



## CHAPTER 3

# Installing Cisco Broadband Access Center on Solaris

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This chapter explains the procedure for a successful installation of Cisco Broadband Access Center (Cisco BAC) on Solaris.

## Preinstallation Tasks

Before you begin to install Cisco BAC on Solaris, you need to perform the following set of tasks:

- Check the database configuration, for details see [Database Requirements, page 2-3](#).
- [Create groups and users. Assign users to the groups.](#)
- [Assign privileges to users using the command:](#)

## Users and Groups

The Cisco BAC root user can create the users and groups, and assign the appropriate privileges to the users.

A non-root user should be assigned with the following privileges to run Cisco BAC:

- file\_chown
- file\_link\_any
- file\_owner
- net\_privaddr
- proc\_exec
- proc\_fork
- proc\_info
- proc\_owner
- proc\_session
- proc\_setid
- net\_access

**Note**

The Cisco BAC non-root user can run any process associated with socket connection, only if the `net_access` privilege are provided to the non-root user. The `net_access` privileges are available only in Solaris 10 (update 9 and 10) platform.

Following are the preinstallation procedures that a root user should perform:

**Step 1** Create groups and users. Assign users to the groups.

**Note**

You must have system administrator privileges to create groups and users and assign users to groups.

If you are installing each of the Cisco BAC components in different servers, then you must create groups and users in all the different servers.

To create a group, run the following command.

```
groupadd -g 1110 baceng
```

where `-g` is the argument for representing group ID. This creates a group named `1110 baceng`.

To create a user, run the following command:

```
useradd -u 102 -g 1110 -d /home/user -m -s /bin/sh -c "Test User" user
```

where `-u` is the argument for representing user ID, `-g` is the group ID, `-d` is the directory location.

**Step 2** Assign privileges to users using the command:

```
usermod -K
defaultpriv=file_chown,file_link_any,file_owner,net_privaddr,proc_exec,proc_fork,proc_info,proc_owner,proc_session,proc_setid user
```

**Step 3** Set password for the user using the command:

```
passwd <user_name>
New Password:
Re-enter new Password:
passwd: password successfully changed for user
```

where, `<user_name>` is the name of the root or non-root user.

To configure RBAC feature of Solaris, see *System Administration Guide: Security Services for configuring RBAC* in <http://download.oracle.com/docs/cd/E19082-01/819-3321/rbactask-30/index.html>

**Note**




During installation, it may be necessary to install several Solaris patches on your computer. Should patch installation become necessary, see the Sun Microsystems support site to download these patches. For a list of recommended patches, see [Operating System Requirements, page 1-2](#).

## Installation Checklist


This section explains the procedures you must follow to install Cisco BAC on a Solaris operating system.

Before you install Cisco BAC, ensure that you are ready by reviewing the checklist that [Table 3-1](#) describes.

**Table 3-1** *Installation Checklist*

Task	Checkoff
1. Verify if your system meets the minimum system hardware and software requirements described in <a href="#">Chapter 1, “Overview.”</a>	<input type="checkbox"/>
2. Ensure that you have access to the computers on which you intend to install Cisco BAC components.	<input type="checkbox"/>
3. Save your license file on the system from which you intend to launch the Cisco BAC administrator user interface via a web browser. You need a valid service license file to configure Cisco BAC licensing.	<input type="checkbox"/>
4. Determine the home directory ( <i>BPR_HOME</i> ) in which you want to install the Cisco BAC component or components. The default directory is <i>/opt/CSCObac</i> . Ensure that the target installation directory has enough disk space.	<input type="checkbox"/>
 <p><b>Note</b> We recommend that you have at least 1 GB of disk space available in <i>BPR_HOME</i> otherwise launching the Admin UI might result in some errors.</p>	
5. For the RDU, determine where you want to install the data directory ( <i>BPR_DATA</i> ) and the database logs ( <i>BPR_DBLOG</i> ). The default directory is <i>/var/CSCObac</i> . Ensure that the target installation directory has enough disk space.	<input type="checkbox"/>
 <p><b>Note</b> The RDU database directory must be empty or manually cleaned up before proceeding with the installation. For the DPE, a warning message is displayed. If you click OK, the database directory is deleted.</p>	
 <p><b>Note</b> We recommend that you locate the data directory on a different physical disk than the home directory; for example, <i>/var/disk0/CSCObac</i>. The disk should have at least 1 GB and up to 30 GB of free space. The installation program, by default, installs the data directory, the database transaction logs directory, and the logs directory in the same location. We recommend that you locate the database transaction logs directory on the fastest disk on the system. Also, ensure that 1 GB of disk space is available.</p>	
6. Verify that you have minimum 500 MB of free space available in the <i>/tmp</i> directory for successful installation.	<input type="checkbox"/>
7. For the RDU, determine the listening port number. The RDU uses this interface to communicate with other Cisco BAC components, such as DPEs and Cisco Network Registrar extension points. The default port is 49187.	<input type="checkbox"/>
8. For the RDU, determine the shared secret password that Cisco BAC servers on your network use as a token to authenticate communication with one another. The shared secret password should be the same for all Cisco BAC servers on your network.	<input type="checkbox"/>

**Table 3-1** *Installation Checklist (continued)*

Task	Checkoff
<p>9. For the RDU, determine the ports through which you will access the administrator user interface using HTTP or HTTP over SSL (HTTPS). The default ports are:</p> <ul style="list-style-type: none"> <li>• 8100 for HTTP</li> <li>• 8443 for HTTPS</li> </ul>	<input type="checkbox"/>
10. For the DPE, ensure that 2 GB of disk space is available in the data directory.	<input type="checkbox"/>
11. Ensure that Cisco Network Registrar 7.2 is installed and running on the servers on which you are installing Cisco BAC extensions.	<input type="checkbox"/>
<p> <b>Note</b> To enable IPv6 support in Cisco BAC, you must install version 7.2 of Cisco Network Registrar.</p>	
12. For the Cisco Network Registrar extensions, determine the name of the provisioning group to which the Cisco Network Registrar server belongs.	<input type="checkbox"/>
13. For the Cisco Network Registrar extensions, determine where you want to install the data directory ( <i>BPR_DATA</i> ). The default directory is <i>/var/CSCObac</i> .	<input type="checkbox"/>
14. Run the command	<input type="checkbox"/>
15. Verify that you have the necessary Cisco Network Registrar configuration files. For an example of these configuration files, see <a href="#">Appendix A, “Cisco Network Registrar Extension Point Configuration.”</a>	<input type="checkbox"/>
16. Verify that you have the necessary KDC servers available.	<input type="checkbox"/>
<p>17. Enable your machine to support IPv6.</p> <p>To enable IPv6, log in as <i>root</i>, and run:</p> <pre># ifconfig <i>intf</i> inet6 plumb up # /usr/lib/inet/in.ndpd # touch /etc/hostname6.<i>intf</i></pre> <p>where <i>intf</i> identifies the interface on which you want to enable IPv6.</p>	<input type="checkbox"/>

## Installing Cisco BAC

This section describes how to work with the installation program and the initial installation steps. The initial steps in the Cisco BAC installation program are identical regardless of the component you are installing.



### Note

The procedure of running Cisco BAC as a non-root user is similar to that of a root user. The non-root user should have appropriate permissions to run the product. For list of permissions, see [Preinstallation Tasks, page 3-1](#)

To install Cisco BAC:

- 
- Step 1** Log in to the intended Cisco BAC host as *root*.
- Step 2** At the Solaris system prompt, change directory to your CD-ROM drive or other installation media.

Ensure that the **gzip** and **gtar** utilities are available on your system to decompress and unpack the Cisco BAC installation file, and:

- a. Change to the directory in which you will decompress and extract the installation file.
- b. Decompress the file with the `.tar.gz` extension. Enter:

```
gunzip -d BAC_42_SolarisK9.tar.gz
```

- c. Unpack the file with the `.tar` extension that `gunzip` decompressed. Enter:

```
gtar -xvf BAC_42_SolarisK9.tar
```

The utility creates the `BAC_42_SolarisK9` directory into which the installation program is extracted.



**Note** If the program displays a checksum error while unpacking, specify the path to the GNU tar on your machine.

**Step 3** After the installation program is extracted, you can choose to install the components.

- [Installing Components in Interactive Mode, page 3-5](#)
- [Installing Components in Noninteractive Mode, page 3-22](#)

## Installing Components in Interactive Mode

This section explains the procedures that you follow to install one or more Cisco BAC components interactively from the command line.

If you have not enabled IPv6 on your machine, a message similar to the following appears during installation:

```
Warning: IPv6 is not enabled on this system.
```

You can choose to [Enable your machine to support IPv6](#). later



**Note** Before you begin any of these procedures, you must complete the initial procedure described in [Installation Checklist, page 3-2](#).

This section provides instructions on installing components in interactive mode:

- [Installing the RDU in Interactive Mode, page 3-6](#)
- [Installing a DPE in Interactive Mode, page 3-11](#)
- [Installing Cisco Network Registrar Extensions in Interactive Mode, page 3-13](#)
- [Installing the KDC in Interactive Mode, page 3-19](#)

## Installing the RDU in Interactive Mode

Install the RDU on a server running Solaris 10 that meets the requirements described in [Operating System Requirements, page 1-2](#). You should install the RDU on a high-end system that is the most reliable server in your network.


**Note**

We recommend that you configure the RDU server to use a static IP address.

To install the RDU, complete the initial installation described in [Installation Checklist, page 3-2](#). Then:

**Step 1** To start the installation program in interactive mode, enter:

```
# <install-path>/BAC_42_SolarisK9/install_bac_solaris.sh
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears as:

```
Processing package instance <CSCObac> from </opt/BAC42/BAC_42_Solaris/CSCObac.pkg>
```

```
Cisco BAC product(sparc) 4.2
```

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

```
The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

```
The non-root user can run the product, provided the user has the following
privileges:
```

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

```
In order to allow the non-root user or non-root users who belong to a specific
group to run Cisco BAC, specify the name of the non-root user and the
group in the "User and Group" prompt that appears next.
```

```
Else, to run as root user, specify the name as "root" and group as "root" in
the "User and Group" prompt that appears next.
```

**Step 2** Press **Enter** to continue.

The program prompts you to add user name and user group name.

```
----- User and Group -----
```

```
Enter the name of the user [?,q] user
```

```
Enter the name of the group [?,q] baceng
```

**Step 3** Specify the user name and group name to run Cisco BAC.


**Note**

If you want to run BAC as a root user, enter the user and user group as root.

**Step 4** Press **Enter** to continue.

In case IPv6 is not enabled in the system, a warning message is displayed. You can either enable IPv6 and continue with the installation, or just continue with the installation without enabling IPv6.

**Step 5** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 6** Enter **y** and press **Enter** at the RDU prompt.

To skip installing a DPE, Cisco Network Registrar extension points, and the KDC, enter **n** and press **Enter**. You can choose to install these components later.

For example:

```

----- Installation Components -----

Regional Distribution Unit (RDU) (y/n)? [n] y
Device Provisioning Engine (DPE) (y/n)? [n] n
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n] n

```

**Step 7** Confirm the components that you want to install; enter **y** and press **Enter**.

The program prompts you to confirm the components that you want to install.

```

----- Confirmation -----

Install RDU: y
Install DPE: n
Install KDC: n
Install CNR_EP: n

Is this correct (y/n/q)? [y] y

```

**Step 8** Enter **y** and press **Enter** to continue.

Cisco BAC performs lease query requests by binding to the IP addresses and ports that are described in [Table 3-2](#).

**Table 3-2 Lease Query Address for Binding**

Protocol	IP Address	Port
IPv4	Wildcard <sup>1</sup>	67
IPv6	Wildcard	547

1. The wildcard is a special local IP address. It usually means “any” and can only be used for bind operations.

If the installation program detects that either of these ports is being used by another process, it recommends that you use the dynamic ports that the operating system selects.

For example:

```

DHCPv4/DHCPv6 lease query port(s) (Udp/67 and Udp/547) is in use.
Configuring the RDU to use a dynamic port for DHCPv4/DHCPv6 lease query.

```

If port 67 and port 547 are available on the RDU, the installation program displays the home directory prompt.

**Step 9** To accept the default directory, `/opt/CSCObac`, press **Enter**; or enter a different directory.

For example:

```

----- Home Directory -----

Home Directory [/opt/CSCObac]

```

A confirmation prompt appears.

**Step 10** To confirm the home directory location, enter **y** and press **Enter**.

The program prompts you to enter the data directory location.

**Step 11** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter a different directory.

For example:

```
----- Data Directory -----
DB Data Directory [/var/CSCObac] /var/disk0/CSCObac
```

A confirmation prompt appears.

**Step 12** To confirm the data directory location, enter **y** and press **Enter**.

The database log directory prompt appears.

**Step 13** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.

For example:

```
----- DB Log Directory -----
DB Logs Directory [/var/CSCObac] /var/disk1/CSCObac
```

A confirmation prompt appears.

**Step 14** To confirm the directory, enter **y** and press **Enter** to continue.

The program prompts you to enter the information related to the RDU, specifically the IP address and the listening port.

While the installation program obtains the IP address of the RDU automatically, you must enter a value for the listening port. The listening port is the port number that the RDU uses to communicate with other Cisco BAC components, such as DPEs and Cisco Network Registrar extension points.

**Step 15** To accept the default port number, 49187, press **Enter**; or enter another port number.




---

**Caution** If you change the default listening port value, ensure that the new value does not conflict with any existing port assignments. Also, ensure that you configure all DPEs with the correct RDU port number. For details on configuring the DPE, see the *Cisco Broadband Access Center DPE CLI Reference*, 4.2.

---

For example:

```
----- RDU information -----

Enter the listening port of Regional Distribution Unit (RDU).

RDU Listening Port [49187]
```

**Step 16** Confirm the listening port number; enter **y** and press **Enter** to continue.

The program prompts you to enter the shared secret password.

**Step 17** Enter the shared secret password that you want to use for authentication among Cisco BAC servers, and confirm the password.





**Note** You must use the same shared secret password for the RDU, all DPEs, and Cisco Network Registrar extension points in your network.

For example:

```
Enter the password to be used for authentication between BAC servers.
```

```
Enter the shared secret password [] changeme
```

```
Enter the shared secret password again [] changeme
```

**Step 18** Press **Enter** to continue.

The program displays the parameters you have selected to install the RDU.

