

*InCharge*TM

Service Assurance Manager Failover System User's Guide

Version 6.0



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Contents

Preface	vii
Intended Audience	vii
Prerequisites	vii
Document Organization	viii
Documentation Conventions	viii
InCharge Installation Directory	ix
Additional Resources	xi
InCharge Commands	xi
Documentation	xi
Common Abbreviations and Acronyms	xii
Technical Support	xiii
1 Introduction	1
How the Service Assurance Failover System Works	1
When the Failover System Is Activated	2
Service Assurance Failover System Components	5
InCharge Broker	5
Primary Global Manager	6
Secondary Global Manager	6
Failover System Files and Scripts	7
Location of Failover System Files	9
2 Installing and Configuring the Failover System	11
Deployment Considerations	11
Installation and Configuration Overview	12
Installing the InCharge Broker	14
Installing the Primary and Secondary Global Managers	14
Preventing a Global Manager From Starting	15

Determining a Repository File Transfer Method	15
Configuring the Failover System Scripts	16
Modifying InCharge Files	17
Editing the ic-bak-conf Configuration File on UNIX	18
Editing the ic-bak-conf Configuration File on Windows	20
Verifying the SMHOME Variable	23
Scheduling the Failover Monitor and Failover Sync Scripts	23
Configuring Failover System Security	24
Testing the Failover System	26
Restoring the Primary Global Manager	26
Scheduling InCharge Commands	27
Creating the Control File	28
Running the sm_sched Utility	28
Index	31

Preface

InCharge Service Assurance Manager (Service Assurance) serves as the focal point for automating and managing events across the enterprise. It is vital that the Service Assurance Global Manager always be up and running since its central role is to manage the network infrastructure. The Global Manager can be affected by problems such as hardware failures and operating system malfunctions. If such problems occur, the InCharge Service Assurance Manager Failover System (Failover System) provides a secondary Global Manager that automatically activates when the primary Global Manager is unavailable.

Intended Audience

This document is intended for system or network administrators who are responsible for deploying and configuring Service Assurance.

Prerequisites

This document assumes you have the administrative privileges and the necessary experience to properly install and configure network management software.

Document Organization

This document consists of the following sections:

SECTION	DESCRIPTION
1. INTRODUCTION	Describes the functionality, architecture, operation, and components of the Failover System.
2. INSTALLING AND CONFIGURING THE FAILOVER SYSTEM	Describes how to configure each component of the Failover System.

Table 1: Document Organization

Documentation Conventions

Several conventions may be used in this document as shown in Table 2.

CONVENTION	EXPLANATION
<code>sample code</code>	Indicates code fragments and examples in Courier font
keyword	Indicates commands, keywords, literals, and operators in bold
%	Indicates C shell prompt
#	Indicates C shell superuser prompt
<parameter>	Indicates a user-supplied value or a list of non-terminal items in angle brackets
[option]	Indicates optional terms in brackets
<i>/InCharge</i>	Indicates directory path names in italics
<i>yourDomain</i>	Indicates a user-specific or user-supplied value in bold, italics
<i>File > Open</i>	Indicates a menu path in italics
▲ ▼	Indicates a command that is formatted so that it wraps over one or more lines. The command must be typed as one line.

Table 2: Documentation Conventions

Directory path names are shown with forward slashes (/). Users of the Windows operating systems should substitute back slashes (\) for forward slashes.

Also, if there are figures illustrating consoles in this document, they represent the consoles as they appear in Windows. Under UNIX, the consoles appear with slight differences. For example, in views that display items in a tree hierarchy such as the Topology Browser, a plus sign displays for Windows and an open circle displays for UNIX.

Finally, unless otherwise specified, the term InCharge Manager is used to refer to InCharge programs such as Domain Managers, Global Managers, and adapters.

InCharge Installation Directory

In this document, the term **BASEDIR** represents the location where InCharge software is installed.

- For UNIX, this location is: `/opt/InCharge<n>/<productsuite>`.
- For Windows, this location is: `C:\InCharge<n>\<productsuite>`.

The `<n>` represents the InCharge software version number. The `<productsuite>` represents the InCharge product suite that the product is part of.

Table 3 defines the `<productsuite>` directory for each InCharge product.

PRODUCT SUITE	INCLUDES THESE PRODUCTS	DIRECTORY
IP Management Suite	<ul style="list-style-type: none"> • InCharge IP Availability Manager • InCharge IP Performance Manager • InCharge Discovery Manager • InCharge Adapter for HP OpenView NNM • InCharge Adapter for IBM/Tivoli NetView 	/IP
Service Assurance Management Suite	<ul style="list-style-type: none"> • InCharge Service Assurance Manager • Global Console • InCharge Service Assurance Manager Business Impact Manager • InCharge Service Assurance Manager Failover System • InCharge Service Assurance Manager Notification Adapters • InCharge Service Assurance Manager Adapter Platform • InCharge SNMP Trap Adapter • InCharge Syslog Adapter • InCharge XML Adapter • InCharge Adapter for Remedy • InCharge Adapter for TIBCO Rendezvous • InCharge Adapter for Concord eHealth • InCharge Adapter for InfoVista 	/SAM
Application Management Suite	<ul style="list-style-type: none"> • InCharge Application Connectivity Monitor 	/APP
SMARTS Software Development Kit	<ul style="list-style-type: none"> • Software Development Kit 	/SDK

Table 3: Product Suite Directory for InCharge Products

For example, on UNIX operating systems, version 6.0 of InCharge IP Availability Manager is, by default, installed to `/opt/InCharge6/IP/smarts`. This location is referred to as **BASEDIR**/`smarts`.

Optionally, you can specify the root of **BASEDIR** to be something other than `/opt/InCharge6` (on UNIX) or `C:\InCharge6` (on Windows), but you cannot change the `<productsuite>` location under the root directory.

For more information about the directory structure of InCharge software, refer to the *InCharge System Administration Guide*.

Additional Resources

In addition to this manual, SMARTS provides the following resources.

InCharge Commands

Descriptions of InCharge commands are available as HTML pages. The *index.html* file, which provides an index to the various commands, is located in the **BASEDIR**/*smarts/doc/html/usage* directory.

Documentation

Readers of this manual may find other SMARTS documentation (also available in the **BASEDIR**/*smarts/doc/pdf* directory) helpful.

InCharge Documentation

The following SMARTS documents are product independent and thus relevant to users of all InCharge products:

- *InCharge Release Notes*
- *InCharge Documentation Roadmap*
- *InCharge Installation Guide*
- *InCharge System Administration Guide*
- *InCharge Operator's Guide*

InCharge Service Assurance Manager Documentation

The following SMARTS documents are relevant to users of the InCharge Service Assurance Management product suite.

- *An Introduction to InCharge Service Assurance Manager*
- *InCharge Service Assurance Manager Configuration Guide*
- *InCharge Service Assurance Manager Failover System User's Guide*
- *InCharge Service Assurance Manager User's Guide for Business Impact Manager*

The following SMARTS documents are relevant to InCharge Service Assurance Manager adapters.

