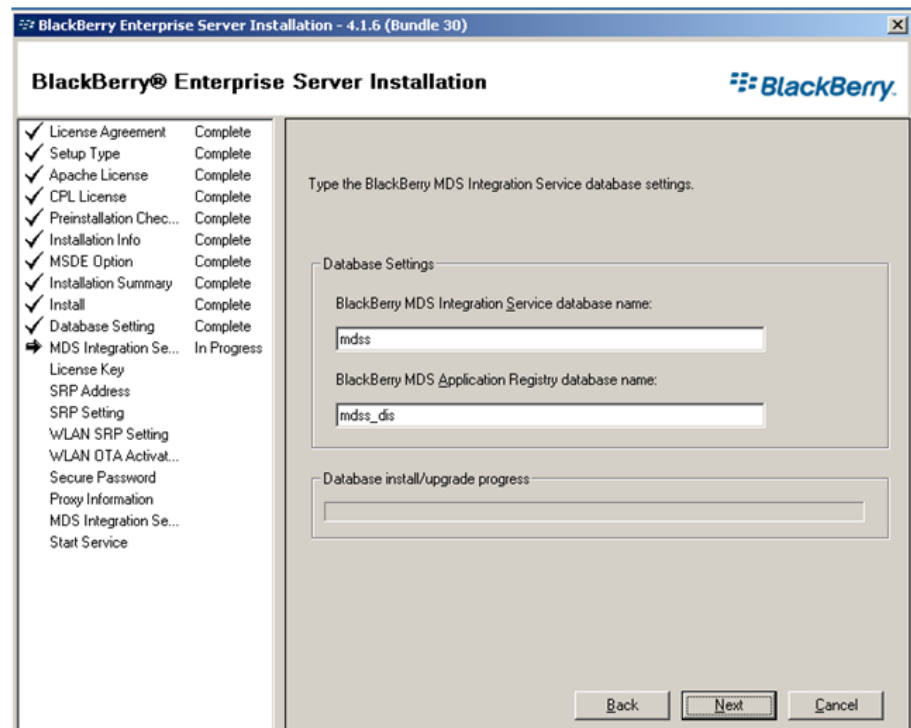
3. Select "No, I want to use a remote Microsoft SQL Server" and click Next.



4. Reboot the machine, when prompted. After the machine reboots, configure the BES database.
 - a. Click Start, Administrative Tools, Data Source (ODBC).
 - b. Choose the System DSN tab and click Add.
 - c. When prompted to provide a name for the data source, make sure you use the SQLFQDN\Instance.
 - d. Ensure this instance connects to the Master database.
 - e. Verify successful connection and continue installation.



5. When you are prompted to create the BES database, click Yes.
6. Provide the MDS Integration Service database settings:



7. When prompted to create the MDS Integration database, click Yes.

8. When prompted to create the MDS Application Registry database, click Yes.
9. Provide the CAL Key, SRP ID and SRP Key.

Note: This information must be the same on both Master and Replica.

You must also provide a Microsoft Exchange User with Send as/Receive as rights within the Exchange organization. See the BlackBerry Enterprise Server documentation for more information.

Start Services. Open the BlackBerry Manager and verify the BlackBerry name used. You must use the same name on the Replica installation.

Install and Configure the Replica BlackBerry Server

Once the Master BES server is configured and ready, you are ready to install the Replica BES server. The procedure for setting up the Replica server is nearly identical for All in One and Distributed Configurations; the difference is marked.

Please consider the following information when installing this server.

Important! Before starting the installation, stop the BES services on the Master BES server (for this server pair), and set them to 'manual'. This is done in order to avoid SRP Key conflicts (see *SRP Connection Errors* (see page 78)). Both Master and Replica BES services cannot be online simultaneously at any time.

You will also be directed to rename the Master server. For clarity, suppose the names of the server pair are BlackBerry1 (Master) and BlackBerry2 (Replica).



To configure the replica server

1. Change all BES services running on the Master server to Manual Startup mode.
2. Rename the Master server to <MasterHostname>-CA and reboot. For example, if the Master server is named BlackBerry1, rename it to BlackBerry1-CA and reboot.
3. Rename the Replica server to the original Master Hostname (without the -CA suffix) and reboot. Using the example in the previous step, rename the Replica to BlackBerry1.
4. Install BES 4.1 software on the Replica server, ensuring the following:
 - Use the same BlackBerry server name used for the Master server
 - (For Distributed Configuration only) Create the ODBC connection. For more information, refer to the topic, [The Replica BES Server Data Source \(ODBC\) Configuration](#) (see page 33).
 - Specify the same SQL server specified for the Master server. If the SQL server is installed locally to the Master, you must make sure you also install SQL on the Replica and choose local.
 - Use the same BES Cal Key, SRP ID and SRP Key used on the Master server
 - Verify all services started and that they can stop and start without issues
5. Change the services installed on the Replica server to Manual Startup mode.
6. Rename the Replica server to its original name (for example, BlackBerry2) and reboot.

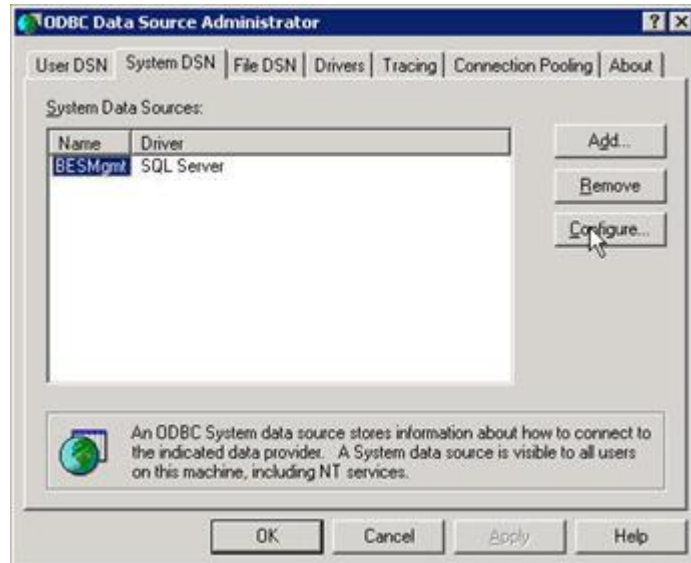
7. Change the services installed on the Master server back to Automatic Startup mode.
8. Rename the Master server to its original name (for example, BlackBerry1) and reboot.
9. Validate that all services started properly and that BES is functioning correctly.

The Replica BES Server Data Source (ODBC) Configuration

If you are using a Distributed Configuration, you must perform the following procedure to ensure database connectivity in the context of Arcserve RHA scenarios.

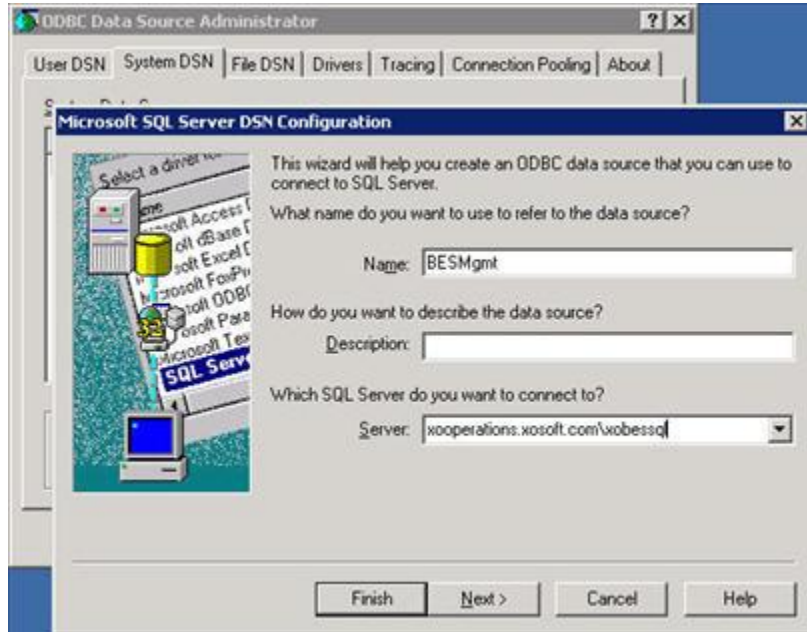
To use the replica BES server data source (ODBC) configuration

1. Click Start, Programs, Administrative Tools, Data Source (ODBC).
2. Choose the System DSN tab; highlight *BESMgmt* and click Configure.



3. In the server field, enter the full DNS name (FQDN) for your SQL server (and the named instance path if not installed as the default instance).

Important! Remember to use the alternate SQL server record you created if you are following *Independent BlackBerry SQL Instance* (for example, bbdb.rha.com/xobessql).



4. Click Next and continue to test your connection; verify that it is successful.

Complete the Configuration

After you install BES on the Master and Replica servers, complete configuration by installing the Arcserve RHA Engine on all servers, including the SQL Server pair, if using Distributed Configuration. A Domain Account is required for the permissions needed for switchover and monitoring services.

For more information, see the *Arcserve RHA Installation Guide*.

Multiple BlackBerry Servers

If you are protecting multiple BES Servers, the previous procedures must be performed for all BES server pairs.

Chapter 3: Redirection Methods

This section contains the following topics:

[How Redirection Works](#) (see page 35)

[DNS Redirection](#) (see page 35)

[Switch Computer Name Redirection](#) (see page 36)

[Scripts Redirection](#) (see page 36)

How Redirection Works

Each server type supported by Arcserve RHA can be configured to use one or more redirection methods. You should enable redirection methods based on your environment and business needs. The following sections describe the supported redirection methods for BlackBerry Enterprise Server.

Note: For Microsoft Exchange Server 2010, by default, only Move IP is available for the redirection method. In addition, Exchange Server 2010 HA scenario works fine even if all redirection methods are set to off.