**Step 19** Enter **y** and press **Enter** to confirm the installation parameters.

For example:

```
----- Confirmation -----  
Home directory: /opt/CSCObac  
DB Data directory: /var/disk0/CSCObac  
DB Log directory: /var/disk1/CSCObac  
RDU Port: 49187
```

The program prompts you to enter the HTTP port for the administrator user interface.

**Step 20** To accept the default port, 8100, press **Enter**; or enter another port number.

For example:

```
Please enter Admin UI http port [8100]
```

**Step 21** Confirm the HTTP port; enter **y** and press **Enter**.

For example:

```
----- Admin UI Information -----

Please enter Admin UI HTTP port [8100]

----- Confirmation -----
Admin UI HTTP port: 8100

Is this correct (y/n/q)? [y] y
```

The program prompts you to enter the HTTPS port for the user interface.

**Step 22** To accept the default port, 8443, press **Enter**; or enter another port number.

For example:

```
Please enter Admin UI HTTPS port [8443]
```

**Step 23** Confirm the HTTPS port; enter **y** and press **Enter**.

The program displays the parameters you have selected to install the administrator user interface.

**Step 24** Enter **y** and press **Enter**.

For example:

```
----- Confirmation -----
Admin UI information
Installation directory: /opt/CSCObac/rdu
HTTP Port: 8100
HTTPS Port: 8443

Is this correct (y/n/q)? [y] y
```

The program prompts you to continue with the installation.

**Step 25** Enter **y** and press **Enter**.

For example:

```
This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

After successful installation, the following message appears:

```
Installation of <CSCObac> was successful.
```

---

## Installing a DPE in Interactive Mode

Install the DPE on a server running Solaris 10 that meets the requirements described in [Operating System Requirements, page 1-2](#).



### Note

We recommend that you configure the DPE server to use a static IP address.

During DPE installation, if the program detects a TFTP server or a ToD server running on the same server as the DPE, the installation displays an error message and quits. To kill the TFTP or ToD server, carry out the steps that the error message lists.

To install the DPE, complete the initial installation described in [Installation Checklist, page 3-2](#). Then:

**Step 1** To start the installation program in interactive mode, enter:

```
# <install-path>/BAC_42_SolarisK9/install_bac_solaris.sh
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

```
Processing package instance <CSCObac> from </opt/BAC42/BAC_42_Solaris/CSCObac.pkg>
```

```
Cisco BAC product(sparc) 4.2
```

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

```
The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

```
The non-root user can run the product, provided the user has the following
privileges:
```

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

```
In order to allow the non-root user or non-root users who belong to a specific
group to run Cisco BAC, specify the name of the non-root user and the
group in the "User and Group" prompt that appears next.
```

```
Else, to run as root user, specify the name as "root" and group as "root" in
the "User and Group" prompt that appears next.
```

**Step 2** Press **Enter** to continue.

The program prompts you to add user name and user group name.

```
----- User and Group -----
```

```
Enter the name of the user [?,q] user
```

```
Enter the name of the group [?,q] baceng
```

**Step 3** Specify the user name and group name to run Cisco BAC.

**Step 4** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 5** Enter **y** and press **Enter** at the DPE prompt.

To skip installing the RDU, Cisco Network Registrar extension points, and the KDC, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----

Regional Distribution Unit (RDU) (y/n)? [n] n
Device Provisioning Engine (DPE) (y/n)? [n] y
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n] n
```

**Step 6** Confirm the components that you want to install; enter **y** and press **Enter**.

The program prompts you to confirm the components that you want to install.

```
----- Confirmation -----

Install RDU: n
Install DPE: y
Install KDC: n
Install CNR_EP: n

Is this correct (y/n/q)? [y] y
```

**Step 7** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 8** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory -----

Home Directory [/opt/CSCObac]
```

**Step 9** Confirm the directory location; enter **y** and press **Enter**.

The data directory prompt appears.

**Step 10** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Data Directory -----

DB Data Directory [/var/CSCObac]
```



**Note** A message is displayed in case the directory is not empty.

**Step 11** Confirm the directory location; enter **y** and press **Enter**.

The program prompts you to enter the shared secret password.

**Step 12** Enter the shared secret password that you want to use for authentication between the Cisco BAC servers.



**Note** You must use the same shared secret password for the RDU, all DPEs, and Cisco Network Registrar extension points in your network.

For example:

```
----- DPE information -----
```

```
Enter the password to be used for authentication between BAC servers.
```

```
Enter the shared secret password [] <changme>
```

```
Enter the shared secret password again [] <changme>
```

**Step 13** Reenter the password for confirmation, and press **Enter**.

The program prompts you to confirm the installation.

**Step 14** Enter **y** and press **Enter**.



**Note** If you choose not to proceed, the following message appears and the installation quits:

```
Installation of <CSCObac> was terminated due to user request.
No changes were made to the system.
```

The program begins the installation process. After successful installation, the following message appears:

```
Installation of <CSCObac> was successful.
```



**Note** After you install the DPE, you must configure the DPE with the RDU. For details, see [Setting Up a Device Provisioning Engine, page 6-1](#).

## Installing Cisco Network Registrar Extensions in Interactive Mode

Install Cisco BAC extensions on all Cisco Network Registrar servers in your Cisco BAC environment. If you are deploying Cisco BAC in a failover environment, you also must install the extensions on the failover servers. After you install extensions, you must configure them. This section explains how to install, configure, and validate these extensions.



**Note** We recommend that you configure the Cisco Network Registrar server to use a static IP address.

Before you install Cisco Network Registrar extensions, complete the initial installation described in [Installation Checklist, page 3-2](#). Ensure that Cisco Network Registrar is installed and running. To install Cisco Registrar Network, see [Installation Guide for Cisco Network Registrar, Release 7.2](#).

**Step 1** To start the installation program in interactive mode, enter:

```
# <install-path>/BAC_42_SolarisK9/install_bac_solaris.sh
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

```
Processing package instance <CSCObac> from </opt/BAC42/BAC_42_Solaris/CSCObac.pkg>
```

```
Cisco BAC product(sparc) 4.2
```

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

```
The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

```
The non-root user can run the product, provided the user has the following
privileges:
```

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

```
In order to allow the non-root user or non-root users who belong to a specific
group to run Cisco BAC, specify the name of the non-root user and the
group in the "User and Group" prompt that appears next.
```

```
Else, to run as root user, specify the name as "root" and group as "root" in
the "User and Group" prompt that appears next.
```

**Step 2** Press **Enter** to continue.

This program prompts you to add user name and user group name.

```
----- User and Group -----
Enter the name of the user [?,q] user
Enter the name of the group [?,q] baceng
```

**Step 3** Specify the user name and group name to run Cisco BAC.

**Step 4** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 5** Enter **y** and press **Enter** at the Cisco Network Registrar Extension Points prompt.

To skip installing the RDU, a DPE, and the KDC, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----
Regional Distribution Unit (RDU) (y/n)? [n] n
Device Provisioning Engine (DPE) (y/n)? [n] n
Cisco Network Registrar extension points (y/n)? [n] y
Key Distribution Center (KDC) (y/n)? [n] n
```



**Note** The installation program validates your Cisco Network Registrar installation. You must install Cisco Network Registrar 7.2 on your server. If the required version is not installed, the installation process terminates, and you must upgrade to the required Cisco Network Registrar version before proceeding.

**Step 6** Confirm the components that you want to install; enter **y** and press **Enter**.

The program prompts you to confirm the components that you want to install.

```
----- Confirmation -----
Install RDU: n
Install DPE: n
Install KDC: n
Install CNR_EP: y

Is this correct (y/n/q)? [y] y
```

**Step 7** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 8** To accept the default directory, `/opt/CSCObac`, press **Enter**; or enter another directory.

For example:

```
----- Home Directory -----

Home Directory [/opt/CSCObac]
```

The program then prompts you to confirm the directory.

**Step 9** Press **y** and **Enter** to continue.

The data directory prompt appears.

**Step 10** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.



**Note** The installation program, by default, installs the data directory (`BPR_DATA`) on a different directory than the home directory (`BPR_HOME`). We recommend that the data directory be on a different physical disk than the home directory; for example, `/var/disk0/CSCObac`.

For example:

```
----- Data Directory -----

DB Data Directory [/var/CSCObac] /var/disk0/CSCObac
```

**Step 11** To confirm the directory, enter **y** and press **Enter**.

The program prompts you to enter information on the RDU required to install the extensions.

**Step 12** Enter the IP address (or hostname) and the listening port of the host on which you have installed the RDU. To accept the default information, press **Enter**; or enter alternative information.

For example:

```
----- CNR EP Info -----

Enter RDU IP Address or Hostname [bachost-rdu.example.com]
Enter RDU Listening Port [49187]
```

You are then prompted to enter the name of the extension point provisioning group.

**Step 13** Enter the name of the Cisco Network Registrar extension point group.

For example:

```
Enter the Cisco Network Registrar extension point provisioning group.
This a required field. The value you specify must contain only alphanumeric
characters without spaces. You can use the BAC command-line tool to
change this value after you complete this installation.
```

```
Enter Extension Point Provisioning Group [] group1
```

The program then asks you if you intend to provision PacketCable or voice technology devices.

**Step 14** Enter **y** and press **Enter** if you are using PacketCable devices; press **Enter** if you are not.

For example:

```
Are you going to use devices that support PacketCable voice technology? [n]
```

If you enter **n**, omit Step 16 to 18. If you enter **y**, the program prompts you to enter several voice technology properties.

**Step 15** The program prompts you to confirm the installation.

```
----- Confirmation -----
RDU IP Address: 10.10.10.10
RDU IP Port: 49187
Extention Point Provisioning Group: group1
PacketCable: y
```




---

**Note** Ensure you enter numeric values for the RDU port number.

---

**Step 16** Enter details on the KDC realm name, the IP addresses for the primary and secondary DHCP servers, and the primary and secondary DNS servers.

For example:

```
----- PacketCable Configuration -----

Enter KDC realm Name [CISCO.COM]

Enter IP Address for Primary DHCP [10.81.88.9]

Enter IP Address for Primary DNS [10.81.88.9]

Enter IP Address for Secondary DHCP []

Enter IP Address for Secondary DNS []
```

**Step 17** Confirm the information; enter **y** and press **Enter**.

```
----- Confirmation -----
KDC Realms: CISCO.COM
Primary DHCP: 10.81.88.9
Primary DNS: 10.81.88.9
Secondary DHCP:
Secondary DNS:

Is this correct (y/n/q)? [y] y
```



**Step 18** Press **Enter** to continue.

**Step 19** Enter the shared secret password that you want to use for authentication among Cisco BAC servers. You must use the same shared secret password for all Cisco BAC servers on your network.

For example:

```
Enter the password to be used for authentication between BAC servers.

Enter the shared secret password [] <changeme>

Enter the shared secret password again [] <changeme>
```

**Step 20** Press **Enter**.

The program displays the installation parameters you have selected.

**Step 21** Enter **y** and press **Enter** to confirm the parameters, and install the Cisco Network Registrar extensions.

For example:

```
----- Confirmation -----
RDU IP Address: 10.10.10.10
RDU IP Port: 49187
Extention Point Provisioning Group: default
PacketCable: n
```

**Step 22** Press **Enter** to continue.

The program prompts you to confirm the installation.

**Step 23** Enter **y** and press **Enter**.

For example:

```
This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

The installation proceeds, and displays the following message after successful installation:

```
Installation of <CSCObac> was successful.
```

## Configuring Extensions

After you install the Cisco BAC extensions on the Cisco Network Registrar server, you must configure the extensions. The procedure described in this section assumes that:

- The Cisco BAC component is installed in */opt/CSCObac*.
- Cisco Network Registrar is installed in */opt/nwreg2*.
- The Cisco Network Registrar username is **admin** and the password is **changeme**.

To configure extensions:

**Step 1** Log in to the Cisco Network Registrar server, with *root* access.

**Step 2** At the command line, enter:

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme -b <
BAC_HOME/cnr_ep/bin/bpr_cnr_enable_extpts.nrcmd
```

**Step 3** To reload the Cisco Network Registrar server, enter:

```
# /etc/init.d/nwreglocal stop
# /etc/init.d/nwreglocal start
```

Alternatively, to reload the DHCP server alone, enter:

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme "dhcp reload"
```



**Note**

Before you can use the Cisco Network Registrar server, you must configure client classes, scope-selection tags, policies, and scopes. In an IPv6 environment, you must configure links and prefixes as well. See the [User Guide for Cisco Network Registrar 7.2](#) for details.

## Validating Extensions

To validate the extensions installed on the Cisco Network Registrar server, from the Cisco Network Registrar Command Line Tool (**nrcmd**), run:



**Note**

Depending on whether you installed a local or regional cluster, the **nrcmd** tool is located in:

- Local—`/opt/nwreg2/local/usrbin`
- Regional—`/opt/nwreg2/regional/usrbin`

```
nrcmd> extension list
100 Ok
dextropras:
  entry = dextropras
  file = libdextension.so
  init-args =
  init-entry =
  lang = Dex
  name = dextropras
preClientLookup:
  entry = bprClientLookup
  file = libprextensions.so
  init-args = BPR_HOME=/opt/CSCObac, BPR_DATA=/var/CSCObac
  init-entry = bprInit
  lang = Dex
  name = preClientLookup
prePacketEncode:
  entry = bprExecuteExtension
  file = libprextensions.so
  init-args =
  init-entry = initExtPoint
  lang = Dex
  name = prePacketEncode

nrcmd>
```



**Note** The *BPR\_HOME* and *BPR\_DATA* values may be different in your installation.

Also, in the **nrcmd** program, run:

```
nrcmd> dhcp listextensions
100 Ok
post-packet-decode: dexdropras
pre-packet-encode: prePacketEncode
pre-client-lookup: preClientLookup
post-client-lookup:
post-send-packet:
pre-dns-add-forward:
check-lease-acceptable:
post-class-lookup:
lease-state-change:
generate-lease:
environment-destroyer:
pre-packet-decode:
post-packet-encode:

nrcmd>
```

## Installing the KDC in Interactive Mode

You must install the KDC only when configuring a system to support voice technology operations.