- *InCharge Service Assurance Manager Notification Adapters User's Guide*
- *InCharge Service Assurance Manager Adapter Platform User's Guide*

- *InCharge XML Adapter User's Guide*
- *InCharge Service Assurance Manager User's Guide for Remedy Adapter*
- *InCharge Service Assurance Manager User's Guide for Concord eHealth Adapter*
- *InCharge Service Assurance Manager User's Guide for InfoVista Adapter*

Common Abbreviations and Acronyms

The following lists common abbreviations and acronyms that are used in the InCharge guides.

ASL	Adapter Scripting Language
CDP	Cisco Discovery Protocol
ICIM	InCharge Common Information Model
ICMP	Internet Control Message Protocol
IDS	Incremental Device Support
IP	Internet Protocol
MSFC	Multilayer Switch Feature Card
MIB	Management Information Base
MODEL	Managed Object Definition Language
RSFC	Router Switch Feature Card
RSM	Router Switch Module
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
VLAN	Virtual Local Area Network

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1

Introduction

This chapter describes the basic operation and functionality of the InCharge Service Assurance Manager Failover System. It includes a description of the Failover System's components. It also describes how and when the Failover System is activated.

How the Service Assurance Failover System Works

The Service Assurance Failover System ensures that Service Assurance is monitoring running application servers when the primary Global Manager becomes unavailable. Redundancy is provided by a second Global Manager that serves as a failover for the primary Global Manager. The Service Assurance Failover System monitors the primary Global Manager and periodically copies its repository file and the contents of certain directories to the secondary Global Manager, preserving important topology and configuration information.

If a failure occurs, the secondary Global Manager is automatically started. The secondary Global Manager registers with the InCharge Broker using the name of the primary Global Manager. Clients of the primary Global Manager, such as consoles and adapters, that become disconnected automatically reconnect to the secondary Global Manager.

When the Failover System Is Activated

The Failover System is activated when it cannot connect to the primary Global Manager. When activated, the system performs the following actions:

- Starts the secondary Global Manager.
- Starts any clients that do not provide an automatic reconnect ability. (This requires changes to the *ic-bak-monitor* script that are beyond the scope of this document.)
- Sends e-mail that indicates that the secondary Global Manager was started.

Figure 1 illustrates the operation of the Failover System when the primary Global Manager is running. The following scripts are components of the Failover System:

- *ic-bak-monitor* periodically monitors the status of the primary Global Manager.
- *ic-bak-sync* periodically transfers the repository file and other important configuration files from the primary Global Manager to the secondary Global Manager.
- *ic-bak-reset* shuts down the secondary Global Manager, synchronizes the repository and other configuration files, and restarts the primary Global Manager. *ic-bak-reset* is not run under normal operation of the primary Global Manager. It is only used manually to revert the configuration back to normal with the primary Global Manager running.

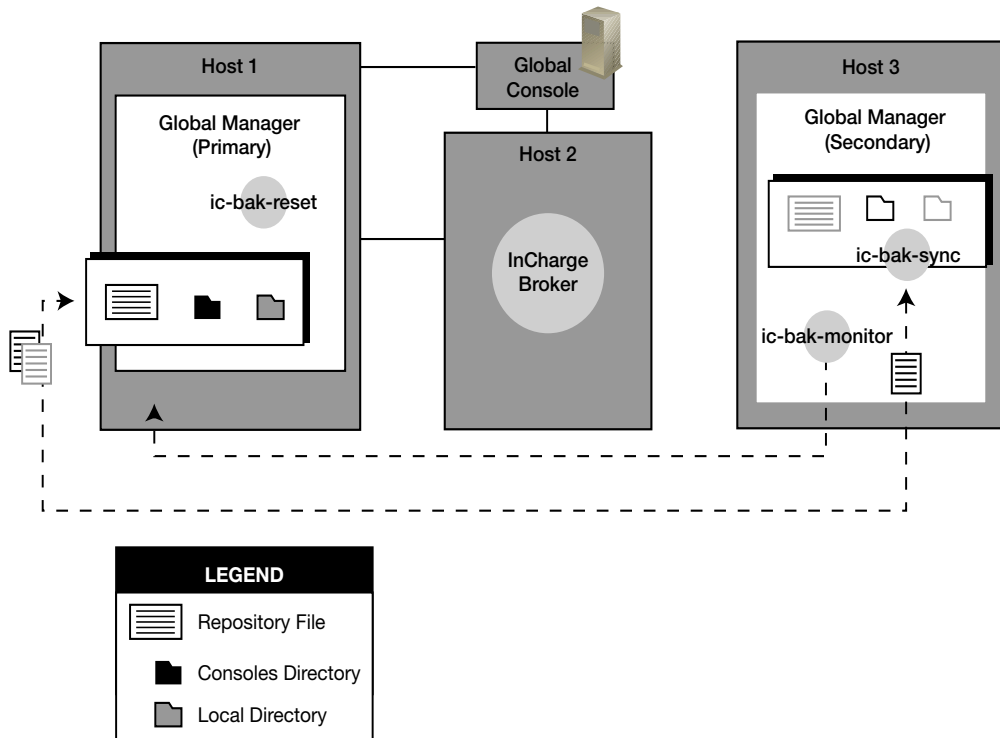


Figure 1: Normal Operation of Primary Global Manager

Figure 2 illustrates the operation of the Failover System when the secondary Global Manager becomes active. Clients, such as the Global Console, automatically reconnect to the secondary Global Manager.

