

HP Configuration Management

Multicast Server

for the HP-UX, Solaris, and Windows® operating systems

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Installation and Configuration Guide

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Documentation Updates

The title page of this document contains the following identifying information:

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Table 1 indicates the changes made to this document since the previous release.

Table 1 Changes in This Document

Chapter	Version	Changes
Entire Guide	5.10	There were no documentation changes for this release.
Entire Guide	5.00	Revised all directory paths. The default directory paths for CM products have been revised to: <ul style="list-style-type: none">• Program Files\Hewlett-Packard\CM (Windows) And... <ul style="list-style-type: none">• HP/CM (UNIX)
Chapter 1	5.00	Page 13, removed all information regarding the now-obsolete CM Inventory Manager Server.
Chapter 4	5.00	Page 45, revised all ROMA references with the updated product name, HP Configuration Management OS Manager System Agent (CM OSM System Agent).
Appendix B	5.00	Page 57, in the appendix, Multicast Results for Reporting, removed all information regarding the now-obsolete CM Inventory Manager Server.

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Contents

1	Introduction to Multicasting	11
	Introduction	11
	Unicasting vs. Multicasting.....	11
	Benefits of Multicasting.....	12
	HP Configuration Management Multicast Server and other CM Components.....	13
	HP Configuration Management OS Manager (CM OS Manager).....	13
	HP Configuration Management Proxy Server (CM Proxy Server)	13
	Audience	13
	Documentation Map	13
	Supporting Documentation	15
2	The CM Multicast Server	17
	Benefits of Configuration Management Multicasting.....	17
	Flexible, Centralized Configuration.....	17
	Increasing Network Efficiency	18
	Guaranteed Delivery.....	18
	Results Reporting	19
	Operational Requirements.....	19
	System Requirements.....	20
	Platform Support.....	20
	The Multicast Process	20
	Multicast Phases	20
	Configuration Phase.....	22
	Collection Phase.....	23
	Distribution Phase.....	24
	Clean up-and-Reporting Phase.....	25
	Completion Status Information	26

3	Installing the CM Multicast Server	27
	Multicasting Components	27
	The CM Configuration Server Database.....	27
	CM Multicast Server Directories	28
	Installation.....	29
	UNIX Pre-Installation Notes	29
	CM Multicast Server Installation	30
	UNIX Post-Installation Note	32
	Windows Services	32
4	Configuring a CM Multicast Server Environment.....	33
	CM Configuration Server Changes	33
	The MULTICAST Class	34
	Multicast Dynamic Windows	37
	ADDRESS.....	38
	CGMTDATE	39
	CGMTTIME.....	39
	CGMTDATE and CGMTTIME Not Specified.....	39
	Time Zone Offsets	39
	Advanced Multicast Configuration Options	40
	MCELIGBL.....	40
	MORDER	40
	MWINDOW	41
	BYPASCON	41
	Creating a Multicast Instance	42
	Associating Groups with a Multicast Instance	43
	Multicast and the CM OS Manager	44
	Requirements	44
	Configuring Multicast for use with the CM OS Manager System Agent.....	45
	Multicast and the CM Proxy Server.....	46
	Preloading a CM Proxy Server	46
	Preloading a CM Proxy Server with Dynamic Windows	49
	Session Logs for a Preload Using Multicast	49

5	Using the CM Multicast Server	51
	Testing the CM Multicast Server	51
	CM Agent Testing	51
	Administrator Testing	52
	Notify and TIMER	52
A	Time Zone Adjustments.....	53
	Example A (DST in effect):.....	53
	Example B (DST not in effect):	53
	Time Zone Overview	54
	Automatic Adjustments for Daylight Saving Time.....	55
B	Multicast Results for Reporting	57
	RMSSTATS Object	57
	RMSSTATS.....	57
	Multicast Durations	59
	RMSSTATS and the CM Configuration Server Database	59
C	Network Test Modules.....	61
	RADCSEND and RADCRECV.....	61
	Syntax	62
	RADCRECV	62
	RADCSEND	62
	BROADCAST Tests	64
	MULTICAST Tests	65
D	Implementation and Diagnostics	67
	Preliminary Parameter Calculation	67
	Calculate DELAYBP and MWINDOW	67
	Test the Network.....	68
	Examine the Test Logs	68
	RADCRECV	69
	RADCSEND	69