Install the KDC on a Solaris 10 server that meets the requirements described in [Operating System Requirements, page 1-2](#). For performance reasons, you should install the KDC on a separate server.

To install the KDC, complete the initial installation described in [Installation Checklist, page 3-2](#). Then:

**Step 1** To start the installation program in interactive mode, enter:

```
# <install-path>/BAC_42_SolarisK9/install_bac_solaris.sh
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

```
Processing package instance <CSCObac> from </opt/BAC42/BAC_42_Solaris/CSCObac.pkg>
```

```
Cisco BAC product(sparc) 4.2
```

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

```
The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

```
The non-root user can run the product, provided the user has the following
privileges:
```

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

```
In order to allow the non-root user or non-root users who belong to a specific
group to run Cisco BAC, specify the name of the non-root user and the
```

group in the "User and Group" prompt that appears next.

Else, to run as root user, specify the name as "root" and group as "root" in the "User and Group" prompt that appears next.

**Step 2** Press **Enter** to continue.

The program prompts you to add user name and user group name.

```
----- User and Group -----
Enter the name of the user [?,q] user

Enter the name of the group [?,q] baceng
```

**Step 3** Specify the user name and group name to run Cisco BAC.

**Step 4** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 5** Enter **y** and press **Enter** at the KDC prompt.

To skip installing the RDU, a DPE, and the Cisco Network Registrar extension points, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----

Regional Distribution Unit (RDU) (y/n)? [n] n
Device Provisioning Engine (DPE) (y/n)? [n] n
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n] y
```

**Step 6** Confirm the components that you want to install; enter **y** and press **Enter**.

The program prompts you to confirm the components that you want to install.

```
----- Confirmation -----
Install RDU: n
Install DPE: n
Install KDC: y
Install CNR_EP: n

Is this correct (y/n/q)? [y] y
```

**Step 7** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 8** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory -----

Home Directory [/opt/CSCObac]
```

A confirmation prompt appears.

**Step 9** Enter **y** and press **Enter**.

The data directory prompt appears.

- Step 10** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.  
For example:

```
----- Data Directory -----
DB Data Directory [/var/CSCObac]
```

- Step 11** To confirm, enter `y` and press **Enter**.  
The KDC Configuration prompt appears.
- Step 12** Enter the KDC interface address, the fully qualified domain name (FQDN), and the Kerberos realm name. The realm name should be consistent with the realm you give to the DPEs that belong to this provisioning group.  
For example:




---

**Note** The warning in this example appears if there is more than one interface on your system.

---

```
----- KDC Configuration -----

Key Distribution Center (KDC) Realm Name
Enter the Kerberos realm name for the KDC:
The realm name should be consistent with the realm you give to DPEs in this
provisioning group.

KDC Interface Address [10.10.10.22]:
KDC FQDN [bachost.example.com]:
KDC Realm [EXAMPLE.COM]:
```

- Step 13** To confirm your entry and continue, enter `y` and press **Enter**.  
The program prompts you to enter a password to generate the KDC service key.
- Step 14** For each DPE, enter a password from 6 to 20 characters. The KDC service key mentioned here is one that you must generate on the DPE and the KDC to enable communication between the two components. To generate this service key, the password that you enter for the KDC must match the one that you enter for the corresponding DPE; otherwise, the DPE does not function.  
For example:

```
Enter Password to generate Service-Key [] <changeme>

Enter Password to generate Service-Key again [] <changeme>
```



- 
- Note** To generate the service key on the:
- DPE, use the **service packetcable / registration kdc-service-key** command from the DPE CLI. For details, see the *Cisco Broadband Access Center DPE CLI Reference 4.2*.
  - KDC, use the KeyGen tool. For details, see the *Cisco Broadband Access Center Administrator Guide 4.2*.
- 

- Step 15** Press **Enter**.
- Step 16** To confirm and continue, enter `y` and press **Enter**.

The program prompts you to enter the DPE FQDN.

**Step 17** Enter the FQDN of the DPE, and press **Enter**.

For example:

```
Enter your DPE FQDN [] bac-dpe1.example.com
```

**Step 18** Enter **y** and press **Enter** to confirm and continue.

**Step 19** To add another DPE, enter **y** and press **enter**, or enter **n** and press **Enter**. The installation program uses the same voice technology shared key for all DPEs.

The program prompts you to confirm the installation.

**Step 20** Enter **y** and press **Enter**.

For example:

```
This package contains scripts which will be executed with super-user
permission during the process of installing this package.
```

```
Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

The installation proceeds, and displays the following message after successful installation:

```
Installation of <CSCObac> was successful.
```



**Caution**

After installing the KDC, install the licenses and the chain of certificates; otherwise, you cannot launch the KDC.

## Installing Components in Noninteractive Mode

This section explains the procedures that you follow to install one or more Cisco BAC components from the command line in noninteractive mode.

In order to install Cisco BAC in noninteractive mode, you must first generate a response file, in which you store values for installing a component. You then use the response file as input while installing that component. For subsequent installations of the same component, you only need to use a single command, which removes all installation prompts and installs the component using the values contained in the response file.

To install Cisco BAC in noninteractive mode, you must perform two steps, each of which is described in detail in subsequent sections:

1. Generate a response file, using:

```
# pkgask -r response -d <install-path>/BAC_42_SolarisK9/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.

Running this command does not install Cisco BAC on your system; it only generates the response file in which you store values for installation.

Note that there can only be one response file. As a result, you can use the response file only to install the component for which you generate the response file. If you want to install another component, you must generate a response file for that component and install that component using the response file generated for it.

For example, if you generate a response file to install the DPE, and, subsequently, you want to install Cisco Network Registrar extensions, you must generate a response file separately to install Cisco Network Registrar extensions. You cannot use the response file that you generated to install the DPE, to install Cisco Network Registrar extensions.

2. After you generate the response file, start the installation program in noninteractive mode, using:

```
# <BAC_42_Solaris>/install_bac_solaris.sh
```

For subsequent installations of the same component, you only need to execute the **install\_bac\_solaris.sh** script.

If you have not enabled IPv6 on the machine, a warning message similar to the following appears:

```
Warning: IPv6 is not enabled on this system.
```

You can choose to [enable your machine to support IPv6](#). For details about enabling IPv6, see [Enable your machine to support IPv6](#).



#### Note

Before you begin any of the procedures described in this section, complete the initial installation procedure described in [Installation Checklist, page 3-2](#).

The following sections provide instructions on installing components in noninteractive mode:

- [Installing the RDU in Noninteractive Mode, page 3-23](#)
- [Installing a DPE in Noninteractive Mode, page 3-28](#)
- [Installing Cisco Network Registrar Extensions in Noninteractive Mode, page 3-31](#)
- [Installing the KDC in Noninteractive Mode, page 3-35](#)

## Installing the RDU in Noninteractive Mode

Install the RDU on a server running Solaris 10 that meets the requirements described in [Operating System Requirements, page 1-2](#). You should install the RDU on a high-end system that is the most reliable server in your network.



#### Note

We recommend that you configure the RDU server to use a static IP address.

To install the RDU, complete the initial installation described in [Installation Checklist, page 3-2](#). Then complete these procedures:

- [Generating the Response File for the RDU, page 3-23](#)
- [Installing the RDU Using the Response File, page 3-28](#)

## Generating the Response File for the RDU

Use this procedure to generate a response file for RDU installation:

- Step 1** To generate the response file, enter:

```
# pkgask -r response -d <install-path>/BAC_42_SolarisK9/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.



**Note** The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

```
The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

```
The non-root user can run the product, provided the user has the following
privileges:
```

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

```
In order to allow the non-root user or non-root users who belong to a specific
group to run Cisco BAC, specify the name of the non-root user and the
group in the "User and Group" prompt that appears next.
```

```
Else, to run as root user, specify the name as "root" and group as "root" in
the "User and Group" prompt that appears next.
```

**Step 2** Press Enter to continue.

The program prompts you to add user name and user group name.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 3** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 4** Enter **y** and press **Enter** at the RDU prompt.

To skip installing a DPE, Cisco Network Registrar extension points, and the KDC, enter **n** and press **Enter**. You can choose to install these components later.

For example:

```
----- Installation Components -----
Regional Distribution Unit (RDU) (y/n)? [n] y
Device Provisioning Engine (DPE) (y/n)? [n] n
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n] n
```

The program prompts you to confirm the components that you want to install.



**Step 5** Enter **y** and press **Enter** to continue.

Cisco BAC performs lease query requests by binding to the IP addresses and ports that are described in [Table 3-3](#).

**Table 3-3 Lease Query Address for Binding**

Protocol	IP Address	Port
IPv4	Wildcard <sup>1</sup>	67
IPv6	Wildcard	547

1. The wildcard is a special local IP address. It usually means “any” and can only be used for bind operations.

If the installation program detects that either of these ports is being used by another process, it recommends that you use the dynamic ports that the operating system selects.

For example:

```
DHCPv4/DHCPv6 lease query port(s) (Udp/67 and Udp/547) is in use.
Configuring the RDU to use a dynamic port for DHCPv4/DHCPv6 lease query.
```

If port 547 and port 67 are available, the installation program displays the home directory prompt.

**Step 6** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter a different directory.

For example:

```
----- Home Directory -----
Home Directory [/opt/CSCObac]
```

A confirmation prompt appears.

**Step 7** To confirm the home directory location, enter **y** and press **Enter**.

The program prompts you to enter the data directory location.

**Step 8** To accept the default directory, */var/CSCObac*, press **Enter**; or enter a different directory.

For example:

```
----- Data Directory -----
DB Data Directory [/var/CSCObac] /var/disk0/CSCObac
```

A confirmation prompt appears.

**Step 9** To confirm the data directory location, enter **y** and press **Enter**.

The database log directory prompt appears.

**Step 10** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- DB Log Directory -----
DB Logs Directory [/var/CSCObac] /var/disk1/CSCObac
```

A confirmation prompt appears.

**Step 11** To confirm the directory, enter **y** and press **Enter** to continue.

The program prompts you to enter the information related to the RDU, specifically the IP address and the listening port.

While the installation program obtains the IP address of the RDU automatically, you must enter a value for the listening port. The listening port is the port number that the RDU uses to communicate with other Cisco BAC components, such as DPEs and Cisco Network Registrar extension points.

**Step 12** To accept the default port number, 49187, press **Enter**; or enter another port number.




---

**Caution** If you change the default listening port value, ensure that the new value does not conflict with any existing port assignments. Also, ensure that you configure all DPEs with the correct RDU port number. For details on configuring the DPE, see the *Cisco Broadband Access Center DPE CLI Reference*, 4.2.

---

For example:

```
----- RDU information -----
Enter the listening port of Regional Distribution Unit (RDU).

RDU Listening Port [49187]
```

**Step 13** Confirm the listening port number; enter **y** and press **Enter** to continue.

The program prompts you to enter the shared secret password.

**Step 14** Enter the shared secret password that you want to use for authentication among Cisco BAC servers, and confirm the password.




---

**Note** You must use the same shared secret password for the RDU, all DPEs, and Cisco Network Registrar extension points in your network.

---

For example:

```
Enter the password to be used for authentication between BAC servers.

Enter the shared secret password [] <changeme>

Enter the shared secret password again [] <changeme>
```

**Step 15** Press **Enter** to continue.

The program displays the parameters you have selected to install the RDU.

**Step 16** Enter **y** and press **Enter** to confirm the installation parameters.

For example:

```
----- Confirmation -----
Home directory: /opt/CSCObac
DB Data directory: /var/CSCObac
DB Log directory: /var/CSCObac
RDU Port: 49187
```

The program prompts you to enter the HTTP port for the administrator user interface.

- Step 17** To accept the default port, 8100, press **Enter**; or enter another port number.  
For example:

```
----- Admin UI Information -----

Please enter Admin UI HTTP port [8100]
```

- Step 18** Confirm the HTTP port; enter **y** and press **Enter**.  
For example:

```
----- Confirmation -----
Admin UI HTTP port: 8100

Is this correct (y/n/q)? [y]
```

The program prompts you to enter the HTTPS port for the user interface.

- Step 19** To accept the default port, 8443, press **Enter**; or enter another port number.  
For example:

```
Please enter Admin UI HTTPS port [8443]
```

- Step 20** Confirm the HTTPS port; enter **y** and press **Enter**.

The program displays the parameters you have selected to install the administrator user interface.

- Step 21** To confirm the parameters, enter **y** and press **Enter**.  
For example:

```
----- Confirmation -----
Admin UI information
Installation directory: /opt/CSCObac/rdu
HTTP Port: 8100
HTTPS Port: 8443

Is this correct (y/n/q)? [y]
```

- Step 22** To continue, press **Enter**.  
A message appears indicating that a response file has been created.  
For example:

```
Response file </tmp/response> was created.

Processing of request script was successful.
```

---

## Installing the RDU Using the Response File

After you generate the response file for the RDU, you can subsequently install the RDU using the following command:

```
# <BAC_42_Solaris>/install_bac_solaris.sh
CSCObac
```

Once you run the above command, the program installs the RDU. After successful installation, the following message appears:

```
# Linking /etc/rc2.d/S81bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc1.d/K05bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc0.d/K05bprAgent to /etc/init.d/bprAgent
Starting BAC Process Watchdog...
BAC Process Watchdog has started.

Registry update completed

Installation of <CSCObac> was successful.
```

## Installing a DPE in Noninteractive Mode

Install the DPE on a server running Solaris 10 that meets the requirements described in [Operating System Requirements, page 1-2](#).



### Note

We recommend that you configure the DPE server to use a static IP address.

During DPE installation, if the program detects a TFTP server or a ToD server running on the same server as the DPE, the installation displays an error message and quits. To kill the TFTP or ToD server, carry out the steps that the error message lists.

To install the DPE, complete the initial steps described in [Installation Checklist, page 3-2](#). Then complete these procedures:

- [Generating the Response File for the DPE, page 3-28](#)
- [Installing the DPE Using the Response File, page 3-30](#)

## Generating the Response File for the DPE

Use this procedure to generate a response file for DPE installation:

**Step 1** To generate the response file, enter:

```
# pkgask -r response -d <install-path>/BAC_42_SolarisK9/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.