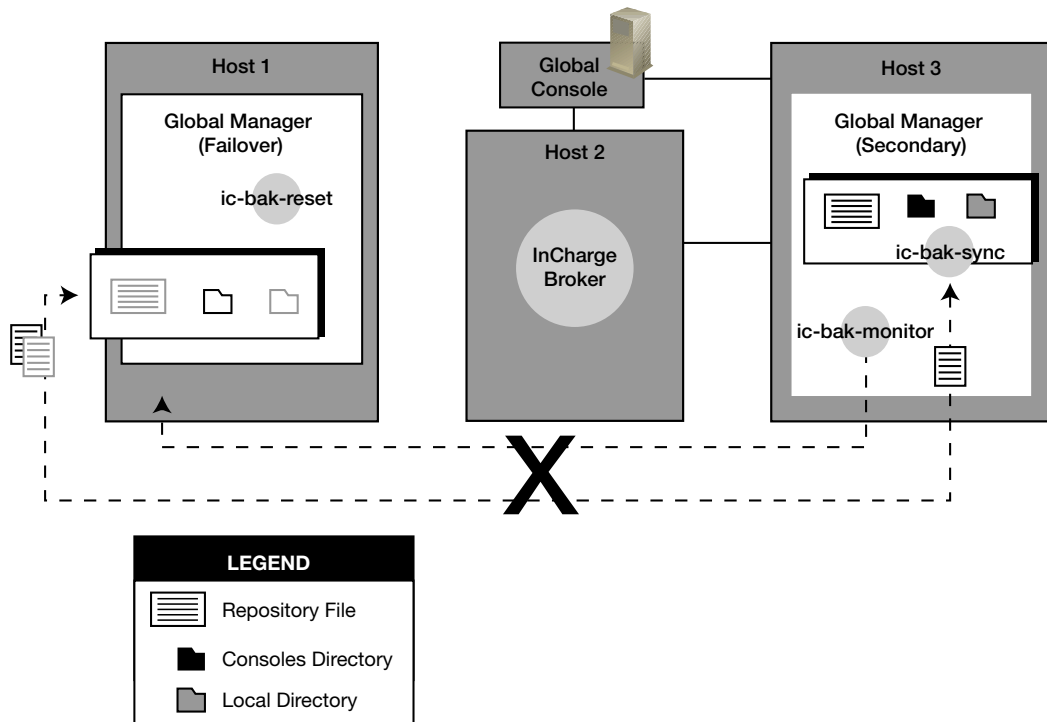


Figure 2: Operation of the Secondary Global Manager

Note: The "X" indicates that `ic-bak-monitor` and `ic-bak-sync` stop monitoring the primary Global Manager when the failover system is started.

When you invoke the `ic-bak-reset` script, the latest repository file and other configuration information is copied to the primary Global Manager. The primary Global Manager is then restarted and resumes monitoring the managed environment. The `ic-bak-sync` and `ic-bak-monitor` scripts must be restarted and their respective lock files deleted when the primary Global Manager is brought back up by the reset script. For more information about restoring the primary Global Manager, see [Restoring the Primary Global Manager](#) on page 26.

Service Assurance Failover System Components

This section describes the components required to assemble a functioning Failover System, including the components that are not exclusive to the Failover System.

- InCharge Broker
- Primary Global Manager
- Secondary Global Manager
- Failover System

A more detailed description of each component is provided below.

InCharge Broker

The InCharge Broker maintains a registry of running Global Managers. Global Manager clients, such as consoles and adapters, query the broker to determine the name of the host where the Global Manager is running and the TCP port where the Global Manager is accepting connections. Clients use the host name and TCP port to establish a connection with the Global Manager.

When the primary Global Manager becomes unavailable, the Failover System starts the secondary Global Manager. The secondary Global Manager registers with the InCharge Broker, using the same name as the primary Global Manager.

SMARTS recommends that you install a broker on a separate host from the primary Global Manager. If necessary, you can install it on the same host as the secondary Global Manager. There is a risk, however, that if the host goes down, the Broker connection is lost until the host is recovered.

Configuration Notes

During installation, record the location of the broker and specify this value for both the primary and secondary Global Managers. The location of the broker is specified in the **BASEDIR**/*smarts/local/conf/runcmd_env.sh* file.

Primary Global Manager

The primary Global Manager is responsible for monitoring the managed environment. It starts and operates as described in the Service Assurance documentation set. After the primary Global Manager registers with the InCharge Broker, all clients connect to the primary Global Manager.

The primary Global Manager must be installed on a host separate from all components of the Service Assurance Failover System except for the *ic-bak-reset*, which must be run on the same host as the primary Global Manager.

Configuration Notes

The Failover System automatically copies the repository file and additional configuration files from the primary Global Manager to the secondary Global Manager.

The *ics.conf* configuration file must be synchronized between the two Global Managers. Both Global Managers should use identical configurations. To accomplish this you can either manually synchronize the two files or you can configure the Failover System to perform the file synchronization.

If you have modified any of the other configuration files under **BASEDIR**/*smarts/local/conf/ics*, you should copy those to the secondary Global Manager as well.

Secondary Global Manager

The secondary Global Manager runs when the Failover System has determined that the primary Global Manager is unavailable. The configuration of the secondary Global Manager should be identical to that of the primary Global Manager.

Configuration Notes

You must configure the Failover System configuration files that are installed with the secondary Global Manager.

After installation, modify the secondary Global Manager service so that it does not start if its host system is restarted.

Failover System Files and Scripts

The Failover System files and scripts are installed with the Global Manager product. It is comprised of the following components:

- *ic-bak-common* file
- *ic-bak-conf* configuration file
- *ic-bak-monitor* script
- *ic-bak-reset* script
- *ic-bak-sync* script
- *ic-bak-sendmail.asl* script

You should configure the local versions of the Failover System files and scripts that are installed with the secondary Global Manager. The following section describes each component. For more information about configuring the Failover System, see [Configuring the Failover System Scripts](#) on page 16.

ic-bak-common

The *ic-bak-common* file contains functions that are used by the various Failover System scripts. You must edit this script to set the value of the SMHOME variable to the location where the secondary Global Manager is installed. Using the default installation path, this location is */opt/InCharge6/SAM/smarts*. You may also need to edit this file if you use a different method for transferring files between the primary and secondary Global Managers. The default location of the *ic-bak-common* file is **BASEDIR**/*smarts/script/ic-bak*.

ic-bak-conf

The *ic-bak-conf* configuration file specifies parameters required by the Failover System scripts. This information includes the location for all the components of the Failover System, the location of the broker, which directories under **BASEDIR**/*smarts* to copy, and the method used to transfer the repository file from the primary Global Manager to the secondary Global Manager.

The default *ic-bak-conf* file is located in the **BASEDIR**/*smarts/script/ic-bak* directory on the host where the secondary Global Manager and the host where the primary Global Manager are installed.

ic-bak-monitor

The *ic-bak-monitor* script runs on the secondary Global Manager host and monitors the status of the primary Global Manager. It regularly performs a number of tests to determine the status of the primary Global Manager, as described in [When the Failover System Is Activated](#) on page 2.

You must edit this script to set the value of the SMHOME variable to the location where the secondary Global Manager is installed. Using the default installation path, this location is */opt/InCharge6/SAM/smarts*. The default *ic-bak-monitor* script is located in the **BASEDIR**/*smarts/script/ic-bak* directory on the host where the secondary Global Manager is installed.

The local copies *ic-bak-monitor* and the *ic-bak-sync* scripts are invoked by cron on UNIX systems or the SMARTS *sm_sched* utility on Windows systems. You will need to configure the system's scheduling mechanism to invoke these scripts on a regular basis.

ic-bak-sync

The *ic-bak-sync* script runs on the secondary Global Manager host and copies the following from the primary Global Manager to the secondary Global Manager:

- Repository file
- Contents of directories you specify

The name of the repository file is taken from the name of the Global Manager. For example, if the name of the Global Manager is INCHARGE-SA, the name of its repository file will be *INCHARGE-SA.rps*.

When you configure the Failover System, you also need to determine the method by which the *ic-bak-sync* script copies the repository file from the primary host to the failover. Supported methods include RCP, SCP, and FTP on UNIX; on Windows, the files can be transferred by network-shared folders.