Pre-Multicast Session Checklist	70
Multicast Program-Call Schematic	71
Troubleshooting	73
Querying the Various Logs	73
Troubleshooting Tips	75
E Product Name Changes	79
Index	81

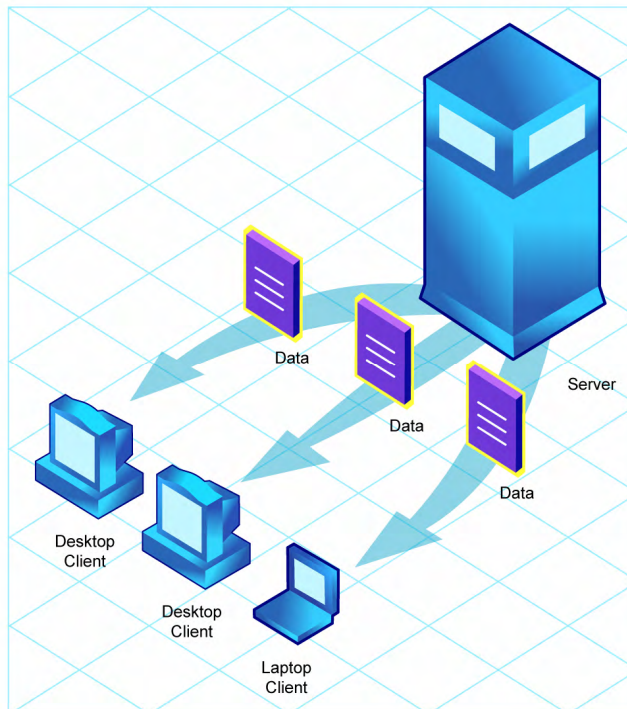
1 Introduction to Multicasting

Introduction

Unicasting vs. Multicasting

The standard method of data transmission is **unicasting** (see [Figure 1](#) below). In a unicast scenario, a server communicates with multiple agents individually and at different times, and transmits data to each during its communications session.

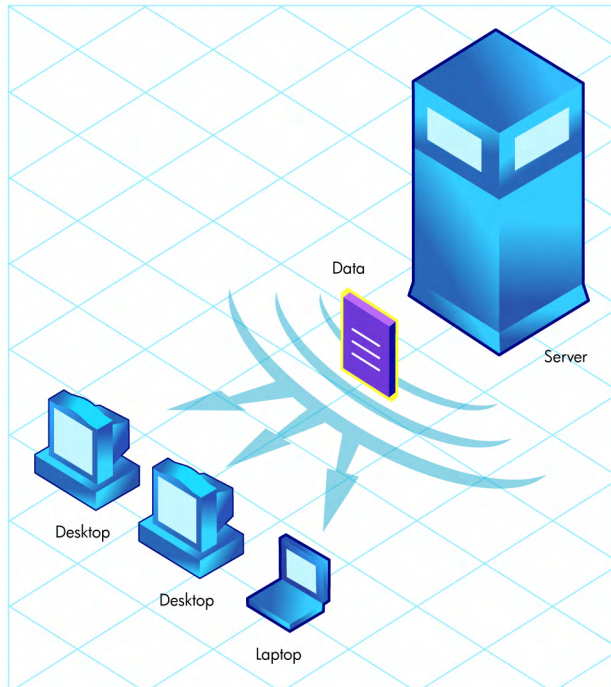
Figure 1 Unicasting scenario



Since the server must repeatedly transmit identical data, the unicast method is very time-consuming.

Multicasting is a technique that allows the simultaneous transmission of a data stream to many receivers (see [Figure 2](#) below). The receivers identify themselves as “interested parties” by joining a logical group, using the Internet Group Membership Protocol (**IGMP**).

Figure 2 Multicasting scenario



Benefits of Multicasting

Multicasting provides the following benefits:

- It maximizes the use of network bandwidth by transmitting a single data-stream to multiple agents, simultaneously.
- It saves resources on the server by not having to set up separate client sessions and then repetitively transmit data individually to each client.

HP Configuration Management Multicast Server and other CM Components

HP Configuration Management OS Manager (CM OS Manager)



The CM OS Manager will work with the CM Multicast Server in a Windows environment only.

The information in this section is not applicable to other operating-system environments.

For more information on using these components together, see the section [Multicast and the CM OS Manager](#) on page 44 and refer to the *HP Configuration Management OS Manager Installation and Configuration Guide (CM OS Manager Guide)*.