**Note** The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

```
The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

```
The non-root user can run the product, provided the user has the following
privileges:
```

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

```
In order to allow the non-root user or non-root users who belong to a specific
group to run Cisco BAC, specify the name of the non-root user and the
group in the "User and Group" prompt that appears next.
```

```
Else, to run as root user, specify the name as "root" and group as "root" in
the "User and Group" prompt that appears next.
```

**Step 2** Press **Enter** to continue.

The program prompts you to add user name and user group name.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 3** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 4** Enter **y** and press **Enter** at the DPE prompt.

To skip installing the RDU, Cisco Network Registrar extension points, and the KDC, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----
Regional Distribution Unit (RDU) (y/n)? [n] n
Device Provisioning Engine (DPE) (y/n)? [n] y
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n] n
```

The program prompts you to confirm the components that you want to install.

**Step 5** Enter **y** and press **Enter** to continue.

The home directory prompt appears.

**Step 6** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory -----
Home Directory [/opt/CSCObac]
```

**Step 7** Confirm the directory location; enter **y** and press **Enter**.

The data directory prompt appears.

**Step 8** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Data Directory -----
DB Data Directory [/var/CSCObac]
```

**Step 9** Confirm the directory location; enter **y** and press **Enter**.

The program prompts you to enter the shared secret password.

**Step 10** Enter the shared secret password that you want to use for authentication between the Cisco BAC servers. You must use the same shared secret password for the RDU, all DPEs, and Cisco Network Registrar extension points in your network.

For example:

```
Enter the password to be used for authentication between BAC servers.

Enter the shared secret password [] <changeme>

Enter the shared secret password again [] <changeme>
```

**Step 11** Reenter the password for confirmation, and press **Enter**.

A message appears indicating that a response file has been created.

For example:

```
Response file </tmp/response> was created.

Processing of request script was successful.
```

## Installing the DPE Using the Response File

After you generate the response file for the DPE, you can subsequently install DPEs using the following command:

```
# <BAC_42_Solaris>/install_bac_solaris.sh
CSCObac
```

Once you run the above command, the program installs the DPE. After successful installation, the following message appears:

```
# Linking /etc/rc2.d/S81bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc1.d/K05bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc0.d/K05bprAgent to /etc/init.d/bprAgent
Starting BAC Process Watchdog...
BAC Process Watchdog has started.
```

```
Registry update completed
```

```
Installation of <CSCObac> was successful.
```

## Installing Cisco Network Registrar Extensions in Noninteractive Mode

Install Cisco BAC extensions on all Cisco Network Registrar servers in your Cisco BAC environment. If you are deploying Cisco BAC in a failover environment, you also must install the extensions on the failover servers. After you install extensions, you must configure them. This section explains how to install, configure, and validate these extensions.



### Note

We recommend that you configure the Cisco Network Registrar server to use a static IP address.

Before you install Cisco Network Registrar extensions, complete the initial installation described in [Installation Checklist, page 3-2](#). Also, ensure that Cisco Network Registrar is running. Then, complete the procedures described in this section:

- [Generating the Response File for Cisco Network Registrar Extensions, page 3-31](#)
- [Installing Cisco Network Registrar Extensions Using the Response File, page 3-35](#)

## Generating the Response File for Cisco Network Registrar Extensions

Use this procedure to generate a response file to install Cisco Network Registrar extensions:

**Step 1** To generate the response file, enter:

```
# pkgask -r response -d <install-path>/BAC_42_SolarisK9/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.



### Note

The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation program. This installation program installs BAC 4.2 on your system.

The installer for Cisco Broadband Access Center for Cable 4.2 enables non-root user, who has appropriate permission to run the product.

The non-root user can run the product, provided the user has the following privileges:

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

In order to allow the non-root user or non-root users who belong to a specific group to run Cisco BAC, specify the name of the non-root user and the group in the "User and Group" prompt that appears next.

Else, to run as root user, specify the name as "root" and group as "root" in the "User and Group" prompt that appears next.

**Step 2** Press **Enter** to continue.

The program prompts you to add user name and user group name.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 3** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 4** Enter **y** and press **Enter** at the Cisco Network Registrar Extension Points prompt.

To skip installing the RDU, a DPE, and the KDC, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----
Regional Distribution Unit (RDU) (y/n)? [n] n
Device Provisioning Engine (DPE) (y/n)? [n] n
Cisco Network Registrar extension points (y/n)? [n] y
Key Distribution Center (KDC) (y/n)? [n] n
```



**Note** The installation program validates your Cisco Network Registrar installation. You must install Cisco Network Registrar 7.2 on your server. If the required version is not installed, the installation process terminates. You must upgrade to Cisco Network Registrar 7.2, before proceeding.

The program prompts you to confirm the components that you want to install.

**Step 5** Enter **y** and press **Enter** to continue.

The home directory prompt appears.



**Step 6** To accept the default directory, `/opt/CSCObac`, press **Enter**; or enter another directory.

For example:

```
----- Home Directory -----
```

```
Home Directory [/opt/CSCObac]
```

The program then prompts you to confirm the directory.

**Step 7** Press **y** and **Enter** to continue.

The data directory prompt appears.

**Step 8** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.




---

**Note** The installation program, by default, installs the data directory (`BPR_DATA`) on a different directory than the home directory (`BPR_HOME`). We recommend that the data directory be on a different physical disk than the home directory; for example, `/var/disk0/CSCObac`.

---

For example:

```
----- Data Directory -----
```

```
DB Data Directory [/var/CSCObac] /var/disk0/CSCObac
```

**Step 9** To confirm the directory, enter **y** and press **Enter**.

The program prompts you to enter information on the RDU required to install the extensions.

**Step 10** Enter the IP address (or hostname) and the listening port of the host on which you have installed the RDU. To accept the default information, press **Enter**; or enter alternative information.

For example:

```
----- CNR EP Info -----
```

```
Enter RDU IP Address or Hostname [bachost-rdu.example.com]
```

```
Enter RDU Listening Port [49187]
```

You are then prompted to enter the name of the extension point provisioning group.

**Step 11** Enter the name of the Cisco Network Registrar extension point group.

For example:

```
Enter the Cisco Network Registrar extension point provisioning group.
This a required field. The value you specify must contain only alphanumeric
characters without spaces. You can use the BAC command-line tool to
change this value after you complete this installation.
```

```
Enter Extension Point Provisioning Group [] group1
```

The program then asks you if you intend to provision PacketCable or voice technology devices.

**Step 12** Enter **y** and press **Enter** if you are using PacketCable devices; press **Enter** if you are not.

For example:

```
Are you going to use devices that support PacketCable voice technology? [n]
```

If you enter **n**, omit Step 16 till Step 20. If you enter **y**, the program prompts you to enter several voice technology properties.

**Step 13** The program displays the installation parameters you have selected, confirm the information.

For example:

```
----- Confirmation -----
RDU IP Address: 10.10.10.10
RDU IP Port: 49187
Extention Point Provisioning Group: group1
PacketCable: y
```

**Step 14** Press **Enter** to confirm the parameters, and install the Cisco Network Registrar extensions.

**Step 15** Confirm the information; enter **y** and press **Enter**.

**Step 16** Press **Enter** to continue.

**Step 17** Enter details on the KDC realm name, the IP addresses for the primary and secondary DHCP servers, and the primary and secondary DNS servers.

For example:




---

**Note** The warning in this example appears if there is more than one interface on your system.

---

```
----- PacketCable Configuration -----

Enter KDC realm Name [EXAMPLE.COM]

Enter IP Address for Primary DHCP [10.10.10.1]

Enter IP Address for Primary DNS [10.10.10.3]

Enter IP Address for Secondary DHCP [10.10.10.2]

Enter IP Address for Secondary DNS [10.10.10.4]
```

**Step 18** Press **Enter**.

**Step 19** The program displays the PacketCable Configuration parameters you have selected, confirm the information.

**Step 20** Enter **y** and press **Enter**.

**Step 21** Press **Enter** to continue.

**Step 22** Enter the shared secret password that you want to use for authentication among Cisco BAC servers. You must use the same shared secret password for all Cisco BAC servers on your network.

For example:

```
Enter the password to be used for authentication between BAC servers.

Enter the shared secret password [] <changeme>

Enter the shared secret password again [] <changeme>
```

**Step 23** To continue, press **Enter**.

A message appears indicating that a response file has been created.

For example:

```
Response file </tmp/response> was created.

Processing of request script was successful.
```

---

## Installing Cisco Network Registrar Extensions Using the Response File

After you generate the response file for Cisco Network Registrar extensions, you can subsequently install extensions using the following command:

```
# <BAC_42_Solaris>/install_bac_solaris.sh
CSCObac
```

After you run the above command, the program installs Cisco Network Registrar extensions. After successful installation, the following message appears:

```
Starting BAC Process Watchdog...

Installation of <CSCObac> was successful.
```

After you install the extensions, you must configure and validate them. For details, see [Configuring Extensions, page 3-17](#), and [Validating Extensions, page 3-18](#).

## Installing the KDC in Noninteractive Mode

You must install the KDC only when configuring a system to support voice technology operations.

Install the KDC on a Solaris 10 server that meets the requirements described in [Operating System Requirements, page 1-2](#). For performance reasons, you should install the KDC on a separate server.

To install the Key Distribution Center (KDC), complete the initial installation described in [Installation Checklist, page 3-2](#). Then complete the procedures described in this section:

- [Generating the Response File for the KDC, page 3-35](#)
- [Installing the KDC Using the Response File, page 3-38](#)

## Generating the Response File for the KDC

Use this procedure to generate a response file for KDC installation:

**Step 1** To generate the response file, enter:

```
# pkgask -r response -d <install-path>/BAC_42_SolarisK9/CSCObac.pkg CSCObac
```

where *install-path* specifies the complete path to the directory in which the *BAC\_42\_SolarisK9* directory has been created.



**Note** The response file is created in the directory in which you run the **pkgask -r** command. If you want the response file to be generated in a specific location, enter:

```
# pkgask -r response-file-path -d CSCObac.pkg
```

where *response-file-path* specifies the path to the directory in which you want the response file to be generated; for example, */tmp/response*. You can also give the response file any name; for example, *outputFile*.

The installation program verifies that you have installed the required patches to the Solaris operating system. When the verification ends, welcome information appears.

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
```

program. This installation program installs BAC 4.2 on your system.

The installer for Cisco Broadband Access Center for Cable 4.2 enables non-root user, who has appropriate permission to run the product.

The non-root user can run the product, provided the user has the following privileges:

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

In order to allow the non-root user or non-root users who belong to a specific group to run Cisco BAC, specify the name of the non-root user and the group in the "User and Group" prompt that appears next.

Else, to run as root user, specify the name as "root" and group as "root" in the "User and Group" prompt that appears next.

**Step 2** Press **Enter** to continue.

The program prompts you to add user name and user group name.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 3** Press **Enter** to continue.

The installation program prompts you to select one or more components.

**Step 4** Enter **y** and press **Enter** at the KDC prompt.

To skip installing the RDU, a DPE, and the Cisco Network Registrar extension points, enter **n** and press **Enter**.

For example:

```
----- Installation Components -----
Regional Distribution Unit (RDU) (y/n)? [n] n
Device Provisioning Engine (DPE) (y/n)? [n] n
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n] y
```

**Step 5** Confirm the component(s) that you want to install; enter **y** and press **Enter**.

The home directory prompt appears.

**Step 6** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory.

For example:

```
----- Home Directory -----
Home Directory [/opt/CSCObac]
```

A confirmation prompt appears.

**Step 7** Enter **y** and press **Enter**.

The data directory prompt appears.

**Step 8** To accept the default directory, `/var/CSCObac`, press **Enter**; or enter another directory.

For example:

```
----- Data Directory -----
```

```
DB Data Directory [/var/CSCObac]
```

**Step 9** To confirm, enter `y` and press **Enter**.

The KDC Configuration prompt appears.

**Step 10** Enter the KDC interface address, the fully qualified domain name (FQDN), and the Kerberos realm name. The realm name should be consistent with the realm you give to the DPEs that belong to this provisioning group.

For example:




---

**Note** The warning in this example appears if there is more than one interface on your system.

---

```
----- KDC Configuration -----
```

```
Key Distribution Center (KDC) Realm Name
Enter the Kerberos realm name for the KDC:
The realm name should be consistent with the realm you give to DPEs in this
provisioning group.
```

```
KDC Interface Address [10.10.10.22]:
```

```
KDC FQDN [bachost.example.com]:
```

```
KDC Realm [EXAMPLE.COM]:
```

**Step 11** To confirm your entry and continue, enter `y` and press **Enter**.

The program prompts you to enter a password to generate the KDC service key.

**Step 12** For each DPE, enter a password from 6 to 20 characters. The KDC service key mentioned here is one that you must generate on the DPE and the KDC to enable communication between the two components. To generate this service key, the password that you enter for the KDC must match the one that you enter for the corresponding DPE; otherwise, the DPE does not function.

For example:

```
Enter Password to generate Service-Key [] <changeme>
```

```
Enter Password to generate Service-Key again [] <changeme>
```




---

**Note** To generate the service key on the:

---

- DPE, use the **service packetcable / registration kdc-service-key** command from the DPE CLI. For details, see the *Cisco Broadband Access Center DPE CLI Reference 4.2*.
- KDC, use the KeyGen tool. For details, see the *Cisco Broadband Access Center Administrator Guide 4.2*.

**Step 13** Press **Enter**.

**Step 14** To confirm and continue, enter `y` and press **Enter**.

The program prompts you to enter the DPE FQDN.

**Step 15** Enter the FQDN of the DPE.

For example:

```
Enter your DPE FQDN [] bac-dpe1.example.com
```

**Step 16** Press **Enter** to confirm and continue.

**Step 17** To add another DPE, enter **y** and press **enter**, or enter **n** and press **Enter**. The installation program uses the same voice technology shared key for all DPEs.

A message appears indicating that a response file has been created.

For example:

```
Response file </tmp/response> was created.

Processing of request script was successful.
```

## Installing the KDC Using the Response File

After you generate the response file for the KDC, you can subsequently install the KDC using the following command:

```
# <BAC_42_Solaris>/install_bac_solaris.sh
CSCObac
```

After you run the above command, the program installs the KDC. After successful installation, the following message appears:

```
# Linking /etc/rc2.d/S81bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc1.d/K05bprAgent to /etc/init.d/bprAgent
# Linking /etc/rc0.d/K05bprAgent to /etc/init.d/bprAgent
Starting BAC Process Watchdog...
BAC Process Watchdog has started.