You must edit this script to set the value of the SMHOME variable to the location where the secondary Global Manager is installed. Using the default installation path, this location is */opt/InCharge6/SAM/smarts*. The default *ic-bak-sync* file is located in the **BASEDIR**/*smarts/script/ic-bak* directory on the host where the secondary Global Manager is installed.

The local copies *ic-bak-sync* and the *ic-bak-monitor* scripts are invoked by cron on UNIX systems or the SMARTS *sm_sched* utility on Windows systems. You will need to configure the system's scheduling mechanism to invoke these scripts on a regular basis.

ic-bak-reset

The *ic-bak-reset* script runs on the primary Global Manager host and is used to shutdown the secondary Global Manager and restart the primary Global Manager. After the problem that caused the primary Global Manager to be unavailable is resolved, you can invoke the *ic-bak-reset* script.

When invoked, the *ic-bak-reset* script shuts down the secondary Global Manager. It also copies the repository file and the contents of specified directories from the secondary Global Manager to the primary Global Manager. These specified directories contain Service Assurance files that may have changed while the secondary Global Manager was running (for example, the contents of **BASEDIR**/*smarts/local/consoles*). Finally, *ic-bak-reset* restarts the primary Global Manager.

You must edit this script to set the value of the SMHOME variable to the location where the primary Global Manager is installed. Using the default installation path, this location would be */opt/InCharge6/SAM/smarts*.

ic-bak-sendmail.asl

The *ic-bak-sendmail.asl* script is an adapter that sends e-mail to specified addresses when the Failover System starts the secondary Global Manager. The default script is located in **BASEDIR**/*smarts/rules/ics*.

The script reads the recipient and sender e-mail addresses as defined in the *ic-bak-conf* file. For more information on configuring these e-mail addresses, see [Editing the *ic-bak-conf* Configuration File on UNIX](#) on page 18.

Location of Failover System Files

The Failover System components are installed with the Global Manager. Typically, SMARTS software is installed into the **BASEDIR**/*smarts* directory.

Table 4 lists the files included with the Failover System and their default locations. After you edit these files using the *sm_edit* utility, the modified version of the file is placed in the corresponding directory under **BASEDIR**/*smarts/local*. Refer to the *InCharge System Administration Guide* for more information about this utility.

DIRECTORY	FILE
BASEDIR /smarts/script/ic-bak	<i>ic-bak-common</i> or <i>ic-bak-common.cmd</i> <i>ic-bak-conf</i> or <i>ic-bak-conf.cmd</i> <i>ic-bak-monitor</i> or <i>ic-bak-monitor.cmd</i> <i>ic-bak-reset</i> or <i>ic-bak-reset.cmd</i> <i>ic-bak-sync</i> or <i>ic-bak-sync.cmd</i>
BASEDIR /smarts/rules/ics	<i>ic-bak-sendmail.asl</i>

Table 4: Location of Failover System Files

2

Installing and Configuring the Failover System

This chapter describes how to set up and configure the InCharge Service Assurance Failover System. Certain procedures require that you configure the operating system on the host where the SMARTS software is installed.

Deployment Considerations

Before you install and configure the Service Assurance Failover System, you should consider these deployment suggestions.

- The primary Global Manager, secondary Global Manager, and InCharge Broker should be installed on different hosts.
- The Failover System, except for the *ic-bak-reset* script, should be configured on the host where the secondary Global Manager is installed.
- You need to decide on the method that the *ic-bak-sync* script uses to transfer files from the host where the primary Global Manager is running to the host where the secondary Global Manager is installed. Supported UNIX transfer methods are RCP, SCP, and FTP. For Windows, transfer the files by creating network-shared folders. You specify the method of file transfer in the *ic-bak-conf* script. You should configure the systems and verify that the file transfer works correctly prior to running the Failover System.

- The Service Assurance security files, *serverConnect.conf* and *clientConnect.conf*, must be configured properly on the hosts where the primary and secondary Global Managers are installed. The file configuration should match on both servers.
- Satisfy the hardware requirements for Service Assurance Manager. For more information on these requirements, see the *InCharge Installation Guide*.

Installation and Configuration Overview

This section provides an overview of the installation and configuration steps in the order you should perform them. Detailed instructions for each step are provided in subsequent sections. In some cases, information regarding a particular step is available in another document. The steps employ three different hosts as discussed in the deployment considerations.

- 1** Install the InCharge Broker as a service. To install the broker, install the Global Manager product on a separate host as described in the installation guide.

If you install the broker on its own host, do not install the Global Manager as a service. This prevents the Global Manager from automatically starting when the system reboots.

- 2** Install the primary Global Manager according to the instructions in the *InCharge Installation Guide*.

It is recommended that you configure both the primary and the secondary Global Managers to use a fixed port number. Setting a fixed port number will help the failover system to better determine the start of the primary Global Manager even when the broker is unavailable or does not have information about the Global Manager. To specify a fixed port number, you must modify the *ic-sam-server* services for both the primary and secondary Global Managers. This procedure is described in [Preventing a Global Manager From Starting](#) on page 15. You must also specify this port number in the *ic-bak-conf* script.

When you are prompted for the host and port of the broker, enter the hostname of the system where you installed the broker in Step 1. The port number should be 426.

For information regarding Step 2, see [Installing the Primary and Secondary Global Managers](#) on page 14.

- 3** Install the secondary Global Manager according to the instructions in the *InCharge Installation Guide*.

Configure the secondary Global Manager to use the same port number as the primary Global Manager by modifying the *ic-sam-server* service as described in [Preventing a Global Manager From Starting](#) on page 15.

When you are prompted for the host and port of the broker, enter the hostname of the system where you installed the broker in Step 1. The port number should be 426.

After the secondary Global Manager is installed, you need to complete additional configuration steps:

- Configure the secondary Global Manager so that it will not start if the host is rebooted.

For more information about Step 3, see [Installing the Primary and Secondary Global Managers](#) on page 14.

- 4** Configure the file transfer method that the *ic-bak-sync* script uses to copy files from the primary Global Manager to the secondary Global Manager. You must select a file transfer method that can occur automatically without user intervention.

For more information, see [Determining a Repository File Transfer Method](#) on page 15.

- 5** Configure the Failover System.

- Provide the appropriate values to the *ic-bak-conf* script. You are required to set the variables.
- Create two cron jobs on UNIX or, on Windows, set up the *sm_sched* utility to regularly run the *ic-bak-monitor* and *ic-bak-sync* scripts.

For more information regarding this procedure, see [Configuring the Failover System Scripts](#) on page 16.

- 6** Configure the security settings on each host where the Service Assurance software is installed. For more information, see [Configuring Failover System Security](#) on page 24.
- 7** Test the Failover System to ensure that it operates as expected. For more information, see [Testing the Failover System](#) on page 26.