HP Configuration Management Proxy Server (CM Proxy Server)

The CM Multicast Server's dynamic-windows feature (see [Multicast Dynamic Windows](#) on page 37) can be used to pre-load a CM Proxy Server. For more information, including an example, refer to the *HP Configuration Management Proxy Server Installation and Configuration Guide (CM Proxy Server Guide)*.

Audience

This guide is for Configuration Management (CM) systems administrators who want to use the HP Configuration Management Multicast Server (CM Multicast Server) in their enterprise environments.

Documentation Map

This guide describes the CM Multicast Server; the following table provides an overview of this book, which will aid in locating specific information about the CM Multicast Server.

Table 2 Document Map

Chapter	Contents
Chapter 1 Introduction to Multicasting	The theory behind multicasting, and a comparison of the CM multicasting facility to traditional data transmission.
Chapter 2 The CM Multicast Server	The implementation and benefits of the CM multicasting facility, including a description of the four primary phases of the CM multicast process.
Chapter 3 Installing the CM Multicast Server	Instructions on installing the CM Multicast Server.
Chapter 4 Configuring a CM Multicast Server Environment	Information on the MULTICAST Class, the CM Configuration Server Database (CM-CSDB) Class in which a multicast session is configured; multicast's dynamic-windows feature; and advanced configuration options.
Chapter 5 Using the CM Multicast Server	The three methods by which the CM Multicast Server can be tested.
Appendix A Time Zone Adjustments	Instructions on calculating time-zone differences, which is necessary for configuring a multicast session.
Appendix B Multicast Results for Reporting	Instructions on how to use the CM Multicast Server's post-session performance statistics for reporting.
Appendix C, Network Test Modules	Instructions on how the test modules of the CM Multicast Server can assist in tuning the multicast and broadcast parameters for a network configuration.
Appendix D Implementation and Diagnostics	Information that should be reviewed prior to starting a multicast session (Preliminary Parameter Calculation, Pre-Multicast Session Checklist, and Multicast Program-Call Schematic), as well as diagnostic (Querying the Various Logs) and troubleshooting information (Troubleshooting Tips).

Supporting Documentation

The following documents are referenced in this manual. They are shipped as part of the standard CM library, and can be accessed at the HP web site. We recommend having these documents accessible.

- *HP Configuration Management Configuration Server User Guide (CM Configuration Server Guide)*
- *HP Configuration Management Application Manager and Application Self-service Manager Installation and Configuration Guide (CM Application Manager Guide)*
- *HP Configuration Management Administrator Guide (CM Admin Guide)*
- *HP Configuration Management OS Manager System Administrator Guide (CM OS Manager Guide)*
- *HP Configuration Management Proxy Server Installation and Configuration Guide (CM Proxy Server Guide)*

2 The CM Multicast Server

Most multicast utilities are designed to provide the simplest delivery of a payload that has been statically composed of all files and components for all possible recipients. In this model, every receiver is forced to take all resources that are bundled into that payload.

The HP multicast option allows the collection of the sets of resources that are needed by only those receivers that are eligible to participate in a specific multicast transmission. This means that only data required that is by the participants is sent, and the participants retrieve only the data that they have requested.

Benefits of Configuration Management Multicasting

Multicast technology is seamlessly integrated with Configuration Management (CM) products to provide a delivery mechanism that builds on the existing resource-optimization capabilities.

By removing the requirement to repetitively transmit data (to each receiver individually), CM provides an additional dimension to its existing architectural focus—using minimum resources in order to bring the desktop computing environment to its desired state.

An administrator also has the ability to perform a “centralized” configuration of the CM agents, and the ability to group CM agents that have similar needs.

Flexible, Centralized Configuration

In many multicast implementations, the logistics of configuring receivers in order to synchronize them with data transmitters becomes very labor-intensive or, for a large number of receivers, extremely restrictive. The administrator must ensure that the receivers are listening at the time the multicast transmission takes place and that the appropriate multicast address has been configured for all listeners. Altering these parameters on a large number of machines, and orchestrating the synchronization of sender and receivers on short notice, can be extremely difficult, if not impossible.