Installation of <CSCObac> was successful.
```

## Adding Components

This section describes how you can add one component of Cisco BAC to a system on which other components have already been installed. This situation arises largely in a deployment similar to a lab installation, where, for the purposes of testing, more than one component is installed on a single machine. The definitions file (*bpr\_definitions.sh*) is updated whenever you add new components.



### Note

Before proceeding to add components, ensure that all the components belong to the Cisco BAC 4.2 version.

When the installation program detects the presence of one component on your system, it does not allow you the option of adding that particular component. It prompts you to add or install other components only.

For example, if you have installed a DPE on a system and then rerun the installation program, the program does not give you the option of installing the DPE.

```
Regional Distribution Unit (RDU) (y/n)? [n] n
Cisco Network Registrar extension points (y/n)? [n] n
Key Distribution Center (KDC) (y/n)? [n] n
```

The procedures for adding a component are similar to those for a fresh installation, except that the program does not allow you to add the component that you have already installed.

**Note**

You cannot reinstall a component that you have already installed. If you must carry out a reinstallation, first uninstall that component, and then install it again.

## Upgrading Cisco Broadband Access Center

This section describes how to upgrade a Cisco Broadband Access Center 2.7.1.x, 4.0.1.x, and 4.1.0.x installation to Cisco Broadband Access Center 4.2. See [compatibility matrix](#) to know which earlier versions of Cisco BAC can be upgraded to 4.2.

This Cisco BAC release supports online migration, using which you can migrate one server at a time without disrupting the entire Cisco BAC deployment.

Before upgrading to Cisco BAC 4.2, ensure that you obtain the license file that this release supports. If upgrading from Cisco BAC 2.7.x, after the upgrade is complete, the installation program deletes all existing license keys. You must then install the license file that Cisco BAC 4.2 supports, using the administrator user interface. For details on obtaining and installing the license file, see the *Release Notes for the Cisco Broadband Access Center 4.2*. If upgrading from Cisco BAC 4.x, the licensing is compatible.

You must stop the process watchdog (bprAgent) before upgrading. After the upgrade is complete, Cisco BAC does not restart the process watchdog automatically. You must migrate your existing database first before starting the watchdog.

When upgrading from Cisco BAC 2.7.1.x, 4.0.1.x, or 4.1.0.x to Cisco BAC 4.2, you must enter a new target location for these directories:

- Data (*BPR\_DATA*)
- Database logs (*BPR\_DBLOG*)

**Note**

License is required to upgrade Cisco BAC 2.7.1.x to Cisco BAC 4.2.

The Cisco BAC upgrade procedure requires that you upgrade the components in the sequence recommended in below-mentioned sections. Performing the upgrade in any other sequence results in error during provisioning.

1. [Backing up the RDU Database, page 3-40](#)
2. [Upgrading the RDU, page 3-40](#)
3. [Upgrading the DPE, page 3-58](#)
4. [Upgrading Cisco Network Registrar Extensions, page 3-60](#)
5. [Upgrading the KDC, page 3-63](#)

## Backing up the RDU Database

Before upgrading Cisco BAC components, ensure that you backup the RDU database files. Throttling limits the I/O bandwidth used by the database with backup utility. Throttle option specifies the rate at which the backup tool reads the files it copies. While using this option, if the reading rate is high, the tool goes to sleep mode till the rate comes down.

**Note**

We recommend that you use the throttle option always since it is not an I/O intensive operation. The throttle option is supported in Cisco BAC 2.7.1.6.1, Cisco BAC 2.7.1.9, Cisco BAC 4.1 and Cisco BAC 4.2.

To back up the RDU database, run the **backupDb.sh** script in the `<BPR_HOME>/rdu/bin` directory.

For example:

```
# backupDb.sh /var/backup
```

where `/var/backup` identifies the database backup directory.

In this example, all backup database files are stored in a directory called `/var/backup/rdu-backup-20071116-031028`. The last subdirectory (`rdu-backup-20070316-111028`) is automatically created with a current time stamp.

**Note**

The time-stamped subdirectory format is `rdu-backup-yyyymmdd-HHmms`. In this example, the subdirectory would be `rdu-backup-20071116-031028`, meaning that the directory contains a backup that was started at 3:10:28 a.m. on November 16, 2007.

After taking the backup, you need to recover the database by using the command:

```
# recoverDb.sh /var/backup/rdu-backup-20071116-031028
```

For additional information on using the **backupDb.sh** tool, see the *Cisco Broadband Access Center Administrator Guide 4.2*.

## Upgrading the RDU

Before upgrading the RDU, we recommend that you archive your files in the `<BPR_HOME>/rdu/conf` directory. We also recommend you to archive the MIBS directory.

Upgrading of RDU is possible for the following Cisco BAC versions and platforms:

- [Cisco BAC 2.7.1.x, 4.0.1.x, 4.1.0.x Solaris to Cisco BAC 4.2 Solaris, page 3-40](#)
- [Cisco BAC 2.7.1.x, 4.0.1.x, 4.1.0.x Solaris to Cisco BAC 4.2 Linux, page 4-20](#)

### Cisco BAC 2.7.1.x, 4.0.1.x, 4.1.0.x Solaris to Cisco BAC 4.2 Solaris

Use this procedure to upgrade the earlier versions of the RDU component to Cisco BAC 4.2:

**Note**

You cannot directly upgrade Cisco BAC 2.7.1 to Cisco BAC 4.2. To be able to upgrade Cisco BAC 2.7.1 to Cisco BAC 4.2, you will first need to upgrade to Cisco BAC 2.7.1.2 or higher and then upgrade to Cisco BAC 4.2.



**Step 1** Stop the *bprAgent*.

**Step 2** Backup the following files. Backup is required only if you have customized these files.

- files under `<BAC_HOME>/rdu/conf/`
  - `rdu.properties`
  - `api.properties`
  - Other xml files and dtd files
- the MIB files under `<BAC_HOME>/rdu/mibs/`
- the \*.xml files under `<BAC_HOME>/snmp/conf/`

**Step 3** Back up the existing RDU database, using the **backupDb.sh** tool. For details, see the *Cisco Broadband Access Center Administrator Guide 4.2*.

For example:

```
# /opt/CSCObpr/rdu/bin/backupDb.sh -nosubdir /disk1/backup
```

- **-nosubdir**—Disables the automatic creation of a subdirectory. If you do not use this option, a subdirectory is created and reported to the console.
- `/disk1/backup`—Identifies the location for the database backup files.



**Note** You must stop the *bprAgent* before taking a backup of the database.

Ensure that the database has been backed up by checking the *history.log* file, which resides in the *BPR\_DATA* directory.

**Step 4** Recover the database that you have backed up to a consistent state, using the **recoverDb.sh** tool. For details, see the *Cisco Broadband Access Center Administrator Guide 4.2*.

For example:

```
# /opt/CSCObpr/rdu/bin/recoverDb.sh /disk1/backup
```

where `/disk1/backup` identifies the location of the database backup files.

**Step 5** After recovering the database, verify it by running the command:

For example:

```
# /opt/CSCObpr/rdu/internal/db/bin/verifydb.sh -dbdir /disk1/backup
```



**Note** In case of any error while verifying the database, contact Cisco Support.

**Step 6** Copy the backed-up database to a safe location.

**Step 7** If the operating system (OS) on which the existing Cisco BAC version runs does not meet the requirements for the Cisco BAC 4.2 release, upgrade the OS to Solaris 10.

When upgrading from 2.7.1.x, the installation program prompts you to enter locations for the:

- Home directory (`BPR_HOME`)



**Note** The home directory will be replaced if installation is done on the existing Cisco BAC `BPR_HOME` directory.

- Database directory (BPR\_DATA)



**Note** The DATA directory should be removed manually before the upgrade. Ensure you take the backup of the old database before you remove the DATA directory.

It then upgrades the necessary libraries and property files but leaves your RDU database intact.

**Step 8** Install the Cisco BAC 4.2 version.

For example:

```
# install-path/BAC_42_SolarisK9/install_bac_solaris.sh
```

A message is displayed asking you to confirm if you want to proceed with the upgrade.

```
The installer will upgrade BAC from <2.7.1.x> to 4.2
```

```
During the upgrade, the existing product will be removed and new version
of the product will be installed. Do you want to continue [y/n]? [n]: y
```

**Step 9** To confirm that you want to upgrade, enter **y** and press **Enter**.

Output similar to the following appears. The output has been trimmed for brevity.

```
2.7.1.x is uninstalled
/opt/CSCObac/rdu/sampleUI/bin
/opt/CSCObac/rdu/sampleUI
/opt/CSCObac/rdu/mibs/TOKEN-RING-RMON-MIB
/opt/CSCObac/rdu/mibs/TCOMLABS-MIB
/opt/CSCObac/rdu/mibs/SNMPv2-TC
/opt/CSCObac/rdu/mibs/SNMPv2-SMI
.
.
.
## Executing postremove script.
## Updating system information.
Removal of <CSCObac> was successful

Processing package instance <CSCObac> from
</opt/bacpathcs/BAC_42_SolarisK9/CSCObac.pkg>

Cisco BAC product(sparc) 4.2

Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

**Step 10** Press **Enter** to continue.

The program prompts you to add user name and user group name.

**Step 11** Specify the user name and group name to run Cisco BAC.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 12** Press **Enter** to continue.

The program prompts you to confirm upgrading.

**Step 13** When upgrading from 2.7.1.x, the installation program prompts you to enter locations for the:

- Home directory (*BPR\_HOME*)



**Note** The home directory will be replaced if installation is done on the existing Cisco BAC *BPR\_HOME* directory.

- Database directory (*BPR\_DATA*)



**Note** The DATA directory should be removed manually before the upgrade. Ensure you take the backup of the old database before you remove the DATA directory.

- Database logs directory (*BPR\_DBLOG*)

It then upgrades the necessary libraries and property files but leaves your RDU database intact.

The program prompts you to enter the HTTP port for the administrator user interface.

**Step 14** To accept the default port, 8100, press **Enter**; or enter another port number.

For example:

```
----- Admin UI Information -----
Please enter Admin UI HTTP port [8100]
```

**Step 15** Confirm the HTTP port; enter **y** and press **Enter**.

For example:

```
----- Confirmation -----
Admin UI HTTP port: 8100

Is this correct (y/n/q)? [y]
```

The program prompts you to enter the HTTPS port for the user interface.

**Step 16** To accept the default port, 8443, press **Enter**; or enter another port number.

For example:

```
Please enter Admin UI HTTPS port [8443]
```

**Step 17** Confirm the HTTPS port; enter **y** and press **Enter**.

The program displays the parameters you have selected to install the administrator user interface.

**Step 18** To confirm the parameters, enter **y** and press **Enter**.

For example:

```
----- Confirmation -----
Admin UI information
Installation directory: /opt/CSCObac/rdu
HTTP Port: 8100
HTTPS Port: 8443

Is this correct (y/n/q)? [y]
```

**Step 19** To continue, press **Enter**.

The installation program checks for any conflicts and if found displays the following message:

```
## Checking for conflicts with packages already installed.
The following files are already installed on the system and are being
used by another package:
* /etc/init.d/bprAgent
* - conflict with a file which does not belong to any package.
Do you want to install these conflicting files [y,n,?,q] y
```

**Step 20** Enter **y** and then press **Enter** to continue.

The installation program prompts you about packages that can only be installed by super user.

```
Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

**Step 21** Enter **y** and then press **Enter** to continue.

The installation continues and completes successfully.

```
File installation completed.
Starting BAC Process Watchdog...
BAC Process Watchdog has started.

Registry update completed

Installation of <CSCObac> was successful.
```

**Step 22** To verify if the version information indicates Cisco BAC release 4.2, enter:

```
# pkgparam CSCObac VERSION
```

**Step 23** Manually start the *bprAgent* process to finish the upgrade process.

For example, from the command line, run:

```
# /etc/init.d/bprAgent start
```

**Step 24** After the installation is complete, upgrade the RDU database by following the steps described in , [page 3-65](#).



**Note**

After the migration to Cisco BAC 4.2, if you continue to see the Cisco BAC 2.7.x, 4.0.1.x or 4.1.0.x UI, we recommend that you clear the cache of the browser.

## Migrating the RDU Database

When the product is installed over the previous versions from which the user can migrate to Cisco BAC 4.2, the installer detects that RDU database-migration is needed. The necessary files should be updated along with package database. To migrate the database, you must run the *migrateDb.sh* shell script which is located under *<BPR\_HOME>/migration*.



**Note**

On Solaris, you can either use the standalone migration tool or the migration script that comes with the installation or upgrade of Cisco BAC 4.2.

On Solaris, the RDU database migration script allows you to migrate your RDU database from:

- [Cisco BAC 2.7.1.x Solaris to Cisco BAC 4.2 Solaris, page 3-48](#)
- [Cisco BAC 4.0.1.x, 4.1.0.x Solaris to Cisco BAC 4.2 Solaris, page 3-53](#)

## About Backward Compatibility

You can use the Cisco BAC 4.2 RDU with a migrated database to operate with earlier versions of Solaris DPEs and Cisco Network Registrar servers for gradual online migration.

Migration preserves the device record revision numbers used in DPE synchronization. As a result, DPE repopulation is not triggered after the RDU database upgrade, ensuring the least disruption until you upgrade the specific DPE.



### Note

This Cisco BAC release provides multivendor support via Option 43 and its suboptions. When using this option, ensure that you modify templates used in earlier releases to be compatible with the template grammar that Cisco BAC 4.2 uses.

## Using the migrateDb.sh Tool

Table 3-4 describes the arguments that you can use with the `migrateDb.sh` tool.

**Table 3-4 Arguments for migrateDb.sh Tool for migration from Cisco BAC 2.7.1.x, 4.0.1.x, 4.1.0.x to Cisco BAC 4.2**

Argument	Description	Required	Optional	Default
<code>-dbdir dir</code>	Specifies the location of the database backup that is to be migrated	✓		None
<code>-dblogdir dir</code>	Specifies the location of the database logs that are to be migrated		✓	The directory that the <code>-dbdir</code> option specifies
<code>-targetdbdir dir</code>	Specifies the target location where the migrated database will be placed	✓ (for 2.7.1.x)		None
<code>-targetdblogdir dir</code>	Specifies the target location in which the migrated database transaction log files are stored temporarily during migration	✓ (for 2.7.1.x)		None

**Table 3-4 Arguments for migrateDb.sh Tool for migration from Cisco BAC 2.7.1.x, 4.0.1.x, 4.1.0.x to Cisco BAC 4.2 (continued)**

Argument	Description	Required	Optional	Default
-cachesize <i>value</i>	Specifies, in MB, the size of the memory cache.  This parameter is optional. If you use this parameter, you must not exceed the 100-MB limit, unless you reduce the value of the <b>-Xmx</b> variable in the migrateDb.sh script by double the increase in the cache size. For example, if you set cache size to 200 MB, you must reduce the value of <b>-Xmx</b> thus:  (200-100)*2 = 200 MB		✓	100 MB
-cmtsv <i>value</i>	Specifies the CMTS DOCSIS version that is to be used during service selection. The service is selected based on the minimum version that the CMTS and the cable modem supports. The DOCSIS version that the cable modem supports is determined by the value of the <b>dhcp-client-identifier</b> option. The acceptable values are: <ul style="list-style-type: none"> <li>• 1.0</li> <li>• 1.1</li> <li>• 2.0</li> </ul>		✓	1.1
-help	Specifies usage for the tool		✓	None

You can use a number of arguments, as described in the following section, to specify the Class of Service and DHCP Criteria for promiscuous devices. These arguments are optional, provided the default objects, as specified here, exist in the database. The first phase of migration uses these objects to select the service for the devices granted promiscuous access.

During the second phase of migration, the standard selection process for each device is performed according to the policies found in the RDU database. Any discrepancies are addressed in favor of the configuration found in the database. However, the migration process is most efficient if few discrepancies are encountered.



**Tip** While it may not be possible for you to specify these policy objects accurately if devices of the same type use different promiscuous policy objects, migration will be more efficient if you specify the most frequently used promiscuous objects.

-pcospc <i>value</i>	Specifies the name of the most frequently used Class of Service for promiscuous computers		✓	unprovisioned-computer
----------------------	---	--	---	------------------------

**Table 3-4 Arguments for migrateDb.sh Tool for migration from Cisco BAC 2.7.1.x, 4.0.1.x, 4.1.0.x to Cisco BAC 4.2 (continued)**

Argument	Description	Required	Optional	Default
-pcosmta <i>value</i>	Specifies the name of the most frequently used Class of Service for promiscuous MTAs		✓	unprovisioned-packet-cable-mta
-pcoschwd <i>value</i>	Specifies the name of the most frequently used Class of Service for promiscuous CableHome WAN-Data devices		✓	unprovisioned-cablehome-wan-data
-pcoschwm <i>value</i>	Specifies the name of the most frequently used Class of Service for promiscuous CableHome WAN-MAN devices		✓	unprovisioned-cablehome-wan-man
-pcoscpe <i>value</i>	Specifies the name of the most frequently used Class of Service for promiscuous custom CPE		✓	unprovisioned-customcpe
-pdpcpc <i>value</i>	Specifies the name of the most frequently used DHCP Criteria for promiscuous computers		✓	genericCPE
-pdcmta <i>value</i>	Specifies the name of the most frequently used DHCP Criteria for promiscuous MTAs		✓	genericCPE
-pdcchwd <i>value</i>	Specifies the name of the most frequently used DHCP Criteria for promiscuous CableHome WAN-Data devices		✓	genericCPE
-pdcchwm <i>value</i>	Specifies the name of the most frequently used DHCP Criteria for promiscuous CableHome WAN-MAN devices		✓	genericCPE
-pdcpcpe <i>value</i>	Specifies the name of the most frequently used DHCP Criteria for promiscuous custom CPE		✓	genericCPE

## Verifying Database Integrity

We recommend that you perform a dry run of the migration process on a staging (nonproduction) system, instead of on a live system during RDU downtime. These steps may not be practical during live migration, because in the case of a large database, verification can take an extended length of time.

To verify the database:

- Before migration, run the **verifyDb.sh** tool on a backup snapshot.



### Note

To verify the database before migration, use the **verifyDb.sh** tool from the Cisco BAC installation corresponding to the version of the database. You cannot verify a nonmigrated database with the Cisco BAC 4.2 version of **verifyDb.sh**.

For example, enter:

```
# /opt/<BPR_HOME>/rdu/internal/db/bin/verifyDb.sh -dbdir /disk1/backup
```

This pathname is specific to the Cisco BAC installation version before migration.

- After migration, run the **verifyDb.sh** tool on the migrated database.

For example, enter:

```
# /opt/<BPR_HOME>/rdu/internal/db/bin/verifyDb.sh -dbdir /disk2/target
```

If any error occurs during the process, the log file, **bpr-verify-db-log.xml** is generated in the path **/opt/CSCObac/rdu/internal/db/bin**, which contains the details of the error. For further assistance, you can contact Cisco Support.

For details on the **verifyDb.sh** tool, see the *Cisco Broadband Access Center Administrator Guide 4.2*.

## Cisco BAC 2.7.1.x Solaris to Cisco BAC 4.2 Solaris

Migrating the RDU database from Cisco BAC 2.7.1.x to Cisco BAC 4.2 consists of two phases:

1. Phase 1—This phase is executed after installation via the **migrateDb.sh** tool.
2. Phase 2—This phase is executed when the RDU is first started up after the Phase 1 migration is completed. You cannot launch the Admin GUI until the phase 2 migration is completed.



### Caution

You must setup a firewall to prevent any connection to RDU until phase 2 is complete. Any attempt to connect to RDU through DPE, CNR EP or OSS client would jeopardize the system.

The migration script (**migrateDb.sh**) is automatically installed when you run the Cisco BAC 4.2 installation program (**install\_bac\_solaris.sh**). Migration is accomplished by reading from the original database and writing it into a new database. For this purpose, you must allocate additional disk space for accommodating the newly created database.

The status of the first phase of migration is recorded in a migration log file, which is stored in the migrated database directory. The *migration.log* file identifies the version of the database that is being migrated and provides status messages for the migration process.



### Note

Migration deletes any outstanding jobs stored in the database, such as reliable batches that did not finish execution or pending Configuration Regeneration Service (CRS) jobs.

### About Migration Performance

A large Cisco BAC RDU database can be several gigabytes in size, and may take an extended length of time to migrate. This depends largely on your hardware. Using faster disks improves the time significantly.

Migration automatically compacts your database that may be fragmented. However, this Cisco BAC release stores additional data for every device. You can expect the size of the database to increase after migration by as much as 10 percent.

The migration process is optimized for speed and database compactness. As a result, migration requires a large amount of process heap size (memory). For example, migrating a 7-million device database requires approximately 1,024 MB of process heap size. Since the migration process is limited to 4 GB of heap space, migration is effectively limited to a database size of approximately 25-30 million devices.



The **-Xmx** parameter in the **migrateDb.sh** script determines the maximum process heap size for migration. The default setting of 3,072 MB for this parameter is sufficient for migrating a 20-million device database. You may need to fine-tune this setting to suit your environment. For example, to migrate smaller databases running on low-end systems with less memory, you can reduce the value of the maximum heap size setting. For databases that exceed the maximum supported scale, you may need to increase this setting.

To change the heap size parameter, in the **migrateDb.sh** script edit the value for the **-Xmx** parameter.

### Licensing After Migration

You cannot use the license keys from Cisco BAC 2.7.1.x versions to provision your network using Cisco BAC 4.2. Any existing license keys are automatically deleted during database migration. To configure Cisco BAC licensing, you must obtain the license files via a license claim process and install them using the administrator user interface. For details, see the *Release Notes for Cisco Broadband Access Center 4.2*.

During migration, device counters are recalculated based on the number of devices in each provisioning group found in the database. New counters are recorded in the new database and used for licensing.

### Migration of Duplicate Class of Service and Node Name

This Cisco BAC release does not support duplicate names across technologies for Class of Service and nodes. If Cisco BAC detects duplicate names during database migration, the duplicate entries are automatically renamed in the following format:

- Class of Service—{*Technology\_Name*}\_{*Original\_ClassOfService\_Name*}
- Nodes—{*Node\_Type*}\_{*Node\_Name*}

For example, if Cisco BAC encounters a **gold** Class of Service for a computer and a DOCSIS modem, either the computer Class of Service is renamed **Computer\_gold** or the DOCSIS modem Class of Service is renamed **DOCSISModem\_gold**. The appropriate warnings are issued to the console and migration log, and all properties containing the specific Class of Service value are automatically updated.

[Table 3-5](#) describes the process of migration from Cisco BAC 2.7.1.x to 4.2 using examples that assume that:

- Cisco BAC is installed in the default home directory (*/opt/CSCObac*).
- The backup of the previous version of the RDU database is located in the */disk1/backup* directory.

Table 3-5 RDU Migration Workflow from Cisco BAC 2.7.1.x to Cisco BAC 4.2

Task	See
<p><b>Step 1</b> Select two disk partitions: one for the migrated database, and another as a temporary storage directory for the database transaction logs.</p> <p><b>Note</b> For performance reasons, we recommend that you configure these disks on a fast I/O system, such as a RAID array with battery-backup write cache or a RAM disk. For details on migrating using a RAM disk, see <a href="#">Migrating Using a RAM Disk, page 3-55</a>.</p> <p>The partitions that are used in the examples in this procedure are:</p> <ul style="list-style-type: none"> <li>• Volume <i>/disk2/target</i>—Used to write the migrated database data. The available disk space for the migrated database should be at least 120 percent of the size of the original database (which is the <i>bpr.db</i> file in the backup directory).</li> <li>• Volume <i>/disk3/target</i>—Used as the temporary storage directory. The available space on the temporary storage disk must be at least 2 GB. For performance reasons, however, we recommend that you locate this directory on a different disk from the backup database and the target database location.</li> </ul>	Solaris documentation
<p><b>Step 2</b> Run the <b>migrateDb.sh</b> tool on the backed-up database. The <b>migrateDb.sh</b> script resides in the <i>&lt;BPR_HOME&gt;/migration</i> directory. For a description of all arguments that this tool supports, see <a href="#">Migrating Using a RAM Disk, page 3-55</a>.</p> <p>For example:</p> <pre># /opt/CSCObac/migration/migrateDb.sh -dbdir /disk1/backup -targetdbdir /disk2/target -targetdblogdir /disk3/target &amp;&gt; /var/run/migration-console.log &amp;</pre> <ul style="list-style-type: none"> <li>• <b>-dbdir</b>—Specifies the location of the database backup that is to be migrated; in this case, <i>/disk1/backup</i>.</li> <li>• <b>-targetdbdir</b>—Specifies the target location where the migrated database should be placed; in this case, <i>/disk2/target</i>. This directory is created automatically during migration and must not exist before the script is executed.</li> <li>• <b>-targetdblogdir</b>—Specifies the target location for the temporary migration transaction log files; in this case, <i>/disk3/target</i>. This directory is created automatically during migration and must not exist before the script is executed.</li> </ul> <p><b>Note</b> New database log files are created in this directory and later destroyed automatically during migration. After migration is complete, all the necessary files are automatically copied from this directory to <i>/disk2/target</i>. After migration, you can delete this directory.</p>	Cisco Broadband Access Center Administrator Guide 4.2

Table 3-5 RDU Migration Workflow from Cisco BAC 2.7.1.x to Cisco BAC 4.2 (continued)




Task	See
<p><b>Step 3</b> Observe the migration progress using the <i>migration.log</i> file.</p> <p>For example:</p> <pre># tail -f /disk2/target/migration.log</pre>	Solaris documentation
<p><b>Step 4</b> Verify if the migration is complete using the <i>migration.log</i> file. If you find any warnings or notices, use the <b>grep</b> command-line tool.</p> <p>For example:</p> <pre># tail /disk2/target/migration.log ... Tue Oct 16 15:36:20 EDT 2007: Phase 1 of RDU database migration to BAC 4.2 completed with 1 warning(s) and 2 notice(s).  # cat migration.log   grep "WARNING"  Tue Oct 16 15:57:23 EDT 2007: WARNING: Duplicate Class of Service name [cg814wg_chn_n05] detected for [CableHomeWanMan] technology. Class of Service object was renamed to [CableHomeWanMan_cg814wg_chn_n05].  # cat migration.log   grep "NOTICE"  Tue Oct 16 19:06:23 EDT 2007: NOTICE: A deprecated property [/dhcp/client-policy/response/boot-file] was found on object with oid [2882304375712137210]. Property will be declared as custom property.</pre> <p> <b>Tip</b> You may also find it useful to examine the device statistics printed at the end of the <i>migration.log</i> file.</p>	Solaris documentation
<p><b>Step 5</b> After migrating the database, verify it by running the command:</p> <p>For example:</p> <pre># /opt/CSCObpr/rdu/internal/db/bin/verifydb.sh -dbdir /disk2/target</pre> <p> <b>Note</b> In case of any error while verifying the database, contact Cisco support.</p>	
<p><b>Step 6</b> Stop the <i>bprAgent</i>.</p> <pre>/etc/init.d/bprAgent stop</pre>	
<p><b>Step 7</b> Empty the target RDU database.</p> <p>For example:</p> <pre># rm -rf /var/CSCObac/rdu/db*</pre>	

Table 3-5 RDU Migration Workflow from Cisco BAC 2.7.1.x to Cisco BAC 4.2 (continued)

Task	See
<p><b>Step 8</b> Restore the migrated database into the target directories for the 4.2 RDU. This process copies the migrated database to the RDU <i>BPR_DATA</i> and <i>BPR_DBLOG</i> directories.</p> <p>For example:</p> <pre># /opt/CSCObac/rdu/bin/restoreDb.sh /disk2/target</pre> <p><b>Note</b> Once the migration process is complete, you can delete the content of <i>/disk2/target</i> and <i>/disk3/target</i> directories.</p>	<p><i>Cisco Broadband Access Center Administrator Guide 4.2</i></p>
<p><b>Step 9</b> Start the RDU process from the Cisco BAC watchdog process command line, and look for messages on successful initialization in the <i>rdu.log</i> file.</p> <p>For example:</p> <pre># /etc/init.d/bprAgent start</pre>	<p><i>Cisco Broadband Access Center Administrator Guide 4.2</i></p>
<p><b>Step 10</b> Verify if the second phase of migration has started.</p> <p>For example, <i>rdu.log</i> should include similar messages:</p> <pre>bac-test.example.com: 2007 10 17 02:36:28 EDT: %BAC-RDU-6-0695: [Starting Phase 2 of RDU db migration].</pre> <p> <b>Note</b> When the phase 2 migration is in progress, you must not connect to any API clients or to the Admin GUI.</p>	<p>Solaris documentation</p>
<p><b>Step 11</b> Observe the progress of the migration.</p> <p>For example, <i>rdu.log</i> should include similar messages:</p> <pre>bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Progress report for selection process...].  bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Selection process stats: Read a total of 400000 DOCSISModem device records].  bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Selection process stats: Read a total of 400000 device records].  bac-test.example.com: 2007 10 10 02:50:36 EDT: %BAC-RDU-6-0695: [Selection process stats: Ran selection on 398228 eligible devices].</pre>	<p>Solaris documentation</p>

**Table 3-5 RDU Migration Workflow from Cisco BAC 2.7.1.x to Cisco BAC 4.2 (continued)**

Task	See
<p><b>Step 12</b> Verify if the second phase of migration is complete.</p> <p>For example, <i>rdu.log</i> should include a similar message:</p> <pre>bac-test.example.com: 2007 10 17 03:28:58 EDT: %BAC-RDU-6-0695: [Completed Phase 2 of RDU db migration].</pre> <pre>bac-test.example.com: 2007 10 17 03:28:58 EDT: %BAC-RDU-6-0695: [RDU db migration has been finalized].</pre> <p>Also, you can check if the <i>&lt;BPR_HOME&gt;/rdu/db/DB_VERSION</i> file indicates the database version as 4.2.</p>	<p><i>Cisco Broadband Access Center Administrator Guide 4.2</i></p>
<p><b>Note</b> Migration preserves the device record revision numbers used in DPE synchronization. As a result, DPE repopulation is not triggered after the RDU database upgrade, ensuring the least disruption until you upgrade the specific DPE.</p>	
<p><b>Step 13</b> Verify the RDU operations by logging in to the administrator user interface. From <b>Servers &gt; RDU</b>, you can check the RDU version and device count statistics.</p>	<p><i>Cisco Broadband Access Center Administrator Guide 4.2</i></p>

## Cisco BAC 4.0.1.x, 4.1.0.x Solaris to Cisco BAC 4.2 Solaris

Migration of the RDU database from Cisco BAC 4.0.1.x to Cisco BAC 4.2 must be performed after you install Cisco BAC 4.2. You must use the **migrateDb.sh** tool to migrate the RDU database.




**Note** Migration from Cisco BAC 4.0.1.x/4.1.0.x to Cisco BAC 4.2 takes less time and space.

Table 3-6 describes the process of migration from 4.0.1.x to 4.2 using examples that assume that:

- Cisco BAC is installed in the default home directory (*/opt/CSCObac*).
- The migration from Cisco BAC 4.0.1.x to Cisco BAC 4.2 is an inline migration where the source and the target database are same and a separate target database need not be created. The source database is restored once the migration is complete.
- The backup of the previous version of the RDU database is located in the */disk4/backup* directory.

Table 3-6 RDU Migration Workflow from Cisco BAC 4.0.1.x, 4.1.0.x to Cisco BAC 4.2

Task	See
<p><b>Step 1</b> Run the <b>migrateDb.sh</b> tool on the backed-up database. The <b>migrateDb.sh</b> script resides in the <code>&lt;BPR_HOME&gt;/migration</code> directory. For a description of all arguments that this tool supports, see <a href="#">Migrating Using a RAM Disk, page 3-55</a>.</p> <p>For example:</p> <pre># /opt/CSCObac/migration/migrateDb.sh -dbdir /disk4/backup</pre> <p><b>-dbdir</b>—Specifies the location of the database backup that is to be migrated; in this case, <code>/disk4/backup</code>.</p>	Solaris documentation
<p><b>Step 2</b> Observe the migration progress using the <code>migration.log</code> file.</p> <p>For example:</p> <pre># tail -f /disk4/backup/migration.log</pre>	Solaris documentation
<p><b>Step 3</b> Verify if the migration is complete using the <code>migration.log</code> file. If you find any warnings or notices, use the <b>grep</b> command-line tool to search them.</p> <p>For example:</p> <pre># tail /disk4/backup/migration.log</pre> <p>Completed database migration to BAC 4.2 release</p>	<i>Cisco Broadband Access Center Administrator Guide 4.2</i>
<p><b>Step 4</b> After migrating the database, verify it by running the command:</p> <p>For example:</p> <pre># /opt/CSCObpr/rdu/internal/db/bin/verifydb.sh -dbdir /disk4/backup</pre> <p> <b>Note</b> In case of any error while verifying the database, contact Cisco support.</p>	
<p><b>Step 5</b> Stop the bprAgent.</p> <pre>/etc/init.d/bprAgent stop</pre>	
<p><b>Step 6</b> Empty the target RDU database.</p> <p>For example:</p> <pre># rm -rf /var/CSCObac/rdu/db*</pre>	
<p><b>Step 7</b> Restore the migrated database into the RDU <code>BPR_DATA</code> and <code>BPR_DBLOG</code> directories.</p> <p>For example:</p> <pre># /opt/CSCObac/rdu/bin/restoreDb.sh /disk4/backup</pre>	<i>Cisco Broadband Access Center Administrator Guide 4.2</i>
<p><b>Step 8</b> Start the RDU process from the Cisco BAC watchdog process command line, and look for messages on successful initialization in the <code>rdu.log</code> file, it will be up and running.</p> <p>For example:</p> <pre># /etc/init.d/bprAgent start rdu</pre>	<i>Cisco Broadband Access Center Administrator Guide 4.2</i>

**Table 3-6 RDU Migration Workflow from Cisco BAC 4.0.1.x, 4.1.0.x to Cisco BAC 4.2 (continued)**

Task	See
<b>Step 9</b> Also, you can check if the <code>&lt;BPR_DATA&gt;/rdu/db/DB_VERSION</code> file indicates the database version as 4.2.	<i>Cisco Broadband Access Center Administrator Guide 4.2</i>
<b>Note</b> Migration preserves the device record revision numbers used in DPE synchronization. As a result, DPE repopulation is not triggered after the RDU database upgrade, ensuring the least disruption until you upgrade the specific DPE.	
<b>Step 10</b> Verify the RDU operations by logging in to the administrator user interface. From <b>Servers &gt; RDU</b> , you can check the RDU version and device count statistics.	<i>Cisco Broadband Access Center Administrator Guide 4.2</i>

### RDU Extension Migration

During database migration, custom extensions are retained for using it after the migration process. For details, see the Cisco Broadband Access Center Administrator Guide 4.2.

## Migrating Using a RAM Disk

The RAM disk is a Solaris feature that allows you to mount a portion of the RAM as a disk volume. Disk I/O operations on such volumes are considerably faster and can be useful when you have large databases on systems with sufficient memory.

The procedures described in this section are optional and describe how to create and use different RAM disks to migrate your database instead of a regular disk volume, such as a fast RAID array with battery-backed write cache:

- [Creating RAM Disk Volumes for Migration, page 3-55](#)
- [Using the RAM Disk Volumes for Migration, page 3-56](#)

### Creating RAM Disk Volumes for Migration

The following procedure creates three volumes for migration and assumes that the size of the original database is 9 GB. Adjust the volume sizes as required for your database and according to what the available memory permits.

Using the following procedure, you can create three RAM disks that you could use for migration:

- `/ram-disk1`—To contain the source database
- `/ram-disk2`—To contain the migrated database directory
- `/ram-disk3`—To contain the temporary migration transaction logs

**Step 1** Ensure that enough memory is allocated to the RAM disk in the `/etc/system` file. This figure is a percentage of the total RAM on the system. Assuming a 64-GB RAM, this setting dedicates 32 GB to the RAM disk.

For example:

```
# less /etc/system
...
set ramdisk:rd_percent_physmem=50
```



---

**Note** If you also set the `segmap_percent` parameter, which determines the quantity of memory allocated to the OS I/O buffer cache, make sure that there is sufficient memory for both settings and some space is left for the OS operation.

---

**Step 2** Reboot the system.

For example:

```
# shutdown -i6 -g0 -y
```

**Step 3** Create three RAM volumes.

For example:

```
# ramdiskadm -a volume1 10g
# ramdiskadm -a volume2 12g
# ramdiskadm -a volume3 2g
```

**Step 4** Create new file systems on each volume.

For example:

```
# newfs /dev/ramdisk/volume1
# newfs /dev/ramdisk/volume2
# newfs /dev/ramdisk/volume3
```

**Step 5** Mount the volumes.

For example:

```
# rmdir /ram-disk1
# rmdir /ram-disk2
# rmdir /ram-disk3

# mkdir /ram-disk1
# mkdir /ram-disk2
# mkdir /ram-disk3

# mount /dev/ramdisk/volume1 /ram-disk1
# mount /dev/ramdisk/volume2 /ram-disk2
# mount /dev/ramdisk/volume3 /ram-disk3
```

**Step 6** Verify the mount points and their size.

For example:

```
# df -kh
```

---

## Using the RAM Disk Volumes for Migration

To use the RAM-disk volumes that you have created for migration:

---

**Step 1** Copy the backup of your database to `/ram-disk1`.

For example:

```
# mkdir /ram-disk1/backup
# cp /disk1/backup/* /ram-disk1/backup/.
```



- Step 2** Perform the first phase of migration according to the procedure that [Table 3-5](#) describes. Remember to use a command similar to the one described here instead of the one mentioned in Step 2 of the table.

For example:

```
# /opt/CSCObac/migration/migrateDb.sh -dbdir /ram-disk1/backup
-targetdbdir /ram-disk2/target -targetdblogdir /ram-disk3/target
&> /var/run/migration-console.log &
```

- Step 3** To ensure that the second phase of migration is executed with the database of the RAM disk:
- Install the 4.2 RDU such that the database directory and the database logs directory (defined by the *BPR\_DATA* and *BPR\_DBLOG* variables, respectively) point to the volumes on the RAM disk.
  - After the second phase of migration is complete, stop the Cisco BAC process watchdog, using the `/etc/init.d/bprAgent stop` command from the Cisco BAC process watchdog command line.
  - Back up the database using:  

```
<BPR_HOME>/rdu/bin/backupDb.sh -nosubdir /ram-diskX/migrated-db/
```

    - *BPR\_HOME*—Specifies the home directory, which is by default `/opt/CSCObac`.
    - *X*—Specifies the RAM disk to which the RDU database is migrated.
  - Edit the `bpr_definitions.sh` file that is found in the home directory (by default `/opt/CSCObac`) and change the *BPR\_DATA* and *BPR\_DBLOG* locations to new directories located on permanent storage drives.
  - Recover and restore the database to the new RDU locations. Run the `recoverDb.sh` and the `restoreDb.sh` scripts, respectively, using:  

```
<BPR_HOME>/rdu/bin/recoverDb.sh
```

where *BPR\_HOME* specifies the home directory, which is by default `/opt/CSCObac`.  

```
<BPR_HOME>/rdu/bin/restoreDb.sh /ram-diskX/migrated-db/
```

    - *BPR\_HOME*—Specifies the home directory, which is by default `/opt/CSCObac`.
    - *X*—Specifies the RAM disk to which the RDU database is migrated.
- For details on using these scripts, see the *Cisco Broadband Access Center Administrator Guide 4.2*.
- Start the process watchdog, by running the `/etc/init.d/bprAgent start` command.

## Upgrading the DPE

Before upgrading your DPE, we recommend that you archive your files in the `<BPR_HOME>/dpe/conf` directory and archive the database cache.

### Cisco BAC 2.7.1.x, BAC 4.0.1.x, BAC 4.1.0.x Solaris to Cisco BAC 4.2 Solaris

Use this procedure to upgrade the earlier versions of the DPE component to Cisco BAC 4.2:

**Step 1** Stop the `bprAgent` before upgrade using the following command:

```
/etc/init.d/bprAgent stop
```

**Step 2** Backup the following files:

- a. `dpe.properties` under `<BAC_HOME>/dpe/conf/`
- b. `*.xml` files under `<BAC_HOME>/snmp/conf/`

**Step 3** Execute the script `install_bac_solaris.sh` in the `BAC_42_SolarisK9` directory.

Output similar to the following appears. The output has been trimmed for brevity.

```
Processing package instance <CSCObac> from
</opt/bacpathcs/BAC_42_SolarisK9/CSCObac.pkg>

Cisco BAC product(sparc) 4.2

Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

**Step 4** Press **Enter** to continue.

The program prompts you to add user name and user group name.

**Step 5** Specify the user name and group name to run Cisco BAC.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 6** Press **Enter** to continue.

The program prompts you to confirm upgrading.

**Step 7** When upgrading, the installation program prompts you to enter locations for the:

- Home directory (`BPR_HOME`)



**Note** The home directory will be replaced if installation is done on the existing Cisco BAC `BPR_HOME` directory.

- Database directory (`BPR_DATA`)



**Note** The DATA directory should be removed manually before the upgrade. Ensure you take the backup of the old database before you remove the DATA directory.

- Database logs directory (*BPR\_DBLOG*)

It then upgrades the necessary libraries and property files but leaves your RDU database intact.