Installing the InCharge Broker

SMARTS recommends that you install the InCharge Broker on a different host than the primary and secondary Global Managers. Running the broker on a separate host provides an extra measure of redundancy. If the host on which the broker is running should fail, you can start the broker installed on the secondary Global Manager.

Instructions for installing the broker are provided in the *InCharge Installation Guide*. The broker is a component of the Global Manager product, so installing a Global Manager also installs the InCharge Broker.

Because this procedure also installs a Global Manager, you should not install the Global Manager as a service. This prevents the Global Manager from starting when the system is rebooted.

Installing the Primary and Secondary Global Managers

The procedures for configuring the primary and secondary Global Managers are similar and are described in this section.

The primary and secondary Global Managers should be installed as services on separate hosts. You should configure the Failover System on the host of the secondary Global Manager.

To install both Global Managers, follow the instructions in the *InCharge Installation Guide*. During the installation process you will be prompted for the host name and port number of the broker. Specify the hostname of the system where you installed the broker. Typically, the broker listens on port 426. You can specify the name of the host or create an alternative hostname—for example, a DNS alias such as *smarts-broker*.

When the installations have finished, configure the secondary Global Manager so that it does not start when the system is rebooted.

Preventing a Global Manager From Starting

The following sections describe how to stop a Global Manager and how to configure the Global Manager so that it does not start when the system is rebooted. To perform these commands, you need root or administrator privileges.

Modifying the Global Manager Service

To stop a Global Manager started as a service, invoke the following command from the **BASEDIR**/*smarts*/*bin* directory:

```
# ./sm_service stop ic-sam-server
```

To prevent the Global Manager from starting when the system is rebooted, you must modify the *ic-sam-server* service as shown below.

```
# ./sm_service install ic-sam-server \  
    --force \  
    --startmode=manual  
    /opt/InCharge6/SAM/smarts/bin/sm_server  
    --name=INCHARGE-SA  
    --config=ics  
    --port=<PORT>  
    --ignore-restore-errors  
    --output
```

Replace <PORT> with the port number used by both the primary and secondary Global Managers.

Determining a Repository File Transfer Method

The Failover System, specifically the *ic-bak-sync* script, regularly transfers the contents of the repository file from the primary Global Manager to the secondary Global Manager. Regularly copying these files ensures that the secondary Global Manager has an up-to-date representation of the managed topology and the most recent configuration information.

Supported UNIX File Transfer Methods

To transfer these files, the *ic-bak-sync* script invokes a standard file transfer method. You can choose from one of the following file transfer protocols:

- RCP — The **r**cp command does not prompt for a password when establishing a connection to a remote system. Instead, the local user account must exist on the remote system and have permission to execute remote commands by rsh.

- SCP — The **scp** command can perform a secure transfer. To use it, you must configure ssh so that the scp command can execute without prompting for a password.
- FTP — The **ftp** command performs the file transfer by recursively copying the entire contents of the specified directory. This is the least secure method for transferring files.

SMARTS recommends that you use SCP as it provides the most secure method of transferring files between two hosts. Regardless of which method is chosen, you must configure it in such a way that it does not require user intervention. Because the file transfer is invoked programmatically, it is not possible to provide a password at the terminal.

When you finish configuring the file transfer method, test it under the user account from which it will run. Make sure that the login to the primary Global Manager from the secondary Global Manager successfully completes without any user intervention. Make sure that the user has adequate permissions to transfer files between the two hosts and the two sets of Service Assurance Manager installation directories.

Supported Windows File Transfer Method

On Windows, files are transferred by sharing folders. The folders containing the primary and failover configuration and repository files should be shared on the network. Make sure that you edit the *ic-bak-conf* file to specify your shared folders.

Note: It is important that the Windows server is configured correctly to allow file transfer to occur. Therefore, it is imperative that you test for permissions and prompting errors before you implement the Failover System.

Configuring the Failover System Scripts

You must complete these procedures to configure the Failover System:

- Edit the local copy of the *ic-bak-conf* script. The parameters specified in this file are used by the Failover System scripts. The parameters differ slightly between UNIX and Windows.
- Configure the system on which the Failover System is installed to periodically invoke the *ic-bak-sync* and *ic-bak-monitor* scripts.

Note: Be sure that **BASEDIR**/*smarts/local/conf/ics/ics.conf* are identical on both the primary Global Manager and secondary Global Manager hosts. After setting up the configurations on one host, you can copy that file to the host of the other Global Manager.

Modifying InCharge Files

As part of the InCharge deployment and configuration process, you will need to modify certain files. User modifiable files include InCharge tool scripts, configuration files, rule set files, and templates. Original versions of these files are installed into appropriate subdirectories under the **BASEDIR**/*smarts/* hierarchy. For example, original versions of Global Manager configuration files are installed to **BASEDIR**/*smarts/conf/ics*.

To edit a user modifiable file, create a local copy of the file in **BASEDIR**/*smarts/local* or one of its subdirectories. For example, a modified *ics.conf* file should be saved to **BASEDIR**/*smarts/local/conf/ics*. InCharge software is designed to first search for user modifiable files in **BASEDIR**/*smarts/local* or one of its subdirectories. If a modified version of a file is not found in the local area, InCharge software then searches appropriate nonlocal directories.

Note: Original versions of files may be changed or updated as part of an InCharge software upgrade. However, files located in **BASEDIR**/*smarts/local* are always retained during an upgrade.

To facilitate proper file editing, SMARTS provides the *sm_edit* utility. When used to modify an original version of a file, this utility automatically creates a local copy of the file and places it in the appropriate location under **BASEDIR**/*smarts/local*. This ensures that the original version of the file remains unchanged. In both UNIX and Windows environments, you can invoke *sm_edit* from the command line. Optionally, you can configure Windows so that *sm_edit* is automatically invoked when user-modifiable files are double-clicked in Windows Explorer.

To invoke the *sm_edit* utility from the command line, specify the path and the name of the file you want to edit under **BASEDIR**/*smarts*. For example, to edit the configuration file for the Global Manager, you invoke the *sm_edit* utility as follows:

```
% BASEDIR/smarts/bin/sm_edit conf/ics/ics.conf
```

The *sm_edit* utility automatically creates a local copy of the *ics.conf* file in the **BASEDIR**/*smarts/local/conf/ics* directory, if necessary, and opens the file in a text editor. If a local version of the file already exists, the *sm_edit* utility opens the local version in a text editor. In addition, *sm_edit* creates any necessary directories.

For more information about how to properly edit user modifiable InCharge files and how to use the *sm_edit* utility, refer to the *InCharge System Administration Guide*.

Editing the *ic-bak-conf* Configuration File on UNIX

The configuration parameters for the Failover System are specified in the local copy of *ic-bak-conf* script, located in the **BASEDIR**/*smarts/local/script/ic-bak* directory. Table 5 lists the configuration parameters of *ic-bak-conf* file on UNIX.