DNS Redirection

DNS Redirection changes the DNS "A" Record of the Master server to resolve to IP address of the Replica server. Upon failure of the Master, the Replica server modifies the appropriate DNS record so that references to the Master server resolve to the Replica's IP address rather than the Master's IP address. This redirection method requires no network reconfiguration and works in LAN and WAN network configurations.

DNS redirection works only with A (host) type records and cannot update CNAME (Alias) records directly. However, if the CNAME record points to the modified A record, it is indirectly redirected.

Using the record that has the Master server's name is the default, however you can configure Arcserve RHA to redirect any DNS A (host) record via the *Master's name in DNS* setting in the switchover properties tab.

Switch Computer Name Redirection

If you are redirecting File Shares, in which clients connect via the Master server name, enable Switch Computer Name. For example, if the Master server name is fs01 and clients connect to \\fs01\sharename or \\fs01.domain.com\sharename, using the Switch Computer Name method redirects clients to the failover server. To use Switch Computer Name Redirection in the Active Directory environment, both Master and Replica must belong to the same domain.

It is also recommended to enable one other method. The most common method is to use both DNS Redirection and Switch Computer Name. Arcserve RHA makes the required computer name switch by assigning a temporary name to the Master server and taking over its computer name for use with the Replica server.

Arcserve RHA updates records directly and does not generally require a reboot. If, however, you encounter any problems after switchover, consider setting the reboot option to On and testing again.

Note: For Windows Server 2008 systems, you must reboot the computer after a switchover occurs when the switch computer name method is used. To do so, enable the property, Reboot after switchover. However, for Windows 2008 Cluster systems, reboot will not occur even if this property is enabled. You must reboot manually and ensure the SQL Server service is running.

Important! This is the redirection method preferred for BlackBerry Enterprise Server scenarios.

Automatic Redirection Using Switch Computer Name

When possible during switchover, Arcserve RHA renames the master host to *masterhostname-RHA* and assigns its original name to the replica server. This step prevents name conflict, since the master's name is now assigned to the replica server. In this graceful case, if automatic reverse replication is set to on, Arcserve RHA starts the backward scenario automatically. If Automatic Reverse Replication is set to Off, run the scenario again manually by selecting the Run button or choosing Run from the Tools menu. Once the backward scenario has run and synchronization is complete, you can click Perform Switchover to switch back.

Scripts Redirection

Arcserve RHA can trigger custom scripts or batch files to perform the user redirection or any additional steps not covered by built-in methods. If the above methods are not appropriate or do not fully meet all requirements, see the *Arcserve RHA Administration Guide* for details on scripted redirection methods.

Chapter 4: Creating Replication and High Availability Scenarios

The procedure for creating BES HA scenarios varies depending upon your configuration. For All in One Configurations, create a SQL Server scenario modified to use the provided BBha.vbs script. For Distributed Configurations, protect the BES front end using a File Server scenario modified to use the same script. (Back-end protection can be achieved using standard SQL HA scenarios.)

You can also manage your BES scenarios as a single group. For more information about creating scenario groups, see the *Arcserve RHA Administration Guide*.

Before you begin, ensure the following:

- SQL servers and additional instances meet all specifications listed in the topic, [The BlackBerry HA Solution](#) (see page 9)
- You have added the required DNS Host (A) Record for the Master SQL server. This DNS record is used for all BES HA purposes related to the SQL database. It should have a unique name and must be a host (A) record type. CNAME alias records are not supported.
- You are using the additional DNS record and not the hostname when you set up the Blackberry server for all SQL configuration settings in BES and OBDC.
- You have the script required to run the scenario in the specified folder. For more information, see the topic, [BlackBerry HA Script](#) (see page 13).

Example

Suppose the real name of your SQL server is rhaoperations.rha.com. Add a new DNS Host (A) record named BBDB.rha.com. BBDB is the name you must specify in your SQL configuration settings and in the Switchover Properties step of the scenario creation process.

For more information, refer to the topic, [Independent Blackberry SQL Instance](#). (see page 78)

Important! At the end of the scenario creation process, click Finish. Do not click Run Now. You must modify the scenario with the provided script at several locations in Scenario Properties. For more information, refer to [Configure Additional BlackBerry HA Scenario Settings](#) (see page 43).

This section contains the following topics:

[Create Arcserve RHA for Applications Scenarios for BES](#) (see page 39)

[Create File Server HA Scenarios for BES](#) (see page 41)

[Configure Additional BlackBerry HA Scenario Settings](#) (see page 43)

[Manage Services](#) (see page 47)

[Run a Scenario](#) (see page 49)

[Set Scenario Properties](#) (see page 51)

[Stop a Scenario](#) (see page 53)

[View a Report](#) (see page 53)

[Use Scenario Groups](#) (see page 56)

Create Arcserve RHA for Applications Scenarios for BES

Perform this procedure to create BES HA scenarios if you are running BES and SQL on the same machine (All in One Configuration). If you are running BES and SQL on separate machines (Distributed Configuration), see the topic, [Create BES-File Server HA Scenarios](#) (see page 41).

Creating scenarios for BlackBerry Enterprise Server high availability requires you to set additional scenario properties to protect BlackBerry servers. You may configure these additional properties as part of the scenario creation process (using the Wizard), or after the scenario is created, from the Properties pane of the Arcserve RHA Manager. The properties you need to configure are described in the topic, [Configure Additional BlackBerry HA Scenario Settings](#) (see page 43). In the following procedure, configuring the additional properties is done outside of the wizard, and requires that you select the Finish option instead of the Run Now option from the final scenario creation screen.

To create Arcserve RHA for Applications scenarios

1. From the Arcserve RHA Manager, choose Scenario, New or click the New Scenario button.
2. When the Welcome screen opens, select Create New Scenario, provide a Group name, if desired, and click Next. For more information about creating scenario groups, see the *Arcserve RHA Administration Guide*.
3. When the Select Scenario Type dialog opens, select Microsoft SQL, and High Availability Scenario. Assured Recovery is not applicable to BES scenarios due to SRP key conflicts.
4. When the Master and Replica hosts dialog opens, name your scenario and provide the hostname or IP address for the Master and Replica servers. Click Next. For more information, refer to the topic, [Redirection Methods](#) (see page 35).
5. Wait for Engine Verification to complete.

If needed, click Install to upgrade the Engine on one or both servers. Click Next to continue.

The Database for Replication dialog opens, listing all auto-discovered results for the specified Master. By default, all databases are included.
6. Accept the default selection or make changes, if desired. At minimum, you should select the System and BESMgmt databases, as well as mdss and mdss_dis if you also have MDS applications to protect. You should also include the following directory: c:\Program Files\Research in Motion\BlackBerry Enterprise Server\Logs. Exclude the Install and Webserver subdirectories. Click Next to continue.
7. The Services Discovery Result screen opens. See [Manage Services](#) (see page 47) for information on completing the Services Discovery Result and Services Setting screens.

8. When the Scenario Properties dialog opens, you may configure additional required properties now, or accept the defaults and configure additional properties later. (Refer to the topic, [Configure Additional BlackBerry HA Scenario Settings](#) (see page 43).)

If you use NTFS ACLs with domain accounts for user access control, we recommend that you choose the Replicate NTFS ACL option and click Next. For more information, refer to the topic, [Scenario Properties](#) (see page 51) or the *Arcserve RHA Administration Guide*.

The Master and Replica Properties dialog opens.

9. Accept default settings or make changes and click Next.
10. Wait for the Switchover Properties dialog to retrieve information. Configure the desired redirection properties and click Next. We recommend setting Redirect DNS, Switch Computer Name, and Reboot on Switchover and Switchback to On. For more information, refer to the topic, [Switching Over and Switching Back](#) (see page 59).
11. From the Switchover and Reverse Replication Initiation dialog, choose automatic or manual switchover, and automatic or manual reverse replication.

For BlackBerry scenarios, we recommend using manual for both selections to avoid SRP key conflicts. For more information, refer to the topic, [Scenario Properties](#) (see page 51) or the *Arcserve RHA Administration Guide*.

12. Click Next to initiate scenario verification. If errors are reported, you should resolve them before continuing. At successful verification, click Next to complete scenario creation.

Important! Do not click Run Now.

13. Choose Finish to save the scenario. You need to make additional changes before running this scenario. For more information, see [Configure Additional BlackBerry HA Scenario Settings](#) (see page 43).

Create File Server HA Scenarios for BES

Perform this procedure if you are running BES and SQL on separate machines (Distributed Configuration). This procedure makes BES highly available. If desired, you can protect the separate SQL database in its own scenario.

Creating File Server scenarios for BlackBerry Enterprise Server high availability follows the same procedure as regular File Server HA scenarios, with this exception: You must configure additional scenario properties to protect BlackBerry servers. You may configure these additional properties as part of the scenario creation process (using the Wizard), or after the scenario is created, from the Properties pane of the Arcserve RHA Manager. The properties you need to configure are described in the topic, [Configure Additional BlackBerry HA Scenario Settings](#) (see page 43). In the following procedure, configuring the additional properties is done outside of the wizard, and requires that you select the Finish option instead of the Run Now option from the final scenario creation screen.

To create a BES-File Server HA scenario

1. From the Arcserve RHA Manager, choose Scenario, New or click the New Scenario button.
2. When the Welcome screen opens, select Create New Scenario, provide a Group Name, if desired, and click Next. For more information about creating scenario groups, see the *Arcserve RHA Administration Guide*.
3. When the Select Scenario Type dialog opens, select File Server, and High Availability Scenario. Integrity Testing for Assured Recovery is not applicable to BES scenarios due to SRP key conflicts.
4. When the Master and Replica hosts dialog opens, name your scenario and provide the hostname or IP address for the Master and Replica servers. Click Next. For more information, refer to the topic, [Redirection Methods](#) (see page 35).
5. Wait for Engine Verification to complete.
If needed, click Install to upgrade the Engine on one or both servers and then click Next.
6. The Master Root Directories dialog opens, listing all auto-discovered results for the specified Master.
We recommend choosing the C:\Program Files\Research in Motion\BlackBerry Enterprise Server\logs and excluding the Webserver and Installer subdirectories. Click Next when you are done making selections.
7. The Replica Root Directories dialog opens.
Accept the default selection or make changes, if desired, and click Next.
8. The Services Discovery Result screen opens. See [Manage Services](#) (see page 47) for information on completing the Services Discovery Result and Services Setting screens.