The configuration that is required in order to setup CM multicast distribution is performed centrally by the CM administrator. The CM agents obtain all required multicast configuration parameters in the framework of the standard CM agent connect. The parameters can be changed regularly or as needed, and the CM agent connect process can be started using any of the standard options that allow end user scheduled, or remotely invoked, initiation.

To further optimize its multicast capabilities, CM provides the ability (using the standard administration tools that are provided with the product) to associate users that have similar requirements into separate multicast groups (for example: file servers, desktops, and HP Configuration Management Staging Servers [CM Staging Servers]). A scenario in which this “grouping” would be beneficial is CM Staging Servers that need to be populated overnight with large volumes of data can be segregated from desktops that need smaller application updates as soon as possible.

Increasing Network Efficiency

HP has designed its multicasting utility to enable you to maximize the functionality of your existing network bandwidth. This is accomplished by configuring the CM Multicast Server to concurrently transmit a single data-stream to multiple CM agents.

Each CM agent can distinguish between the files and components that are being delivered in the multicast stream, and retrieve only those that it needs. As a result, transfer time is minimized, and the CM agent’s storage and processing resources are conserved because they are not forced to process and store superfluous data.

Guaranteed Delivery

The CM Multicast Server uses existing CM functionality to determine whether all the required resources have been delivered in the multicast phase. It then uses the standard protocol—the CM agent connect process—to deliver any unsatisfied requirements. This protects against potential “thrashing” that can typically occur in broadcast/multicast type protocols when the quality of the communication channel is poor. The CM Multicast Server can be tuned to the network characteristics using a buffering/transmit scheme, and a programmable time delay between packets.

Results Reporting

Since the CM Multicast Server is an extension of the Configuration Management product family, results of a multicast session are reported to the CM Configuration Server Database (CM-CSDB). This information can then be mined for reporting and auditing purposes. For more information on how this is accomplished and the benefits of this feature, see Appendix B, [Multicast Results for Reporting](#).

Operational Requirements

It is important to note that the CM Multicast Server will work only with services (applications) that are specified as mandatory. For more information on how to specify that services are mandatory, refer to the *CM Application Manager and Application Self-service Manager Guide*.

CM uses the standard IGMP. The CM Multicast Server requires:

- The availability of HTTP, and
- Routers to be enabled for the IGMP protocol.

► There are network configurations (primarily satellite or single sub-area networks) that might not support IGMP, so a broadcast option is offered as an alternative.

The following requirements must be established in an environment in order to ensure the proper execution of multicasting.

- The CM Multicast Server must have network connectivity to the CM Configuration Server.
- The CM Configuration Server must be, at a minimum, at version 4.5.1.

► Although the CM Multicast Server can be installed on a machine other than that which houses the CM Configuration Server, it is recommended that they be co-resident.

- CM agents must be, at a minimum, version 4.0.1.
- The CM Proxy Server must be, at a minimum, at version 2.1.

For more information, refer to the *CM Proxy Server Guide*.

System Requirements

Platform Support

For information about the platforms that are supported in this release, refer to the Configuration Management 5.10 Release Notes.

The Multicast Process

During the multicast process, the CM agent interacts with the CM Configuration Server and the CM Multicast Server. The multicast process is defined by two time windows: the **preparation window** and the **distribution window**. (See [Figure 3](#) on page 21.) The time windows are then subdivided into four **phases**, during which the CM agent interacts with the CM Configuration Server and the CM Multicast Server in order to:

- Determine which files are needed.
- Collect the requirements for the necessary files.
- Transmit the files.
- Report the results of the transmission.

Multicast Phases

The multicast phases involve interaction (at various times) between the CM agent, the CM Configuration Server, and the CM Multicast Server. The CM agent is involved in all four phases of the process, whereas the CM Multicast Server and the CM Configuration Server are active only during some phases. This section details these phases, as well as each component's role in the process.