VARIABLE	DEFAULT VALUE	DESCRIPTION
IC_BAK_BROKER_HOST	localhost:426	Host where the InCharge Broker is running.
IC_BAK_DOMAIN_NAME	INCHARGE-SA	Name used by the primary and secondary Global Managers to register with the broker.
IC_BAK_SM_SERVICE	ic-sam-server	Name of the service associated with the Global Manager during installation.
IC_BAK_PSS_HOST	primary_server	Host name of the system running the primary Global Manager.
IC_BAK_PSS_PORT	0	The port on PSS_Host where the primary server is running. A value of 0 indicates that there is no fixed port for the PSS.
IC_BAK_SMHOME_PSS	<i>/opt/InCharge5/smarts</i>	Location where the primary Global Manager is installed. You must modify this value.
IC_BAK_PSS_LOGS	<i>\${IC_BAK_SMHOME_PSS}/local/logs</i>	Location of logfiles on primary Global Manager.
IC_BAK_PSS_REPOS	<i>\${IC_BAK_SMHOME_PSS}/local/repos/icf</i>	Location of repository file on primary Global Manager.
IC_BAK_BSS_HOST	secondary_server	Host name of the system where the secondary Global Manager is installed.

VARIABLE	DEFAULT VALUE	DESCRIPTION
IC_BAK_BSS_PORT	0	The port on BSS HOST where the secondary server is running. A value of 0 indicates that there is no fixed port for BSS.
IC_BAK_SMHOME_BSS	/opt/InCharge5/smarts	Location where the secondary Global Manager is installed. You must modify this value.
IC_BAK_BSS_LOGS	\${IC_BAK_SMHOME_BSS}/local/logs	Location of logfiles on secondary Global Manager.
IC_BAK_BSS_REPOS	/local/repos/icf	Location of repository file on secondary Global Manager.
IC_BAK_PING_RETRY_COUNT	5	The number of times a server is pinged to determine if it is accessible.
IC_BAK_PING_SLEEP_INTERVAL	1	The amount of time between each ping attempt.
IC_BAK_TRANSFER_TYPE	rcp	File transfer method used by the <i>ic-bak-sync</i> script.
IC_BAK_TRANSER_COMMAND_PATH	/bin	The full path to the directory of the transfer program.
HOME	/special/work/user	[Only used when transfer type is ftp.] Home directory of the user that invokes the ftp command. Used to locate <i>.netrc</i> file.
IC_BAK_USER	user	[Only used when transfer type is rcp or scp.] User name required to invoke the rcp or scp command.
IC_BAK_DIRS_TO_COPY	local/consales	List of directories to be copied between the primary and secondary Global Managers. If this variable contains a list of directories, use a space separator. The location of the directories is relative to BASEDIR /smarts.

VARIABLE	DEFAULT VALUE	DESCRIPTION
IC_BAK_SMTP_SERVER	mailhost	Host name of the mail server. Used to send e-mail to when the secondary Global Manager is invoked.
IC_BAK_SENDER	admin@company.com	Sender's email address as it will be used in the ic-bak-sendmail.asl file.
IC_BAK_RECIPIENTS	admin@company.com	Comma separated list of e-mail addresses to which to send e-mail.

Table 5: Configuration Parameters for Failover System on UNIX

Editing the ic-bak-conf Configuration File on Windows

The configuration parameters for the Failover System are specified in the *ic-bak-conf* file, located in the **BASEDIR**/*smarts/local/script/ic-bak* directory. Table 6 lists the configuration parameters of *ic-bak-conf* file on Windows.

VARIABLE	DEFAULT VALUE	DESCRIPTION
IC_BAK_BROKER_HOST	localhost:426	Host where the InCharge Broker is running.
IC_BAK_DOMAIN_NAME	INCHARGE-SA	Name used by the primary and secondary Global Managers to register with the broker.
IC_BAK_SM_SERVICE	Service Assurance Manager Server	Name of the service associated with the InCharge Global Manager.
IC_BAK_PSS_HOST	primary-server	Host name of the system running the primary Global Manager.
IC_BAK_PSS_PORT	0	Fixed port number where the primary Global Manager is running. If not using a fixed port number, use a value of 0.
IC_BAK_SMHOME_PSS	C:\InCharge5\smarts	Location where the primary Global Manager is installed. You must modify this value.
IC_BAK_PSS_LOGS	%IC_BAK_SMHOME_PSS%\local\logs	Location of logfiles on primary Global Manager.
IC_BAK_PSS_REPOS	%IC_BAK_SMHOME_PSS%\local\repos\ict	Location of repository file on primary Global Manager.

VARIABLE	DEFAULT VALUE	DESCRIPTION
IC_BAK_BSS_HOST	secondary-server	Host name of the system where the secondary Global Manager is installed.
IC_BAK_BSS_PORT	0	Fixed port number where the secondary Global Manager is running. A value of 0 indicates that there is no fixed port number.
IC_BAK_SMHOME_BSS	C:\InCharge5\smarts	Location where the secondary Global Manager is installed. You must modify this value.
IC_BAK_BSS_LOGS	%IC_BAK_SMHOME_BSS%\local\logs	Location of logfiles on secondary Global Manager.
IC_BAK_BSS_REPOS	%IC_BAK_SMHOME_BSS%\local\repos\icf	Location of repository file on secondary Global Manager.
IC_BAK_PING_RETRY_COUNT	5	The number of times a server is pinged to determine if it is accessible.
IC_BAK_PING_SLEEP_COUNT	500	The amount of time between each ping attempt in terms of an integer count.
IC_BAK_TRANSFER_TYPE	share	File transfer method used by the <i>ic-bak-sync</i> script.
IC_BAK_DIRS_TO_COPY	local\consoles	List of directories to be copied between the primary and secondary Global Managers. If this variable contains a list of directories, use a comma separator. The location of the directories is relative to BASEDIR /smarts.
SHARED_FOLDER_BSS	InCharge-SA-BSS	The name of the shared directory for the secondary Global Manager.
PATH_TO_SMHOME_BSS	smarts	Remaining path to the smarts directory from the shared folder of the secondary Global Manager.

VARIABLE	DEFAULT VALUE	DESCRIPTION
PATH_TO_BSS_REPOS	smarts\local\repos\icf	Remaining path to the "smarts" directory from the shared folder to SMHOME_BSS. For example, if C:\InCharge-SA on the PSS is shared as "InCharge-SA-PSS" then: SHARED_FOLDER_PSS = InCharge-SA-PSS PATH_TO_SMHOME_PSS = smarts PATH_TO_PSS_REPOS = smarts\local\repos\icf
SHARED_FOLDER_PSS	InCharge-SA-PSS	The name of the shared directory for the primary Global Manager.
PATH_TO_SMHOME_PSS	smarts	Remaining path to the smarts directory from the shared folder of the primary Global Manager.
PATH_TO_PSS_REPOS	smarts\local\repos\icf	Remaining path to the "smarts" directory from the shared folder to SMHOME_PSS
REMOTE_USER_ACCOUNT	N/A	User name required to connect to shared folder (if necessary)
REMOTE_PASSWORD	N/A	Password required to connect to shared folder (if necessary).
IC_BAK_SMTP_SERVER	mailhost	Host name of the mail server. Used to send e-mail to when the secondary Global Manager is invoked.
IC_BAK_SENDER	admin@company.com	Sender's email address as it will be used in the ic-bak-sendmail.asl file.
IC_BAK_RECIPIENTS	admin@company.com	Comma separated list of e-mail addresses to which to send e-mail.
SMHOME	C:\InCharge5\smarts	This is the location of your Service Assurance Manager software. You must modify this value.