9. When the Scenario Properties dialog opens, you may configure the additional properties now, or accept the defaults and configure the additional properties later. (Refer to the topic, [Configure Additional BlackBerry HA Scenario Settings](#).)

If you use NTFS ACLs with domain accounts for user access control, we recommend that you choose the Replicate NTFS ACL option and click Next. For more information, refer to the topic, [Scenario Properties](#) (see page 51) or the *Arcserve RHA Administration Guide*.

The Master and Replica Properties dialog opens.

10. Accept default settings or make the desired changes and click Next.
11. Wait for the Switchover Properties dialog to retrieve information. Configure the desired redirection properties and click Next. We recommend setting Redirect DNS and Switch Computer Name with Reboot on Switchover and Switchback to On.

For more information, refer to the topic, [Switching Over and Switching Back](#) (see page 59).

12. From the Switchover and Reverse Replication Initiation dialog, choose automatic or manual switchover, and automatic or manual reverse replication, as needed.

For BlackBerry scenarios, we recommend using manual for both selections to avoid SRP key conflicts. For more information, refer to the topic, [Scenario Properties](#) or the *Arcserve RHA Administration Guide*.

13. Click Next to initiate scenario verification. If errors are reported, you should resolve them before continuing. At successful verification, click Next to complete scenario creation.

Important! Do not click Run Now.

14. Choose Finish to save the scenario. You need to make additional changes before running this scenario. For more information, refer to the topic, [Configure Additional BlackBerry HA Scenario Settings](#) (see page 43).

Configure Additional BlackBerry HA Scenario Settings

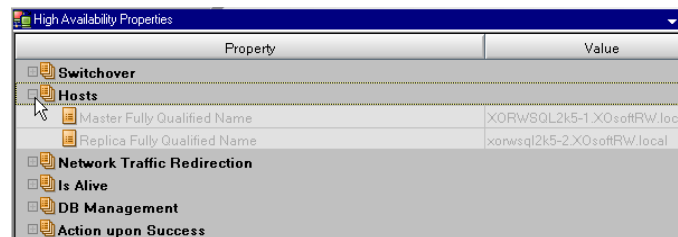
Before you can run the BES HA scenario, there are some additional configuration changes you must make. The High Availability Properties pane has been resized in some steps to show detail.

Important! In the following procedure, you must specify the actual Master and Replica information for the script arguments provided in angle brackets (<>). Do not omit the quotation marks ("). You will be asked to enable User-Defined Scripts at the end of this procedure. Note that the steps to do so differ slightly depending upon scenario type.

To configure the BlackBerry HA Scenario

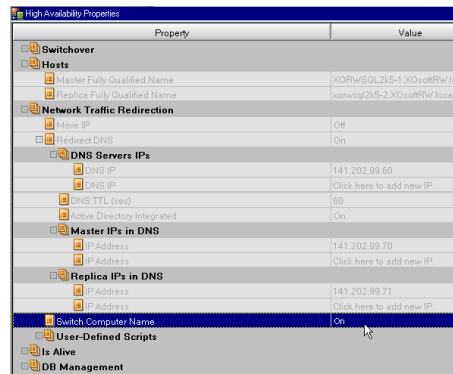
1. From Scenario Manager, select the SQL or File Server scenario you created for BlackBerry HA and click the High Availability Properties tab from the framework pane.
2. Expand Hosts. Verify that the Master Full Qualified Name is the correct DNS name for the SQL Server to which the BES servers connect.

Note: If you created an additional record to be used solely for the BES SQL Instance (as described in *Independent BlackBerry SQL Instance*), remember to enter this record instead for proper redirection. For example, BBDB.xosoft.com.



3. Expand Network Traffic Redirection:

- Redirect DNS -- turn On
 - DNS Servers IPs -- verify that the addresses for all DNS servers are correct
 - DNS TTL (sec) -- change default value of 60 to 10 to allow for faster propagation during switchover for BES servers.
 - Master IPs in DNS -- verify this is correct for SQL server
 - Replica IPs in DNS -- verify this is correct for SQL server
- Switch Computer Name -- turn On



4. Expand Is Alive, Check Method, User-Defined Scripts:

- Check Script on Standby Host -- turn On
- Script Name -- C:\Windows\System32\cscript.exe
- Arguments -- "C:\Program Files\CA\Arcserve RHA\Engine\bbha.vbs" /command:monitor /master:<MASTER IP>/replica:<REPLICA IP>/fqdn:<MASTER Fully qualified domain name>

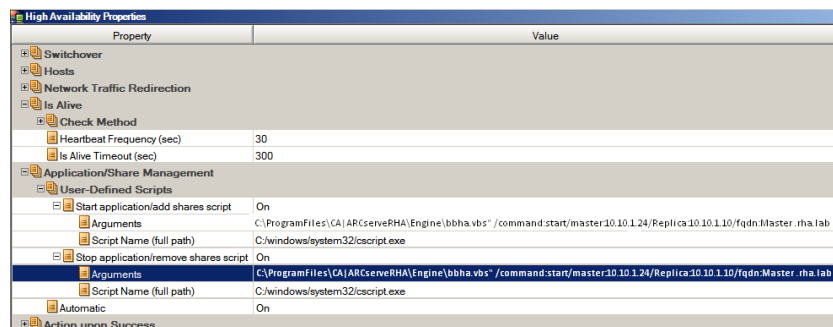
Note: Replace the text in angled brackets with the actual IP addresses of the Master and Replica and the actual FQDN of the Master.

Important! The following steps differ, depending upon scenario type. Ensure you follow the correct steps for the scenario you are modifying.

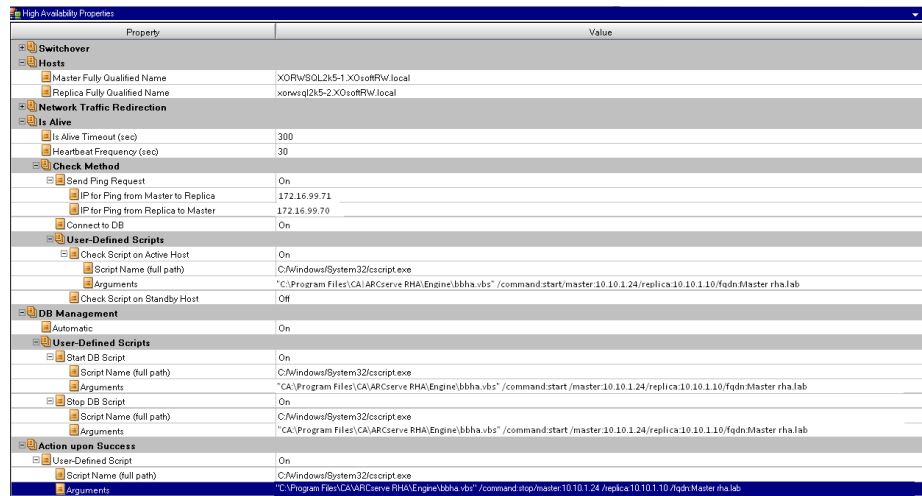
5. For **SQL HA** scenarios, expand DB Management, User-Defined Scripts.
 - Start DB Script -- turn On
 - Script Name (full path) -- C:\Windows\System32\cmd.exe
 - Arguments -- "C:\Program Files\CA\Arcserve RHA\Engine\bbha.vbs" /command:start /master:<MASTER IP> /replica:<REPLICA IP> /fqdn:<MASTER Fully qualified domain name>
 - Stop DB script -- turn On
 - Script Name (full path) -- C:\Windows\System32\cmd.exe
 - Arguments -- "C:\Program Files\CA\Arcserve RHA\Engine\bbha.vbs" /command:stop /master:<MASTER IP> /replica:<REPLICA IP> /fqdn:<MASTER Fully qualified domain name>

For **File Server HA** scenarios, expand Application/Share Management, User-Defined Scripts.

- Start application/add shares script -- turn On
 - Script Name (full path) -- C:\Windows\System32\cmd.exe
 - Arguments -- "C:\Program Files\CA\Arcserve RHA\Engine\bbha.vbs" /command:start /master:<MASTER IP> /replica:<REPLICA IP> /fqdn:<MASTER Fully qualified domain name>
- Stop application/remove shares script -- turn On
 - Script Name (full path) -- C:\Windows\System32\cmd.exe
 - Arguments -- "C:\Program Files\CA\Arcserve RHA\Engine\bbha.vbs" /command:stop /master:<MASTER IP> /replica:<REPLICA IP> /fqdn:<MASTER Fully qualified domain name>



6. For **SQL HA** scenarios, expand DB Management, Action on Success:
 - User Defined Script -- turn On
 - Script Name (full path) -- C:\Windows\System32\cscript.exe
 - Arguments -- "C:\Program Files\CA\Arcserve RHA\Engine\bbha.vbs" /command:start /master:<MASTER IP> /replica:<REPLICA IP> /fqdn:<MASTER Fully qualified domain name>



For **File Server HA** scenarios, expand Application/Share Management, Action on Success:

- User Defined Script -- turn On
 - Script Name (full path) -- C:\Windows\System32\cscript.exe
 - Arguments -- "C:\Program Files\CA\Arcserve RHA\Engine\bbha.vbs" /command:start /master:<MASTER IP> /replica:<REPLICA IP> /fqdn:<MASTER Fully qualified domain name>