**Step 8** To continue, press **Enter**.

The installation program checks for any conflicts and if found displays the following message:

```
## Checking for conflicts with packages already installed.
The following files are already installed on the system and are being
used by another package:
* /etc/init.d/bprAgent
* - conflict with a file which does not belong to any package.
Do you want to install these conflicting files [y,n,?,q] y
```

**Step 9** Enter **y** and then press **Enter** to continue.

The installation program prompts you about packages that can only be installed by super user.

```
Do you want to continue with the installation of <CSCObac> [y,n,?] y
```

**Step 10** Enter **y** and then press **Enter** to continue.

Output similar to the following appears. The output has been trimmed for brevity.

```
Processing package instance <CSCObac> from </var/CSCObac.pkg>

Cisco BAC product
(sparc) 4.2
CSCObpr

Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.

The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.

The non-root user can run the product, provided the user has the following
privileges:

file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid

In order to allow the non-root user or non-root users who belong to a specific
group to run Cisco BAC, specify the name of the non-root user and the
group in the "User and Group" prompt that appears next.
Else, to run as root user, specify the name as "root" and group as "root" in
the "User and Group" prompt that appears next.

Press Enter to Continue or q to Quit:

Upgrading BAC from 2.7.1.x to 4.2. Are you sure? [n]: y

Stopping BAC Process Watchdog...
```

**Step 11** The program begins the installation process. After successful installation, the following message appears:

```
...
File installation completed.
...
Installation of <CSCObac> was successful.
```

**Step 12** To verify if the version information indicates Cisco BAC version 4.2, enter:

```
# pkgparam CSCObac VERSION
```

**Step 13** Manually restart the DPE process to finish the upgrade process.

For example, from the command line, run:

```
# /etc/init.d/bprAgent start
```



**Note**

If database cache is backed up, it has to be restored to the upgraded location since it takes considerable time to rebuild the cache from scratch. You must restore the database before restarting the agent. Refer to [page 3-65](#) for more details.

## DPE Cache Backup and Restore Tool

The DPE Cache Backup and Restore Tool tool supports populating the DPE cache from Cisco BAC 4.1.0.x to Cisco BAC 4.2. This reduces the time required for the synchronization with RDU while porting all the devices to the new DPE.

To perform the DPE cache backup and restore operation:

**Step 1** Stop the Cisco BAC 4.1.0.x DPE server.

**Step 2** Run the following command in the source DPE.

```
# <BPR_HOME>/dpe/internal/bin/createDbTar.sh <tarfile>
```

**Step 3** Stop the Cisco BAC 4.2 DPE server.

**Step 4** Copy the created database tar to the Cisco BAC 4.2 DPE and then run the script:

```
# <BPR_HOME>/dpe/internal/bin/extractDbTar.sh <tarfile>
```

**Step 5** Verify if the cache data is copied properly to `<BPR_DATA>/dpe/cache/` directory.

**Step 6** Start the Cisco BAC 4.2 DPE.

If the cache is successful, there should not be any more synchronization.

## Upgrading Cisco Network Registrar Extensions

Before upgrading Cisco Network Registrar extensions, we recommend that you archive your files in the `<BPR_HOME>/cnr_ep/conf` directory.

Also disable the CNR extensions point and then stop the DHCP server by using following commands respectively:

```
# /opt/nwreg2/local/usrbin/nrcmd -s < /opt/CSCObac/cnr_ep/bin/bpr_cnr_disable_extpts.nrcmd
# /etc/init.d/nwreglocal Stop
```

## Cisco BAC 2.7.1.x, BAC 4.0.1.x, BAC 4.1.0.x Solaris to Cisco BAC 4.2 Solaris

Use this procedure to upgrade the earlier versions of the Cisco Network Registrar Extensions component to Cisco BAC 4.2:

**Step 1** Stop *bprAgent* before upgrade using the following command:

```
/etc/init.d/bprAgent stop
```

**Step 2** Backup the file:

```
<BAC_HOME>/cnr_ep/conf/cnr_ep.properties
```

**Step 3** Execute the script **install\_bac\_solaris.sh** in the *BAC\_42\_SolarisK9* directory.

A message is displayed asking you to confirm if you want to proceed with the upgrade.

```
The installer will upgrade BAC from <2.7.1.x> to 4.2
During the upgrade, the existing product will be removed and new version
of the product will be installed. Do you want to continue [y/n]? [n]: y
Stopping BAC Agent....
```

```
The following package is currently installed:
CSCObpr Cisco Broadband Access Center
(sparc) 2.7.1
```

```
Do you want to remove this package? [y,n,?,q] y
```

**Step 4** Enter **y** and press **Enter** to continue.

Output similar to the following appears. The output has been trimmed for brevity.

```
Updating system information.

Removal of <CSCObpr> was successful.

Processing package instance <CSCObac> from </opt/INSTALL/BAC_42_Solaris/CSCObac.pkg>

Cisco BAC product(sparc) 4.2

Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.

The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

**Step 5** Press **Enter** to Continue.

The program prompts you to add user name and user group name.

**Step 6** Specify the user name and group name to run Cisco BAC.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 7** Press **Enter** to continue.

- Step 8** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory. The program prompt also displays the available disk space.

For example:

```
----- Home Directory -----
Home Directory [/opt/CSCObac]

Available disk space for /opt/CSCObac is 3458249 kilobytes.
```

- Step 9** Confirm the directory location; enter **y** and press **Enter**.

The data directory prompt appears.

- Step 10** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory. The program prompt also displays the available disk space.

For example:

```
----- Data Directory -----
DB Data Directory [/var/CSCObac]

Available disk space for /var/CSCObac is 2614226 kilobytes.
```

- Step 11** Confirm the directory location; enter **y** and press **Enter**.

- Step 12** The program begins the installation process. After successful installation, the following message appears:

```
...
Registry update completed.

Installation of <CSCObac> was successful.
```

- Step 13** Enable the Cisco Network Registrar extension points and restart the DHCP server using following commands respectively:

```
/opt/nwreg2/local/usrbin/nrcmd -s < /opt/CSCObac/cnr_ep/bin/bpr_cnr_enable_extpts.nrcmd
/etc/init.d/nwreglocal Start
```

The upgrade script automatically copies the upgraded extension point files to the required directories. When complete, it prompts you to restart the Cisco Network Registrar Server Agent.

- Step 14** To verify if the output information indicates Cisco BAC release 4.2, enter:

```
# pkgparam CSCObac VERSION
```

- Step 15** Go to the *<BPR\_HOME>/lib* directory. If the upgrade was successful, the directory content appears similar to the list of installed files for the DPE upgrade with the addition of the *libbprextensions.so* file. The date shown should be the current date. To check this, run the command:

```
# ls -l /opt/CSCObac/lib
```

- Step 16** If a second check is required to verify upgrade success, go to the *CNR\_HOME/extensions/dhcp/dex* directory and verify the *libbprextensions.so* file with the current date. To check this, run the command:

```
# ls -l /opt/nwreg2/local/extensions/dhcp/dex
```

Depending on the components installed, the directory content shown in this procedure may differ from the output featured above.



**Note** In case of Cisco BAC 2.7.1.x, you should run the following command to completely remove the previous version of Cisco BAC from your system:

```
# rm -rf /var/CSCObpr
```

## Upgrading the KDC

### Cisco BAC 2.7.1.x, BAC 4.0.1.x, BAC 4.1.0.x Solaris to Cisco BAC 4.2 Solaris

Use this procedure to upgrade the earlier versions of the KDC component to Cisco BAC 4.2:



**Note** If you are upgrading from a release prior to 4.2.x, you need to backup the KDC license from the `<BPR_HOME>/kdc` directory and copy it to the same directory after the upgrade.

**Step 1** Stop `bprAgent` before upgrade using the following command:

```
/etc/init.d/bprAgent stop
```

**Step 2** Execute the script `install_bac_solaris.sh` in the `BAC_42_SolarisK9` directory.

A message is displayed asking you to confirm if you want to proceed with the upgrade.

```
The installer will upgrade BAC from <2.7.1.x> to 4.2
```

```
During the upgrade, the existing product will be removed and new version
```

```
of the product will be installed. Do you want to continue [y/n]? [n]: y
```

**Step 3** Enter `y` and press **Enter**.

The program prompts you to confirm the removal of the package.

**Step 4** Enter `y` and press **Enter** to remove the package.

```
Removal of <CSCObac> was successful.
```

**Step 5** Press **Enter** to continue.

Output similar to the following appears. The output has been trimmed for brevity.

```
Processing package instance <CSCObac> from </var/CSCObac.pkg>
Cisco BAC product(sparc) 4.2
```

```
Welcome to the Cisco Broadband Access Center for Cable 4.2 (BAC) installation
program. This installation program installs BAC 4.2 on your system.
```

```
The installer for Cisco Broadband Access Center for Cable 4.2 enables
non-root user, who has appropriate permission to run the product.
```

```
The non-root user can run the product, provided the user has the following
privileges:
```

```
file_chown, file_link_any, file_owner, net_privaddr, proc_exec, proc_fork,
proc_info, proc_owner, proc_session, proc_setid
```

In order to allow the non-root user or non-root users who belong to a specific group to run Cisco BAC, specify the name of the non-root user and the group in the "User and Group" prompt that appears next.

Else, to run as root user, specify the name as "root" and group as "root" in the "User and Group" prompt that appears next.

Press Enter to Continue or q to Quit:

**Step 6** Press **Enter** to continue.

**Step 7** Specify the user name and group name to run Cisco BAC.

```
----- User and Group -----
Enter the name of the user [?,q] user1
Enter the name of the group [?,q] group1
```

**Step 8** Press **Enter** to continue.

**Step 9** To accept the default directory, */opt/CSCObac*, press **Enter**; or enter another directory. The program prompt also displays the available disk space.

For example:

```
----- Home Directory -----
Home Directory [/opt/CSCObac]
Available disk space for /opt/CSCObac is 3458249 kilobytes.
```

**Step 10** Confirm the directory location. To do this, enter **y** and press **Enter**.

The data directory prompt appears.

**Step 11** To accept the default directory, */var/CSCObac*, press **Enter**; or enter another directory. The program prompt also displays the available disk space.

For example:

```
----- Data Directory -----
DB Data Directory [/var/CSCObac]
Available disk space for /var/CSCObac is 2614226 kilobytes.
```

**Step 12** Confirm the directory location. To do this, enter **y** and press **Enter**.

**Step 13** The program begins the installation process. After successful installation, the following message appears:

```
Installing Cisco BAC product as <CSCObac>
```

**Step 14** In case the installation program encounters any conflicts and it displays the following message:

```
## Checking for conflicts with packages already installed.
The following files are already installed on the system and are being
used by another package:
* /etc/init.d/bprAgent
* - conflict with a file which does not belong to any package.
Do you want to install these conflicting files [y,n,?,q] y
```

**Step 15** Enter **y** and then press **Enter** to continue with the installation.

```
Installation of <CSCObac> was successful
```



**Step 16** To verify if the version information indicates Cisco BAC version 4.2, enter:

```
# pkgparam CSCObac VERSION
```

**Step 17** Manually start the Cisco BAC process watchdog to complete the upgrade process.

For example, from the command line, run:

```
# /etc/init.d/bprAgent start
```

## Uninstalling Cisco Broadband Access Center

This chapter describes how you can uninstall Cisco Broadband Access Center (Cisco BAC).

The procedure described in this chapter uninstalls the RDU, Cisco Network Registrar extensions, the DPE, and the KDC, but it does not uninstall the Cisco Network Registrar application. Before removing Cisco BAC, manually remove the Cisco BAC configuration on Cisco Network Registrar.

The uninstallation program removes all files found in the installation directory (the default directory is */opt/CSCObac*). The program also shuts down and removes these processes, if they are detected: RDU, KDC, SNMP Agent, Tomcat, Cisco BAC agent, and DPE.

The uninstallation program does not remove files that were placed outside the installation directory. For example, a component installation places the database and database logs directories under */var/CSCObac*. These files must be removed manually. (Subsequent sections describe how to delete these files.) Also, the program does not remove any files found in the Cisco Network Registrar directory.

If you have installed Cisco BAC extensions on Cisco Network Registrar, you must uninstall those extensions to completely uninstall the Cisco BAC program; otherwise, an error message similar to the following appears:

```
The uninstall program found a copy of the BAC extensions in the NR extension
directory(/opt/nwreg2/local/extensions/dhcp/dex/libbprextensions.so), please disable
the extensions and remove the library before uninstalling BAC.
```



**Note** The path to the Cisco Network Registrar extensions differs based on the location where you have installed Cisco Network Registrar; the default location is */opt/nwreg2*.

If the uninstallation program fails to uninstall Cisco BAC, an error messages appear.

After uninstalling Cisco BAC, manually remove the data and database logs directories. See [Post-Uninstallation Task, page 3-66](#).

To uninstall Cisco BAC from the command line:

**Step 1** Login to the Cisco BAC server as the *root* user.

**Step 2** Manually remove the configuration of the Cisco BAC extensions on the Cisco Network Registrar server. You can do this from any server that has **nrcmd** installed and connectivity with Cisco Network Registrar.

a. To uninstall the Cisco BAC extensions from your Cisco Network Registrar configuration, enter:

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme -b <
<BPR_HOME>/cnr_ep/bin/bpr_cnr_disable_extpts.nrcmd
```

b. To reload your DHCP server, enter:

```
# /etc/init.d/nwreglocal stop
```

```
# /etc/init.d/nwreglocal start
```

Alternatively, enter:

```
# NR_HOME/local/usrbin/nrcmd -N admin -P changeme "dhcp reload"
```

- c. To remove the Cisco BAC extensions from the Cisco Network Registrar extensions directory, enter:

```
# rm -rf NR_HOME/local/extensions/dhcp/dex/libbprextensions.so
```

- Step 3** At the CLI prompt, enter:

```
# pkgrm CSCObac
```

The following information appears:

The following package is currently installed:

```
CSCObac          Cisco BAC product
                  (sparc) 4.2.
```

```
Do you want to remove this package? [y,n,?,q] y
```

- Step 4** Enter **y**, and press **Enter** to start uninstalling.

```
## Removing installed package instance <CSCObac>
```

```
This package contains scripts which will be executed with super-user
permission during the process of removing this package.
```

```
Do you want to continue with the removal of this package [y,n,?,q] y
```

- Step 5** Enter **y** and press **Enter**.

When uninstalling is complete, the following message appears:

```
Removal of <CSCObac> was successful.
```

---

## Post-Uninstallation Task

After you have uninstalled Cisco BAC, manually remove the data and database logs directories. To remove these directories:

- Step 1** Log in as *root*.

- Step 2** Remove the data and the database logs directories. (The default directory for both is */var/CSCObac*.)

For example, enter:

```
# rm -rf /var/CSCObac
```

The data and the database logs directories are deleted.

---