Table 6: Configuration Parameters for Failover System on Windows

Verifying the SMHOME Variable

The Failover System scripts use the SMHOME variable to determine the location where the Service Assurance software is installed. Verify that the value of SMHOME is correct for each of the following scripts:

- *ic-bak-monitor*
- *ic-bak-sync*
- *ic-bak-reset*
- *ic-bak-common*
- *ic-bak-conf*

Scheduling the Failover Monitor and Failover Sync Scripts

The *ic-bak-monitor* and *ic-bak-sync* scripts run on the host where the secondary Global Manager is installed and must be invoked by the system's scheduling facility. On UNIX systems this is typically cron. Consult the documentation for your UNIX system for more information about configuring the system to invoke these commands.

On Windows systems this is accomplished using the SMARTS *sm_sched* utility. For more information about using this utility, refer to [Scheduling with *sm_sched*](#) on page 24.

SMARTS suggests that you configure the scheduling facility to invoke the *ic-bak-monitor* a minimum of every 5 minutes and the *ic-bak-sync* script a minimum of every 15 minutes. The scripts should run from the **BASEDIR**/*smarts/local/script/ic-bak* directory. When these scripts are invoked, the Failover System is running.

The *ic-bak-monitor*, *ic-bak-sync*, and *ic-bak-reset* scripts record important information to their log files. These log files are located in the **BASEDIR**/*smarts/local/logs* directory and the name of each log file is taken from the name of the script.

Note: The log files for the *ic-bak-monitor* and *ic-bak-sync* scripts are located on the same host as the secondary Global Manager and the log file for the *ic-bak-reset* script is located on the same as the primary Global Manager.

Scheduling with `sm_sched`

On Windows, use the `sm_sched` utility to schedule the `ic-bak-monitor` and `ic-bak-sync` scripts to run at the appropriate intervals. You list the scripts and time intervals in a control file used by the utility.

Assuming you use the default control file name (`sched.conf`) and store it in the default location (**`BASEDIR/smarts/local/conf`**), simply issue the following command to set the schedule to run the failover scripts:

```
BASEDIR\smarts\bin>sm_sched
```

The following sample illustrates the proper syntax of the control file and how to schedule the `ic-bak-monitor` and `ic-bak-sync` scripts to run in the recommended intervals:

```
# Every 5 minutes, run the monitor script.  
00:05:00 BASEDIR\smarts\local\script\ic-bak\ic-bak-monitor  
# Every 15 minutes, run the sync script.  
00:15:00 BASEDIR\smarts\local\script\ic-bak\ic-bak-sync
```

For more information about how to use `sm_sched`, refer to [Scheduling InCharge Commands](#) on page 27.

Configuring Failover System Security

Service Assurance enforces an access control mechanism that requires authentication for any program connecting to a Global Manager or to the broker. Because of this, you need to configure the `clientConnect.conf` and `serverConnect.conf` files on the hosts where the following software is running:

- Primary Global Manager
- Secondary Global Manager
- InCharge Broker

The Failover System scripts run with the privileges of the user who invokes them. This user must have the following permissions:

- Read access to the `clientConnect.conf` file on the system where the script is invoked. This is a property of the user account on the local system.
- Permission to invoke the program that performs the file transfer on both hosts where the Global Managers are installed.

- Administrative privileges from Service Assurance to invoke InCharge commands from the script and establish a connection with a Global Manager.

The *ic-bak-monitor* and *ic-bak-sync* scripts run on the host where the secondary Global Manager is installed. The user account under which these scripts run requires the following configuration:

- Authentication record in the *clientConnect.conf* on the host where the scripts (and the secondary Global Manager) run. The authentication record must not prompt for a user name or password.
- Authentication record in the *serverConnect.conf* file on the hosts where the failover and primary Global Managers are installed. This authentication record must correspond to the authentication record you specified in the *clientConnect.conf* file.
- The InCharge Broker can be installed on a host other than those where the primary and secondary Global Managers are installed. If using this method, an authentication record is needed in the *serverConnect.conf* of the broker that corresponds to the authentication record in the *clientConnect.conf* file.

The *ic-bak-reset* script runs on the host where the primary Global Manager runs. Because this script must be manually invoked by an administrator, you can configure the security files so that a user name and/or password prompt is required.

- Authentication record in the *clientConnect.conf* on the host where the scripts (and the primary Global Manager) run.
- Authentication record in the *serverConnect.conf* files on the hosts where the primary and the secondary Global Managers run. This authentication record must correspond to the authentication record you specified in the *clientConnect.conf* file.
- The InCharge Broker can be installed on a host other than those where the primary and secondary Global Managers are installed. If using this method, an authentication record is needed in the *serverConnect.conf* that corresponds to the authentication record in the *clientConnect.conf* file.

Testing the Failover System

A pre-requisite for testing the Failover System is to test the file transfer methods between the primary and secondary hosts to the configured directories. Once you confirm that files transfer successfully, then you can test the Failover System. The simplest way to test the Failover System is to run it.

- Start the primary Global Manager and verify that it is running properly. Attach a console and see that you are receiving notifications.
- Check that the *ic-bak-monitor* and *ic-bak-sync* scripts are working properly. Is a repository file copied from the primary Global Manager to the secondary Global Manager?

The repository file is located in the **BASEDIR**/*smarts/local/repos/ics* directory. The repository file will have the name of the Global Manager, *INCHARGE-SA.rps*, for example.

- Are the scripts writing information to their log files?
- You can either stop the primary Global Manager or remove its connection from the network. After several minutes, the secondary Global Manager should start and begin monitoring the managed environment. Did your console automatically re-attach to the Global Manager? Is the secondary Global Manager registered with the broker? If there were any problems with the secondary Global Manager, please contact SMARTS Technical Support.

Restoring the Primary Global Manager

When the failure that prevented the primary Global Manager from monitoring the managed environment is resolved, you can bring the primary Global Manager back online. To restore the primary Global Manager to an operational state, perform the following steps:

- 1 Invoke the *ic-bak-reset* script from the host where the primary Global Manager is installed. This script performs the following actions:
 - Invokes a repository save on the secondary Global Manager.
 - Shuts down the secondary Global Manager.
 - Copies the repository file from the secondary Global Manager to the primary Global Manager.