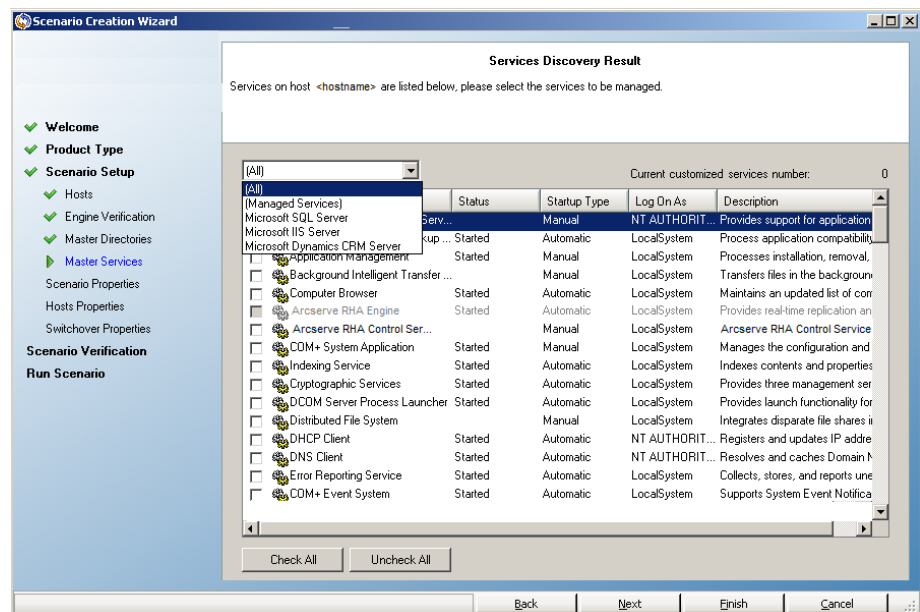
Manage Services

As part of scenario creation or modification, you can specify the services to manage. During scenario creation, the services management screens are displayed in the Scenario Creation Wizard. For existing scenarios, you can also manage services from the Arcserve RHA Manager Root Directories tab.

Services discovered on the specified Master server are automatically shown on the Services Discovery Result screen in the Scenario Creation Wizard.

The following steps are for Custom Application scenarios.

To manage services



- **All** - lists all services discovered on the Master server
- **Managed Services** - lists only the checked services
- **Oracle Database** - lists Oracle-related services if the current host has Oracle installed
- **Microsoft SQL Server** - lists SQL Server-related services if the current host has SQL Server installed
- **Microsoft IIS Server** - lists IIS Server-related services if the current host has IIS Server installed
- **Microsoft SharePoint Server** - lists SharePoint Server-related services if the current host has SharePoint Server installed
- **VMware vCenter Server** - lists vCenter Server-related services if the current host has vCenter Server installed

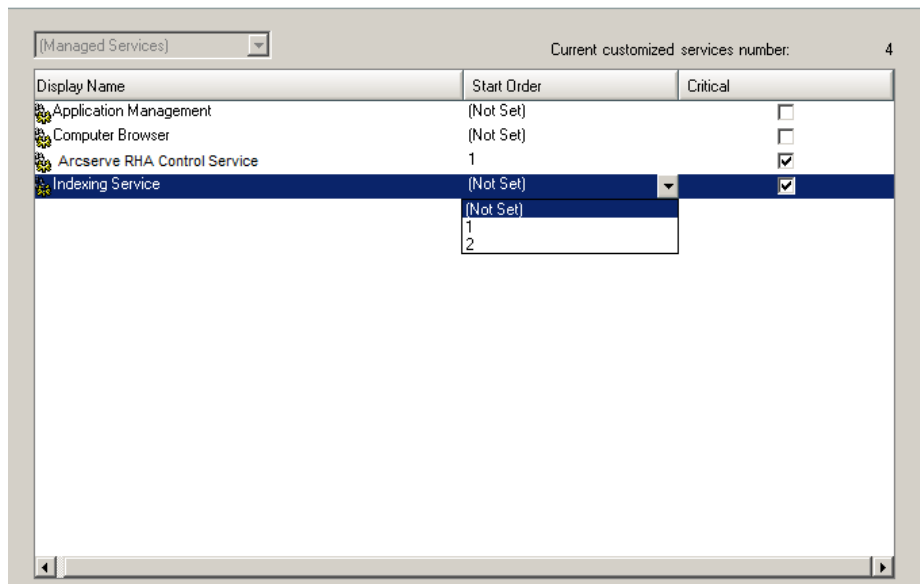
- **Microsoft Exchange Server** - lists Microsoft Exchange Server-related services if the current host has Microsoft Exchange Server installed
 - **Microsoft Dynamics CRM Server** - lists Microsoft Dynamics CRM Server-related services if the current host has Microsoft Dynamics CRM Server installed
1. Select a Service to Monitor. Click the box to the left of each service listed to select it for monitoring.

Important! Do not use Services Management to monitor every service on the Master server in a single scenario. This scenario type is not designed to protect an entire server.

2. Click Next to proceed to the Services Setting screen.

Services Setting

Managed services are listed below, please set the properties for each service.




3. In the Start Order column for each service you chose, specify the numeric value representing start order. For services where order does not matter, use the default value, (Not Set). The options available in the drop down list update as you configure the value. The first service has only two options: Not Set and 1. The second service has three options: Not Set, 1 and 2, and so on. If you assign the same start order to two services, Arcserve RHA automatically reorders the selections you already made.
4. In Replication scenarios, the Critical column is disabled. In HA scenarios, use the Critical column to specify if a service should trigger switchover when it fails. By default, all services are marked Critical. Clear the box for any service whose failure does not require switchover to the stand-by server.

Run a Scenario

You can run a single scenario using the following procedure:

To run the scenario

1. From the Scenario pane, select the scenario you want to run.
2. Click Run  on the Standard toolbar.

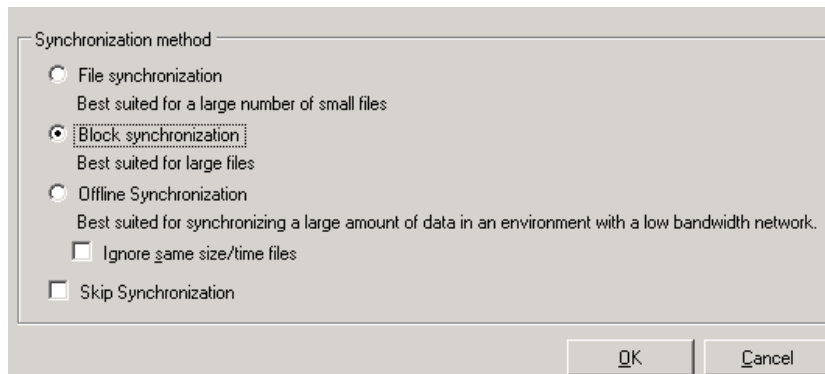
Before initiating synchronization and replication, Arcserve RHA verifies your scenario configuration. When verification completes successfully, the Manager displays the message: *Are you sure you want to run scenario "scenario_name?"* If problems are discovered, the top pane displays any warning and error messages resulting from verification.

Note: Scenario Verification checks many different parameters between the Master and Replica servers to ensure a successful switchover. If any errors or warnings are reported you should not continue until they are resolved.

3. Correct errors before you continue. Errors are reported on the Event pane.

Note: Replication of mount points succeeds only if those were added to the Master before the Engine was started. If you included the mount points in the Master root directories when the Engine was already running, no error is reported but the replication does not start. In this case, you need to restart the Engine on the Master before initiating replication.

When no error is reported, the Run dialog appears and contains synchronization options.



Note: Do not use **Skip Synchronization** for any scenarios replicating a database.

4. If you have a large number of small files, select File Synchronization. If you have large files, select Block Synchronization. If you have low bandwidth, select Offline Synchronization to transfer data to an external device, then perform synchronization from that device. Select the Ignore same size/time files to skip the comparison of files with the same path, name, size and modification time, which are generally identical, to reduce synchronization time. You should enable the Skip Synchronization option only when you are certain the files on both Master and Replica are identical. (The default selections are File Synchronization and Ignore same size/time files option enabled).
5. Click the OK button. Synchronization may take a while, depending on database size and network bandwidth between the Master and Replica. You will receive the following message in the event window when the synchronization is complete: *All modifications during synchronization are replicated.*

At this point, the scenario is operational and active. By default, a Synchronization Report is generated when synchronization finishes. To view the report, refer to the topic, [View a Report](#). You can also generate regular Replication Reports to monitor the replication process on each participating server. For more information, see the *Arcserve RHA Administration Guide*.

Bbha.vbs Script

Once the scenario is started, the bbha.vbs script monitors all services and will notify you if any failures occur. The notification will look like this:

```
Script C:/Windows/System32/cscript.exe executed; return code is 1
```

To view script operation (and to confirm proper arguments), you can view the bbha log located in the scripts directory.

Note: If you see this warning or any other warning regarding the script, but the application is functioning properly, it indicates that the script parameters, script configuration locations, network connectivity or administrative rights between servers are incorrect or that the services on the Master are not currently functioning properly. Stop the scenario and check the arguments and script path. If you are still not successful, contact Technical Support to review the bbha.log file and troubleshoot the issue.

Set Scenario Properties

You can change a scenario configured using the Wizard or configure additional settings, or modify the scenario, using the Properties pane.

The Properties pane and its tabs are context-sensitive and change whenever you select a different node from a scenario folder. You must stop a scenario before configuring its properties. Certain values cannot be modified once set; they are noted. For full details on configuring scenario properties and their descriptions, see the *Arcserve RHA Administration Guide*.

Properties are organized into tabs on the Arcserve RHA Manager Framework pane. The tabs displayed are based upon server type, Arcserve RHA solution, and scenario status. Select the scenario for which you want to change properties, and then select the appropriate tab.

The screenshot displays the Arcserve RHA Manager interface. The main window is titled 'Scenario view' and shows a tree view of scenarios under the 'Exchange' product. The 'Exchange-MovelP' scenario is selected and highlighted in blue. The 'Properties' pane on the right is open, showing the 'Scenario Properties' tab with a table of properties and values. Below the Properties pane, the 'Events' pane is visible, showing a list of events with columns for ID, Sequence, Severity, Host/Scenario, and Time.