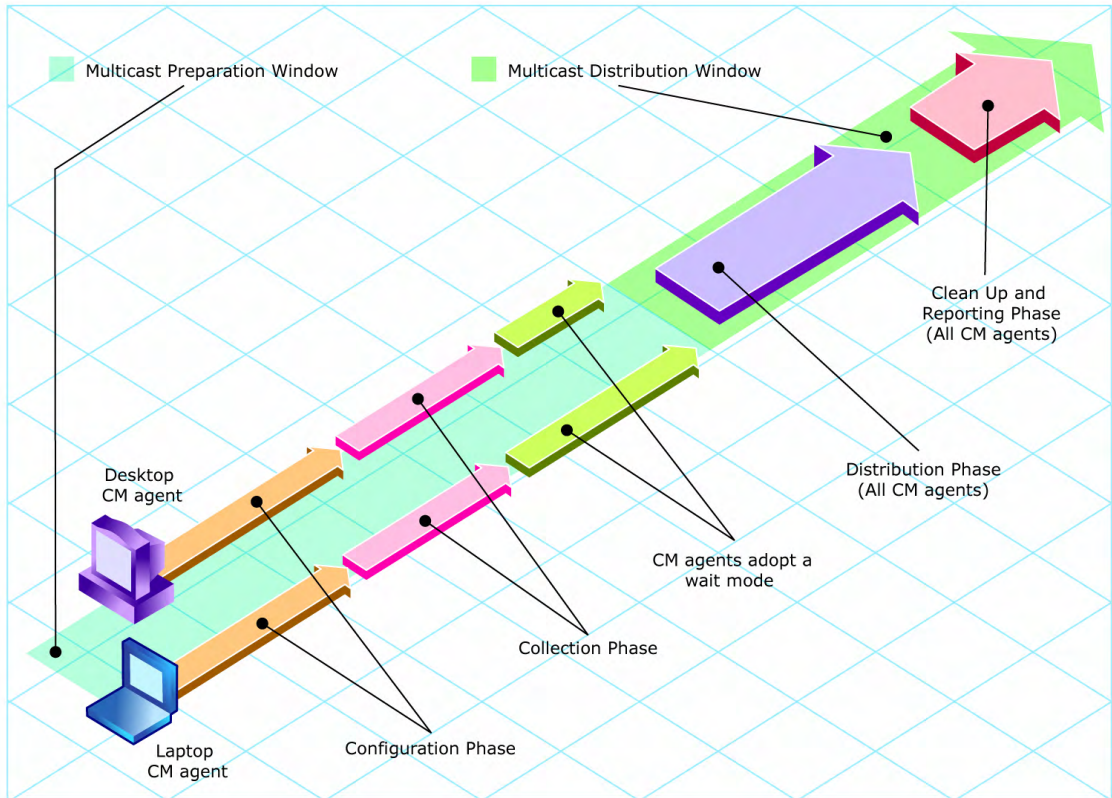
The four phases of the multicast process are:

- Configuration Phase
- Collection Phase
- Multicast Distribution Phase
- Clean up and Reporting Phase



The parameters of these phases are configured in multicast instances in the CM Configuration Server Database.

Figure 3 Multicast time windows and phases

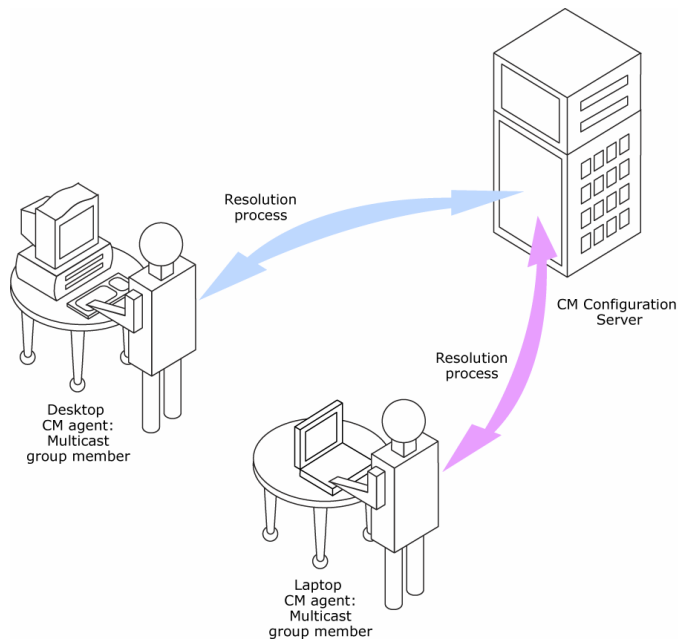


Configuration Phase

(CM agents – CM Configuration Server) and
(CM agents – CM Multicast Server)

The configuration phase (shown in [Figure 4](#) below and [Figure 5](#) on page 23) occurs during a standard CM agent connect with the CM Configuration Server. A CM agent goes through a normal resolution to determine the resources it requires, and whether it is attached to a multicast group, as established by the system administrator.