- Copies the contents of the directories listed in the `IC_BAK_DIRS_TO_COPY` variable from the secondary Global Manager to the primary Global Manager.
 - Starts the primary Global Manager.
- 2 Remove the lock files created by the `ic-bak-monitor` and `ic-bak-sync` scripts to re-enable these scripts. The lock files are located in the **BASEDIR**/`smarts/local/script/ic-bak` directory on the failover system host and are named `ic-bak-monitor.lock` and `ic-bak-sync.lock`.

Note: If the primary Global Manager is unavailable because its host failed, it will automatically restart when the host is rebooted. In this case, you should manually shut down the secondary Global Manager.

Scheduling InCharge Commands

The `sm_sched` utility is used to schedule a command or script to run at a specific interval. For example, you can have the output of `brcontrol` written to a log file on a regular basis. Or, you could run periodic checks to verify that a particular server is up and running and have an e-mail sent to the appropriate person if the server is down. The scheduling engine allows you to perform tasks at predefined times.

This utility uses control files to store configuration options and settings for the scheduled events. By default, `sm_sched` reads the control file called `sched.conf`, located in **BASEDIR**/`smarts/local/conf`. The `sm_sched` utility runs all of the jobs listed in the control file beginning two minutes from the time it is issued and repeats the jobs at the interval times specified. Up to 20 jobs may be performed simultaneously; if you have more than 20 jobs, the additional jobs are queued until the others are completed.

To modify the `sched.conf` file, you should use `sm_edit` to ensure that it is copied to **BASEDIR**/`smarts/local/conf` and it retains the proper permissions. For example, to open and modify the default `sched.conf` file, use the following command:

```
% BASEDIR/smarts/bin>sm_edit BASEDIR/smarts/conf/sched.conf
```

Creating the Control File

The control file describes a number of jobs, or tasks, that should be performed when the control file is called by `sm_sched`. A job is a line that consists of two items: a *time interval* and a *command*. Each job should be typed on an individual line within the control file using the following syntax:

```
<time interval> <command>
```

A line containing whitespace or the # character is treated as a comment line and ignored by the utility.

Time Interval

The time interval has the syntax of `hh:mm:ss` and represents the interval of time that needs to elapse (the hours, minutes, and seconds) before the job is run. For example, "1:20:10", represents an interval of one hour, twenty minutes and ten seconds. An empty field has a value of zero so "::30" represents thirty seconds and ":15" represents fifteen minutes.

Command

The command stated after the time interval can be any command issued at a UNIX or Windows command prompt. For example, in order to append the output of `brcontrol` to a log file every five minutes, the job would be stated as follows:

On UNIX:

```
00:05:00 brcontrol >>BASEDIR/smarts/local/logs/brcontrol-logs
```

On Windows:

```
00:05:00 brcontrol >>BASEDIR/smarts\local\logs\brcontrol-logs
```

Note: When using `sm_sched` to run a command that is not located in the **BASEDIR**/`smarts/bin` directory, you must type the fully-qualified path name of the command you want to run. For example, if you want to schedule a failover script located in **BASEDIR**/`smarts/local/script/ic-back`, you would enter the command as follows:

```
00:05:00 BASEDIR/smarts/local/script/ic-back/ic-bak-monitor
```

Running the `sm_sched` Utility

The syntax for running `sm_sched` is as follows:

```
sm_sched [options...] [control-file]
```

Where control-file is the path and file name of the file listing the jobs you want executed. If you leave the value empty, it is assumed you want to use the default control file, *sched.conf* located in **BASEDIR**/*smarts/local/conf*.

Options for sm_sched

The following options are available when running *sm_sched*:

OPTION	DESCRIPTION	DEFAULT VALUE
--maxjobs=<n>	Maximum number of jobs to be run simultaneously. Additional jobs listed in the control file are queued until one of the currently running jobs finishes.	20
--retries=<n>	Number of retries to attempt for each job. The job is canceled after <n> consecutive failures and no further attempt is made. If <n> is 0, then there is no limit to the number of retries.	3
--maxfails=<n>	Failure limit. The job is canceled after <n> failures. If <n> is 0, then there is no limit on the number of failures allowed.	100

Table 7: Command-Line Options for the *sm_sched* Utility

For example, to run the *sm_sched* utility using the default control file and allow a maximum of 10 jobs to run at one time, you would run the following command:

```
$ sm_sched --maxjobs=10 BASEDIR/smarts/local/conf/sched.conf
```

Results From sm_sched

Jobs listed in the control file are expected to execute without feedback. Should there be any output from the job commands, it is written to a log file called *sm_sched.log* located in **BASEDIR**/*smarts/local/logs*. Items logged by *sm_sched* are done so with a Warning severity.

Since the purpose of the *sm_sched* utility is to continuously schedule jobs, it normally does not exit. There are two conditions that would cause *sm_sched* to exit (and return an exit value):

RETURN CODE VALUE	DESCRIPTION
0	The utility has no further jobs to run.
non-zero	A problem occurred, preventing the utility from starting up or the utility could not find a file that was scheduled to run.

Table 8: *sm_sched* Exit Return Codes

Index

B

BASEDIR ix
Broker 1, 5
 Installing 14

C

Configuration Files
 clientConnect.conf 12, 24, 25
 ic-bak-conf 7, 9, 18, 20
 on UNIX 18
 on Windows 20
 Location 10
 serverConnect.conf 12, 25
Configuration Notes
 InCharge Broker 5
 Primary Global Manager 6
 Secondary Global Manager 6
Configuration Parameters 18, 20

D

Deployment 11

E

Email Adapter 9

F

Failover Manager 5
Failover System 5
 Activation 2
 Components 7
 Configuring 16
 Install location 9
 Overview 1
 Testing 26
File Transfer Method 15, 16
 Defining on UNIX 19
 Defining on Windows 21

G

Global Manager
 Primary 5, 6

Repository file 8
Restoring 26
Secondary 6

I

ic-bak-common 7
ic-bak-conf 7, 9, 18, 20
ic-bak-monitor 2, 4, 8
 Invoking 8, 23
ic-bak-reset 2, 4, 9
ic-bak-sendmail 9, 20, 22
ic-bak-sync 2, 4, 8, 15
 Invoking 8, 23
ics.conf 6
InCharge Broker
 see Broker

L

Log files 23

R

Repository File 8
 Copying 8, 15, 26
Repository File Transfer 11, 15
 RCP, SCP, FTP 15

S

Script
 ic-bak-common 7
 ic-bak-monitor 2, 4, 8
 ic-bak-reset 2, 4, 9
 ic-bak-sendmail 9, 20, 22
 ic-bak-sync 2, 4, 8, 15
 Location 10
Security 12, 24
 clientConnect.conf 12, 24, 25
 serverConnect.conf 12, 25
SMHOME Variable 23

T

Technical Support xiii