Property	Value
General	
Replication	
Event Notification	
Report Handling	

ID	Sequence	Severity	Host/Scenario	Time
SR00096	1785	Significant	192.168.1.13	5/2/2012 10:51:49 PM
SR00202	1784	Significant	192.168.1.12	5/2/2012 10:51:21 PM
IM00405	1783	Info	Exchange-MovelP	5/2/2012 10:51:20 PM
SR00120	1781	Significant	192.168.1.12	5/2/2012 10:51:19 PM
IR00119	1780	Info	192.168.1.12	5/2/2012 10:51:19 PM
IR00119	1779	Info	192.168.1.12	5/2/2012 10:50:55 PM

Settings on the Root Directories tab

Do the following:

1. Select a Master Server from the Scenario Pane. Double-click its Directories folder to add or remove Master Root Directories. Select or clear checkboxes next to folders, as desired, to include or exclude them. You may also edit directory names.
2. Select a Replica Server from the Scenario Pane. For each Master Root directory, you must specify a Replica Root directory. Double-click the Directories folder for the Replica server. Select or clear checkboxes next to folders, as desired, to hold the corresponding Master directory.

Settings on the Properties Tab

Scenario Properties

These settings establish default behavior for the entire scenario.

- General properties -- cannot be changed once created
- Replication properties -- select the replication mode (Online or Scheduled), synchronization values (File or Block, Ignore Files of Same Size/Type) and optional settings (Replicate NTFS Compress Attribute, Replicate NTFS ACL, Synchronize Windows Shares, Prevent Automatic Re-sync upon Error)
- Event notification properties -- specify a script to run, select email notification, or write to event log.
- Report Handling -- specify report settings, email distribution or script execution

Master and Replica Properties

These settings establish server properties on both Master and Replica. Some settings vary by server type.

- Host connection properties -- Enter the IP address, Port number and Fully Qualified Name of the Master and Replica.
- Replication properties -- These properties differ for Master and Replica. See the *Arcserve RHA Administration Guide* for more information.
- Spool properties -- Set the size, minimum disk free size and directory path. See [Spool Directory Settings](#) (see page 77) for more information.
- Event notification properties -- specify a script to run, select email notification, or write to event log.
- Report properties -- select synchronization or replication reports, specify distribution or script execution.
- (Replica) Scheduled Tasks -- set or suspend tasks, including Replica Integrity Testing for Assured Recovery. For more details, see the *Arcserve RHA Administration Guide*.
- (Replica) Recovery properties -- set delay, data rewind properties, or scheduled task for replica.


Settings on the HA Properties Tab

These settings control how switchover and switchback are performed.

- Switchover properties -- select automatic or manual switchover, provide switchover hostname, and reverse replication settings.
- Hosts properties -- specify the Master and Replica Fully Qualified Name.
- Network Traffic Redirection properties -- select Move IP, Redirect DNS, Switch Computer Name or User-defined scripts.
- Is Alive properties -- set the heartbeat frequency and check method.
- DB Management properties (does not apply to File Server scenarios) -- instructs Arcserve RHA to manage shares or services on a database server.
- Action upon Success properties -- defines custom scripts and arguments for use.

Stop a Scenario

To stop a scenario

1. From the Scenario pane, select the scenario you want to stop.
2. To stop the scenario, click the Stop  button on the Standard toolbar.

A confirmation message appears prompting you to approve the scenario stopping.

3. Click Yes in the confirmation message. The scenario stops.

After stopping the scenario, the Manager no longer shows the green play symbol to the left of the scenario, the scenario state turns to Stopped by user and the Statistics tab is no longer available on the Framework pane.

View a Report

Arcserve RHA can generate reports on the replication and synchronization processes. These reports can be stored on your desired location, opened for view from the Report Center, sent by email to a specified address, or they can trigger script execution.

The default storage directory of the generated reports is:
[ProgramFilesFolder]\CA\ArcserveRHA\Manager\reports

To view reports

Note: Though an Exchange report is shown for illustrative purposes, the steps and screens are similar regardless of the type of scenario.

1. To view reports, locate the Tools menu, click Reports, and then select Show Scenario Reports.

The Report Center opens in a new window.

Updated: Tuesday, December 22, 2009 6:39:30 AM

Available Reports per Scenario							
Scenarios							
Scenario Name	Synchronization	Difference	Replication	Assessment Mode	Assured Recovery	Total Reports	
Exchange 1	1	0	0	0	0	1	

Reports							
Drag a column header here to group by that column							
Host	Changes	Date	Time	Type	Summary	Detailed	Size (bytes)

The Report Center consists of two tables:

- The upper table - Available Reports per Scenario - contains a list of all scenarios that have reports, with the type and number of available reports for each scenario.
 - The lower table - Reports - contains a list of all the reports that are available for the scenario selected in the upper table.
2. To view a specific report, select from the Available Reports per Scenario table the scenario that this report represents. Then, from the Reports table below, click the report you want to open.

Drag a column header here to group by that column							
Host	Changes	Date	Time	Type	Summary	Detailed	Size (bytes)
XOR\MEXCH-017-1	Unknown	Today	03:29:37	Assured Recovery			811
XOR\MEXCH-017-1	Changes found	12/07/08	22:29:48	Synchronization			28415

Note: Depending on your settings, for Synchronization and Replication reports a Detailed report can be generated in addition to the Summary report. Both reports represent the same process, but the Detailed report also provides a list of the files that participated in the process.

The report you selected appears in a new window.

SYNCHRONIZATION REPORT	
Synchronization mode	BlockSynchronization (include files with the same size and modification time)
Scenario	Exchange 1
Master host	192.168.50.2(1)
Replica host	192.168.50.12(2)
Scenario start time	12/22/2009 06:37:52
Report start time	12/22/2009 06:38:07
Report finish time	12/22/2009 06:39:15

EVENT	BYTES	TIME STAMP	FILE NAME
-------	-------	------------	-----------

Use Scenario Groups

Each scenario is assigned to a default scenario group called **Scenarios**. You can use this group for all scenarios you create, or you can add new groups to organize your scenarios according to your own criteria. Scenario groups are displayed on both the Manager and the Overview Page.

In distributed server environments, in which several servers (database server, application server, web front end server) comprise the environment, you must create individual scenarios to protect all the servers in the deployment. If an Is Alive check triggers a failover, only the affected server is failed over to its Replica. The resulting data split, where some operations are applied to original Master servers and other operations are applied to the Replica in the failed scenario, can introduce performance issues.

Scenario groups let you manage related scenarios, such as those protecting all servers in a distributed environment, as a single entity. For example, for end-to-end protection in a distributed server environment, you may have a SQL scenario to protect the database component, and several application-specific scenarios to protect application servers. A scenario group lets you set switchover properties at the group level, instead of at individual server levels.

For more information, see the topic, [Enable Scenario Group Management](#), and the [Operation Guide](#) for the specific distributed server application.

Note: For SharePoint Server farms, scenario group creation is handled automatically. For other distributed server environments (BlackBerry Enterprise Server, Microsoft Dynamics CRM), you must manually create groups and scenarios.

Next Steps:

- [Create a Scenario Group](#) (see page 57)
- [Enable Scenario Group Management](#)
- [Run a Scenario Group](#) (see page 57)
- [Stop a Scenario Group](#) (see page 58)


Create a Scenario Group

There are two ways to create a scenario group:

- During the creation of a new scenario, through the Scenario Creation Wizard.
- Before the scenario creation, through the **New Group** option, as described below.

Note: We recommend planning and creating the scenario groups you want to use in advance. After you assign a scenario to a certain group, you cannot move it to another group.

To create a new scenario group

1. From the Manager, click Scenario, New Group from the menu, or click the New group  button on the Standard toolbar.

A New group folder is added to the Scenario pane.

2. You can change the group's name by right-clicking it and selecting Rename from the pop-up menu, or by double-clicking the current name and entering a new name.

The new group name appears on the following places: the Scenario pane, the Group drop-down list in the Scenario Creation Wizard, and the Overview Page.

Note: When no scenario is defined, empty scenario groups do not appear on the Overview Page.

Run a Scenario Group

Before you can run a scenario group, Arcserve RHA performs a pre-run verification of each scenario in the group and reports any errors or warnings. Each scenario in the group must pass verification for the group to run.

To avoid SQL Server connection errors, make sure the Master and Replica servers use the same port, or make sure the SQL Server service is running as a local system, which sets SPN properly.

For more information, see Running the Replication Process.

To run a scenario group

1. When pre-run verification is successful, click Run Now to run the whole group.

The Run dialog opens.

2. Choose a synchronization method and click OK. By default, the synchronization method for the group is set to use the method selected for each individual scenario within it. Or, you may apply a method to all scenarios.

The status for all scenarios in the group changes to Running.

Stop a Scenario Group

You must stop a group that is currently running if you want to add or remove scenarios. To stop a group, you must stop all scenarios in that group. Click Stop on the Manager toolbar for each scenario in sequence. There is no failure recorded by stopping scenarios.

For more information, see Stop Replication.

Chapter 5: Switching Over and Switching Back

Switchover and *Switchback* is the process in which active and passive roles are exchanged between the Master and Replica servers, so that if the Master is currently active, it changes to passive after Switchover passes the active role to the Replica. If the Replica is active, it changes to passive after Switchover passes the active role to the Master. Switchover can be triggered at the push of a button or automatically by Arcserve RHA when it detects that the Master is unavailable, if you enabled the Perform Switchover Automatically option from the Switchover and Reverse Initiation dialog. When this option is Off, the system notifies you that the Master server is down so you can manually initiate switchover from the Arcserve RHA Manager.

This section contains the following topics:

[How Switchover and Switchback Work](#) (see page 59)

[Initiate Switchover](#) (see page 61)

[Initiate Switchback](#) (see page 62)

[Switchover Considerations](#) (see page 65)

How Switchover and Switchback Work

After the HA scenario starts running and the synchronization process is completed, the Replica checks the Master on a regular basis, by default every 30 seconds, to see if it is alive. The following types of monitoring checks are available:

- Ping--a request sent to the Master to verify that the Master is up and responding
- Database check--a request that verifies the appropriate services are running and all databases are mounted
- User-defined check--a custom request you can tailor to monitor specific applications

If an error occurs with any part of the set, the entire check is considered to have failed. If all checks fail throughout a configured timeout period (by default, 5 minutes), the Master server is considered to be down. Then, depending on the HA scenario configuration, Arcserve RHA sends you an alert or automatically initiates a switchover.

When you created an HA scenario, you defined how you want the switchover to be initiated.

- If you selected the Initiate Switchover manually option from the Switchover and Reverse Replication Initiation page, perform a manual switchover. For more information, refer to the topic, [Initiate Switchover](#) (see page 61).
- If you selected the Initiate Switchover automatically option, you can still perform a manual switchover, even if the Master is alive. You can initiate switchover when you want to test your system, or you want to use the Replica server to continue the application service while some form of maintenance is performed on the Master server. Triggered (automatic) switchover is in all ways identical to manual switchover performed by the administrator, except it is triggered by a resource failure on the master server rather than by an administrator manually initiating the switchover by clicking the Perform Switchover button. The timeout parameters are configurable and are more extensively covered in the *Arcserve RHA Administration Guide*.

When you created an HA scenario, you defined how you want the reverse scenario to be initiated.

- If you selected the Initiate Reverse Replication automatically option from the Switchover and Reverse Replication Initiation page, replication in the reverse direction (from Replica to Master) automatically begins after a switchover has finished successfully.
- If you selected the Initiate Reverse Replication manually option, you must resynchronize data from Replica to Master, even after testing a clean switchover without a Master failure.

When the Reverse Replication feature is off, to start reverse replication after a switchover has occurred, click the Run button. The benefit to this feature is, if both the master and replica servers were online and connected during switchover, resynchronization in the reverse direction is not required. Resynchronization involves comparing the data on the master and replica servers to determine which changes to transfer before real-time replication starts; this can take some time. If automatic reverse replication is turned on, and both servers were online during switchover, replication is reversed without the need for resynchronization. This is the one situation in which resynchronization is not required.

Initiate Switchover

Once triggered, whether manually or automatically, the switchover process itself is fully automated.

Note: Though the following steps show Exchange scenario screens as examples, the procedure is similar for all server types.

To initiate manual switchover

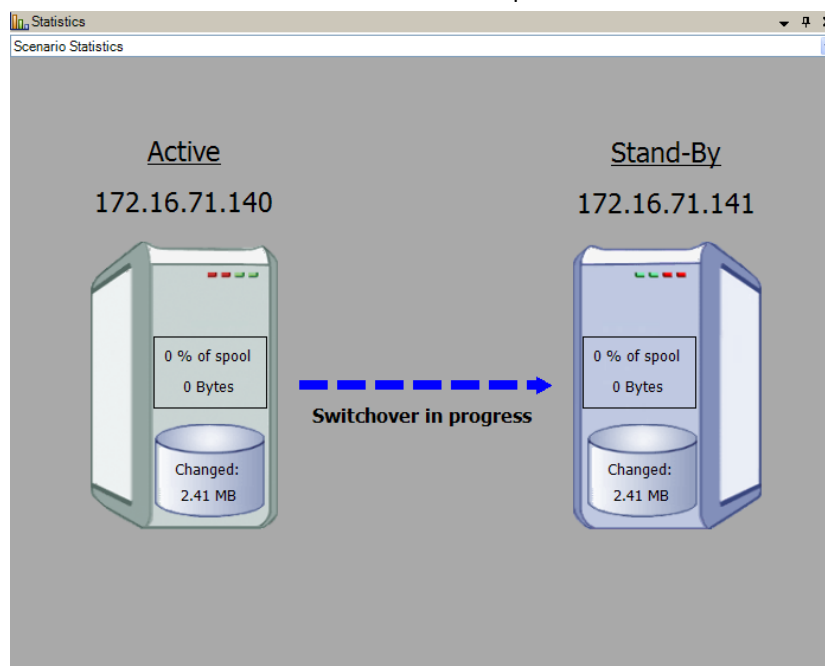
1. Open the Manager and select the desired scenario from the Scenario pane. Ensure that it is running.

2. Click Perform Switchover.

A confirmation message appears.

3. Click OK.

A switchover from the Master server to the Replica server is initiated.



Detailed information about the switchover processes is displayed in the Events pane during switchover.

After the switchover is completed the scenario stops.

HA Scenarios				
Scenario	State	Product	Server	Mode
MS Exchange HA	Stopped on Aut...	HA	Exchange	Online
Hosts				
172.16.71.140	Changed	Synchronized	Files	In spool
172.16.71.141				

Note: The only case in which the scenario may continue to run after switchover is when you have selected Start automatically for Automatic Reverse Replication.

In the Event pane a message appears, informing you that switchover completed and the scenario has stopped.

Now, the Master becomes the stand-by server and the Replica becomes active server.

Initiate Switchback

After a switchover is initiated, whether manually or automatically, at some point, you will want to reverse the server roles and make the original Master the active server and the Replica the standby server. Before you switch back the roles between servers, decide if you want the data on the original Replica server to overwrite the data on the original Master. If yes, you must first perform a reverse scenario, called a backward scenario.

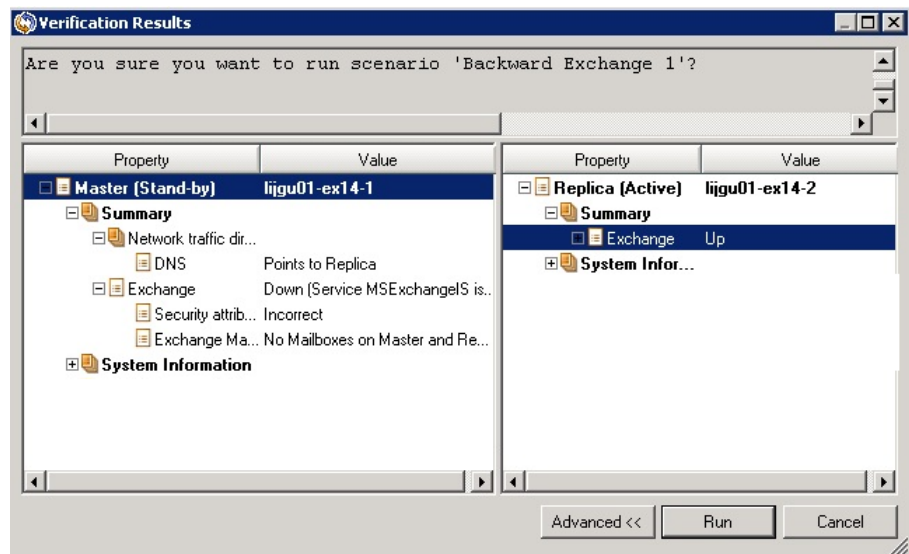
Note: The following steps are the same regardless of server type.

To initiate manual switchback

1. Ensure that both Master and Replica servers are available on the network and that the Engine is running.
2. Open the Manager and select the desired scenario from the Scenario pane.

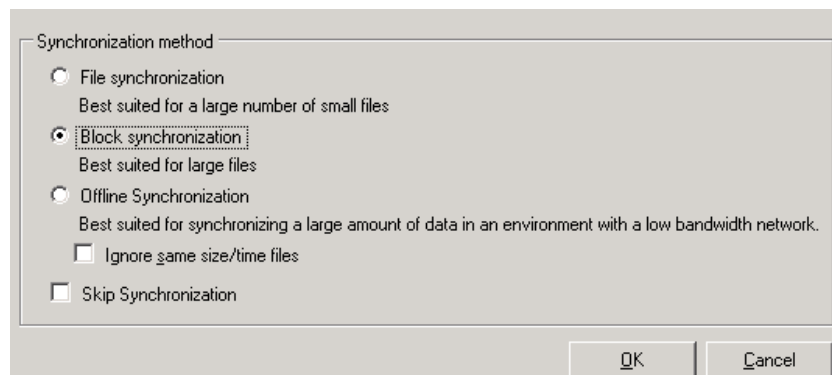
3. Perform one of the following:
 - If the scenario is already running, skip directly to Step 4
 - If the scenario is not running, perform these steps and then go to Step 4:
 - a. Click Run on the toolbar to start the scenario.

Arcserve RHA detects that a switchover has occurred and verifies its state and configuration. After verification completes, the Verification Results dialog appears, listing existing errors and warnings if detected, and prompting you to approve the running of the backward scenario. If desired, click the Advanced button to open an additional pane with detailed information about the hosts that participate in the scenario.

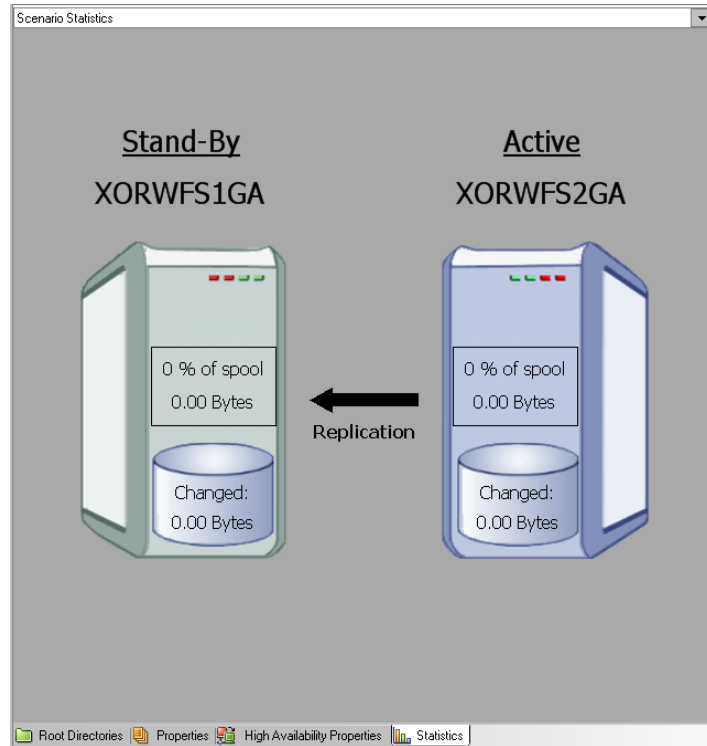


- b. Select a synchronization method from the Run dialog and click OK to start resynchronization.

Note: See the *Arcserve RHA Administration Guide* for more information on Synchronization Methods.



After resynchronization completes, you receive a message in the Event pane: All modifications during synchronization period are replicated. Now, replication from the active server to the standby server begins.



Note: You are now ready to reverse the roles between the Master and Replica servers.

4. Click Perform Switchover on the toolbar while the scenario is running to reverse the server roles. A confirmation message appears.
5. Click Yes to clear the message and start the switchback process.

After the switchback is completed, the server roles are reversed back and the scenario automatically stops.

Note: The scenario will continue to run after the switchback when the Reverse Replication Initiation option is defined as Start Automatically.

You may now run the scenario again in its original (forward) state.

Switchover Considerations

To prevent overwriting data, the best practice is to set *either* the Switchover or the Reverse Replication Initiation property to Automatic. If a server fails while both properties are set to Automatic, Arcserve RHA triggers Switchover without administrative involvement and could start Reverse Replication before you have investigated the cause of the failure. During Reverse Replication, Arcserve RHA overwrites data on your production server.

If a crash or outage occurs during switchover, you may need to perform the Recover Active Server procedure.

When you perform a switchover, BES servers are sent stop and start controls to facilitate BES switchover alongside SQL server switchover. Detailed information about switchover processes is located in the Event Pane during the switchover.

During a switchover/switchback, when both servers are connected, Arcserve RHA ensures that SRP key conflicts do not occur. However, if you switch over when the master is unavailable, the Master BES services may continue running. In most cases, they are stopped because they are set for manual start up mode. Before bringing the master server back on the network, double-check to ensure all BES services are stopped to prevent SRP key conflicts. BES services can run on only one BES server (master or replica) at a time for a SRP key conflict will occur. For more information, see [SRP Connection Errors](#) (see page 78).

Chapter 6: Recovering Data

This section contains the following topics:

[The Data Recovery Process](#) (see page 67)

[Setting Bookmarks](#) (see page 68)

[Data Rewind](#) (see page 69)

[Recover Active Server](#) (see page 71)

[Recovering Servers](#) (see page 72)

The Data Recovery Process

When an event causes loss of Master data, the data can be restored from any Replica. The recovery process is a synchronization process in the reverse direction - from a Replica to the Master.

Arcserve RHA enables you to recover data in two ways:

- **Recover lost data from the Replica to the Master** -- this option is a synchronization process in the reverse direction and requires you to stop the scenario. (This option is not recommended for Oracle, SQL or Exchange scenarios.)
- **Recover lost data from a certain event or point in time (Data Rewind)** -- This option uses a process of stamped checkpoints and user-defined bookmarks to roll corrupt data on the Master back to a time before corruption occurred.

Important! You must stop replication to initiate recovery.

Setting Bookmarks

A *bookmark* is a checkpoint that is manually set to mark a state back to which you can revert. We recommend setting a bookmark just before any activity that can cause data to become unstable. Bookmarks are set in real-time, and not for past events.

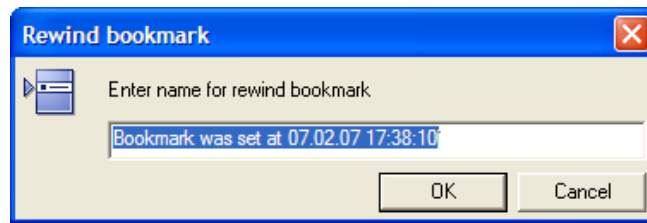
Notes:

- You can use this option only if you set the Recovery--Data Rewind option to *On* (default setting is *Off*).
- You cannot set bookmarks during the synchronization process.
- You can insert manual bookmarks for Full System HA scenarios.

To set a bookmark

1. Select the Replica host on the Scenario pane from which you want to rewind data when the required scenario is running.
2. Select the Set Rewind Bookmark option on the Tools menu.

The Rewind Bookmark dialog opens.



The text that appears in the Rewind Bookmark dialog appears in the Rewind Points Selection dialog as the bookmark's name. The default name includes date and time.

3. Accept the default name, or enter a new name for the bookmark, and click OK.

Note: It is recommended that you provide a meaningful name that will later help you recognize the required bookmark.

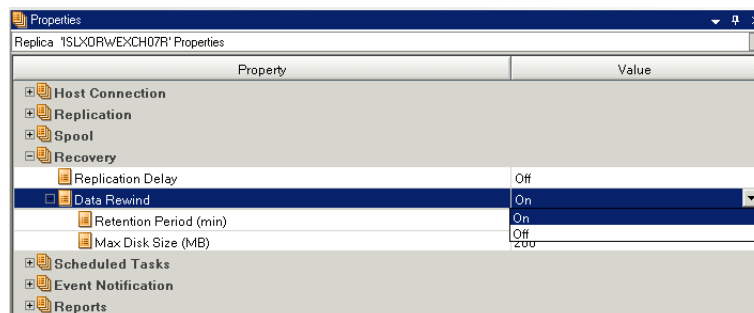
The bookmark is set.

Note: In some scenarios, such as Full System HA, applying journal changes is suspended until the bookmark is created and then resumed.

Data Rewind

The Data Rewind recovery method allows you to rewind data to a point in time before it was corrupted. The rewind process takes place on the Replica server before the reverse synchronization process starts. The Data Rewind method uses rewind points or bookmarks that enable you to reset the current data back to a previous state.

You can use this option only if you set the Recovery - Data Rewind option to *On*.



If this option is set to *Off*, the system will not register data rewind points. For more information about Data Rewind parameters (Retention Period, Max Disk Size), see the *Arcserve RHA Administration Guide*.

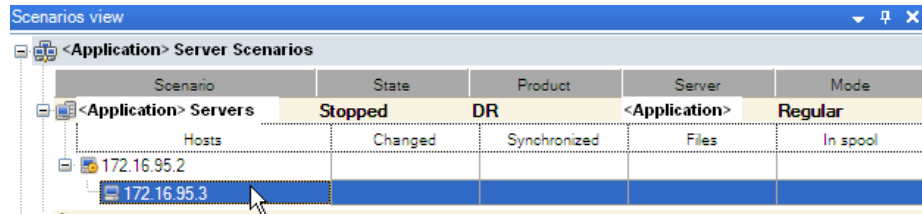
Important! The data rewind process operates in one way only - there is no replay forward. After rewind, all data subsequent to the rewind point will be lost, since data after the rewind point will be overwritten with new data.


Note: The automatic registration of the rewind points starts only after the synchronization process is completed, and the message All modifications during synchronization period are replicated appears on the Event pane. Similarly, you cannot manually set bookmarks during synchronization. In the following example, a File Server scenario is used, but the steps are the same for all scenario types.

To recover lost data using rewind points

1. Select the scenario that you want to stop from the Scenario pane on the Manager and stop it.
2. [For database applications only] Stop the database services on the Master host.
3. Select the Replica host from the scenario folder:

Note: If multiple Replica servers participate in the required scenario, select the Replica from which you want to recover data.



4. Select Restore Data from the Tools menu or click the Restore Data  button. If you are prompted for user credentials, enter the appropriate information and click OK.

The Recovery Method page of the Restore Data Wizard opens.

5. Select one of the Rewind data options, depending on whether you want the rewind data synchronized back to the Master (option 2) or left on the Replica only (option 3).

Notes:

- If the user credentials you used to log in to the Manager are different than the ones required for working with the Engine on the Replica, a User credentials dialog appears, asking you to enter log on account details for the selected Replica.
- The Include Registry Keys synchronization check box is enabled only if you activated this option before starting the scenario. If the check box is enabled, you can select it to include the synchronized Registry Keys in the recovery process.

After you select a Rewind data option, a Recovery scenario is automatically created. This Recovery scenario will run until the end of the rewind process.

6. Click Next.

The Rewind Point Selection page is displayed.

7. Wait until the Select Rewind Point button is enabled, and click it to view the existing rewind points.

The Select Rewind Point dialog opens.

The Select Rewind Point dialog displays a list of all rewind points appropriate to the application you are protecting. These include modifications of folders and files that were automatically registered by the system and user-defined bookmarks.

The list can be filtered according to the rewind point type or other criteria, using the Filter Rewind Points pane on the left.

8. Select the required rewind point and click OK.

Note: If you want to use a Bookmark as the rewind point, it is best practice to select the closest rewind point that indicates an actual event.

You return to the Rewind Point Selection page, which now displays information about the rewind point you selected.

9. Click Next.

The Synchronization Method page is displayed.

10. Select the Block Synchronization method and click Finish.

Note: If the user credentials you used to log in to the Manager are different than the ones required for working with the Engine on the Replica, a User credentials dialog appears, asking you to enter log on account details for the selected Replica.

Arcserve RHA rewinds the data to the point you selected. After the rewind process ends, you receive the following message in the Event pane: Rewind process is completed successfully.

If you chose to replace the data on the Master with the data on the Replica, Arcserve RHA starts a synchronization process from the Replica to the Master. Once the process ends, the temporary Recovery scenario is stopped and then deleted.

By default, once a data recovery occurs a Synchronization Report is generated. The Replication process can restart on the original scenario.

Recover Active Server

In certain circumstances, it may be necessary to forcibly make the Master or Replica server the active server without completing the data synchronization process. For example, if switchover occurred but no data was changed on the Replica server. In this case you may even have newer data on the Master server making it undesirable to synchronize data from the Replica to the Master server. Arcserve RHA allows for this option through a process called Recover Active Server.

To use the Recover Active Server option, stop the scenario, and then select *Recover Active Server* from the Tools menu.

Important! While this option is the right choice in many situations, use it with caution. If used improperly data loss can occur. Normally, Arcserve RHA will not allow switchover from one host to another until all data is synchronized. It is designed this way so users are not redirected to an out-of-date data set that then overwrites what may be a more current data set. When using Recover Active Server, Arcserve RHA is forcing users to one server or the other with no regard as to which server has the correct data set. Thus, as an administrator, you must manually ensure that the server you are making active has the most up to date data set.

If Recover Active Server does not solve the problem, you can manually recover a server. For more information, see [Recovering Servers](#) (see page 72).

Select either *Make Master Active* or *Make Replica Active*, depending onto which server you want to force the active role.

Important! If a legitimate switchover occurs in a disaster situation and users are redirected to the Replica server for any period of time, it is important to replicate all changes on the Replica back to the Master before making the Master server active. Using *Recover Active Server* in such a situation results in loss of data.

Recovering Servers

Arcserve RHA can detect when a Replica server is active and run the recovery process automatically. If recovery does not complete correctly for some reason, do the following:

- Perform the Recover Active Server procedure. For more information, see [Recover Active Server](#) (see page 71).
- If the Recover Active Server procedure does not resolve the issue, try one or more of the following manual tasks appropriate to the redirection method you use:
 - If IP Redirection is used, manually remove the IP. You cannot use this method for scenarios that do not support Move IP redirection (Hyper-V HA, CS HA). For more information, see [Manually Recover a Failed Server-Move IP Address](#). (see page 73)
 - If Switch Computer Name Redirection is used, manually switch the names. You cannot use this method for scenarios that do not support Switch Computer Name Redirection (Hyper-V HA, Exchange HA, vCenter HA if local Oracle is used). For more information, see [Manually Recover a Failed Server-Switch Computer Name](#) (see page 73).
 - If both IP and Switch Computer Name Redirection methods are used, manually remove the IP and switch the computer names. You cannot use this method for scenarios that do not support Move IP and Switch Computer Name redirection (Exchange, CS HA). For more information, refer to the topic, [Manually Recover a Failed Server-IP and Switch Computer Name](#) (see page 75).

Manually Recover a Failed Server-Move IP Address

If IP Redirection is used, you must remove the IP address manually. You cannot use this method for scenarios that do not support Move IP redirection (Hyper-V HA, CS HA).

To recover a failed server using Move IP Address redirection method

1. Boot the Master server without a network connection, to avoid IP conflicts.
2. From the TCP/IP properties dialog, remove the additional IP address.
3. Reboot the server and reconnect to the network.
4. If it is not already running, start the scenario from the Manager. If automatic reverse replication was set to On, the scenario runs in backward mode so that the Replica server is now active and the Master server is on standby.
5. Wait for synchronization to complete.
6. Perform a manual switchover to return the active role to the Master server. It is recommended that you do so outside of normal business hours.

Manually Recover a Failed Server-Switch Computer Name

If Switch Computer Name Redirection is used, you must switch the names manually. You cannot use this method for scenarios that do not support Switch Computer Name Redirection (Hyper-V HA, Exchange HA, vCenter HA if local Oracle is used).

To manually recover a failed server using the Switch Computer Name redirection method

1. Boot the Master server without a network connection, to avoid duplicate network names.
2. Rename the server to <NewServerName>-RHA and move it to a temporary workgroup.

For example, if the server is "Server1", rename it to "Server1-RHA". You will be required to reboot this computer. After the reboot completes, the following error appears: "At least one Service could not be started." Ignore this, it is normal under these circumstances because the Arcserve RHA Engine usually runs in a domain account.

3. Connect to the network.
4. Rejoin the domain, make sure that you use the -RHA name assigned in step 2.
5. Reboot the computer.
6. If it is not already running, start the scenario from the Manager. (If automatic reverse replication was set to On, the scenario runs in backward mode so that the Replica server is now active and the Master server is now standby.)
7. Wait for synchronization to complete. Perform a manual switchover to make the Master server active. It is recommended that you do so outside of normal business hours.

Manually Recover Failed Server-IP and Switch Computer Name

If both IP and Switch Computer Name Redirection methods are used, you must remove the IP address and switch the computer names manually. You cannot use this method for scenarios that do not support Move IP Address and Switch Computer Name redirection (Exchange, CS HA).

To manually recover a failed server using both IP and Switch Computer Name redirection methods

1. Repair any hardware problems that could have caused the switchover, if any.
2. Reboot the server without a network connection to prevent IP conflicts.
3. From the TCP/IP properties dialog, remove the additional IP address.
4. From the System Properties, Computer Name dialog, change the Computer Name to <ServerName>-RHA. For example, if your server is called Server 3, rename it to Server 3-RHA.
5. Assign the server to a temporary workgroup.
6. Restart the computer to enable your changes to take effect. When rebooting completes, reconnect to the network now. Ignore the message, "At least one service failed during system startup." This is normal because the Engine runs in a domain, which is not currently available.
7. Rejoin the domain, making sure you use the -RHA name, and reboot again.
8. The reverse scenario begins and the Replica server assumes the active role. Wait while synchronization completes.
9. Perform a manual switchover by clicking the Perform Switchover button from the toolbar, to return the active role to the Master server.

Appendix A: Additional Information and Tips

This section contains the following topics:

[Spool Directory Settings](#) (see page 77)

[SRP Connection Errors](#) (see page 78)

[Independent BlackBerry SQL Instance](#) (see page 78)

[Troubleshooting BES Scenarios](#) (see page 79)

[Troubleshooting BBHA Script](#) (see page 80)

Spool Directory Settings

The Arcserve RHA spool is a folder on disk where data to be replicated is backed up (spooled) if bandwidth is not sufficient to transfer the amount of changes in real-time. Data can spool due to temporary network disconnections, network congestion, or simply because the network bandwidth is not sufficient to transfer the amount of data changing over on the server. In addition to storing changes waiting on available bandwidth, spool space is also used as part of the normal synchronization process. Thus, some spool build up during synchronization is normal.

Place the spool folder on a drive with relatively low use such as a dedicated volume or boot/system volume. Do not place the spool folder on a volume containing frequently accessed system (OS), user, or application data. Examples include volumes containing databases, shared files, or the system pagefile. By default, the spool folder is located in the tmp folder under the Arcserve RHA installation directory. The spool parameters, located in the properties tab (on both master and replica) or set with the New Scenario Wizard, determines how much disk space is available for the spool. In most cases the default values are sufficient. However, if you change this value, it should be at least 10% of the total dataset size. For example, if you are replicating 50 GB of data on a server you should ensure that at least 5 GB of space is available for spool.

Important! If you change the spool location, remember to remove the new path from file level antivirus scans: both scheduled and real time.

Note: The Spool Directory is not a pre-allocated space folder and will be used only if needed.

SRP Connection Errors

An SRP connection error occurs if at any point both the master and replica BES servers are connected to RIM's server with services running. In this case, RIM generates an SRP key conflict and disables your SRP Key.

When a conflict occurs, despite proper connectivity, the Windows event log reports repeated SRP connection errors. Contact RIM technical support to resolve this conflict. Let them know you were in the process of moving BES servers and accidentally brought both online simultaneously; ask them to re-enable your SRP key. There is no need to mention Arcserve RHA since it is out of the scope of a RIM support call. The conflict is on RIM's side and is not something you can fix directly.

Independent BlackBerry SQL Instance

Arcserve RHA supports the independent transfer of a single instance (on a multi-instance or multi-function SQL server) to a Replica server. This section is directed to administrators using a shared SQL server to host the BES configuration data, and wish to protect only the BES portion via Arcserve RHA. Performing these steps ensures that only the independent instance is switched over while other instances remain working on the Master server.

Implement the Solution

1. Confirm that the SQL servers and additional instances comply with all the specifications described in The BlackBerry HA Solution.
2. Set up an additional DNS Host (A) Record for the Master SQL server. This DNS record is used for all BES HA purposes related to the SQL database. It should have a unique name and must be a host (A) record type; CNAME alias records are not supported.
3. Ensure you use the additional record just created in BlackBerry Server Setup, not the hostname for all SQL configuration settings in BES and ODBC.
4. When you configure the scenario, make sure you select only the desired instance that contains the BES Configuration database.
5. From the Switchover dialog, enter the additional DNS Record as the Master Fully Qualified Name. This is the record that is redirected during switchover.

Troubleshooting BES Scenarios

BlackBerry MDS Connection Service fails to stay started

Upon switchover where the Replica server becomes active, all services should start normally without errors. If you observe the MDS Connection Service start and then stop, make sure you have performed the additional configuration steps required to specify script operations on the host servers. For more information, refer to the topic, [Configure the BlackBerry HA Server](#). (see page 43)

BlackBerry Manager shows two servers, with some services unavailable

Verify that you used the same Master hostname when you installed BES software on the Replica server. When you install the BES software on the Replica server, you cannot use the Replica's hostname or both servers are listed in the Manager.

Example

Suppose the following names are assigned:

- Master: BBS
- Replica: BBS-DR

When you install BES software on the Replica server, assign the Master hostname (BBS), not the Replica hostname. This ensures no conflicts occur after switchover.

Troubleshooting BBHA Script

The BBHA script has a log that contains the commands sent to the script and if those commands resulted in success or error. The following exit codes and error descriptions can also be found in the Bbha.vbs script, at the top of the file.

1 Invalid argument passed to Cscript.exe. This often is an issue with the quotation marks.

0 Successful

-1 One or more host pairs are identical

-2 Missing or improper argument usage

-3 Unable to bind to WMI provider or connect to local host

-4 Unable to bind to WMI provider or connect to DNS server in domain

-5 Unable to bind to WMI provider or connect to remote host

-6 DNS pointed at replica but services started on master

-7 DNS pointed at master but services started on replica

-8 Blackberry service error, switchover is necessary

-9 A service failed to stop on one of the hosts

-10 The DNS HOst A record for the Master does not point to either the Master or Replica servers

-11 Unable to connect to any DNS server to determine network traffic direction

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