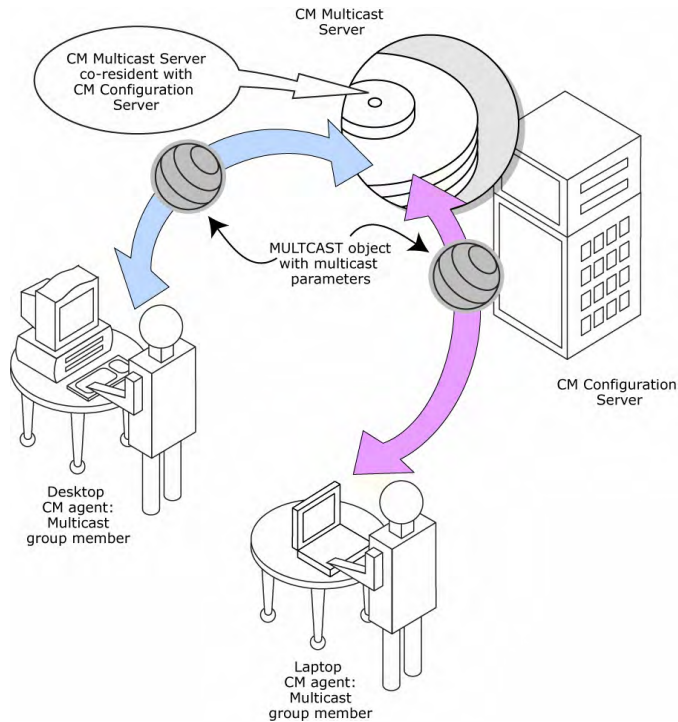
Figure 4 Configuration Phase (first part)



If a CM agent is eligible, it then connects to the CM Multicast Server and exchanges the MULTICAST object, which contains the multicast parameters. If the connection fails in this phase, the CM agent will perform normal, point-to-point retrieval (with the CM Configuration Server, using TCP/IP without multicast) to obtain all resources that are required in order to achieve the desired state.

Thus far, all communications have been performed using HP standard TCP/IP communications.

Figure 5 Configuration Phase (second part)

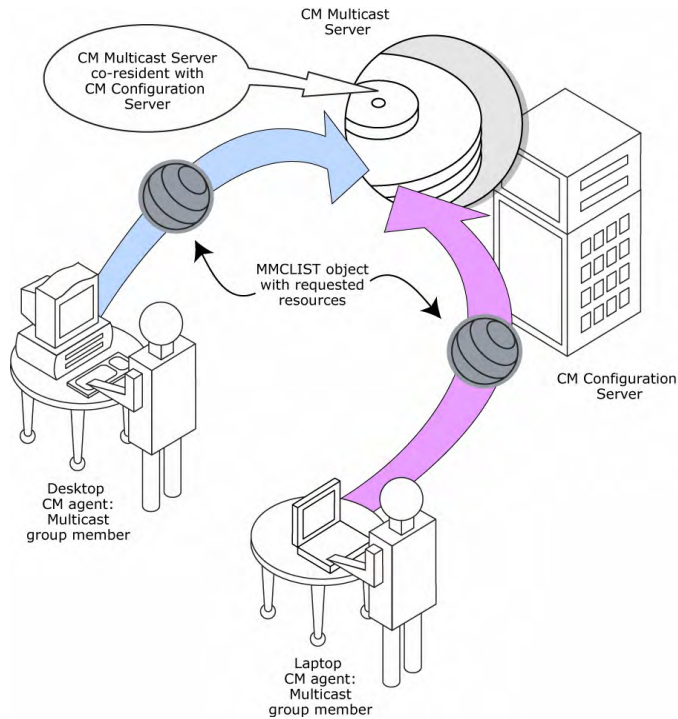


Collection Phase

(CM agents – CM Multicast Server)

In this phase (assuming the criteria to be eligible for multicast distribution, as described in the first phase, have been met), the CM agent will send, to the CM Multicast Server, the MMCLIST object (the list of requested resources that was compiled by the CM Configuration Server during the configuration phase). The CM Multicast Server stockpiles all CM agent requests and prepares to transmit the files at the scheduled time. The CM agent adopts a wait mode in anticipation of the multicast transmission (Figure 6 on page 24).

Figure 6 **Collection Phase**

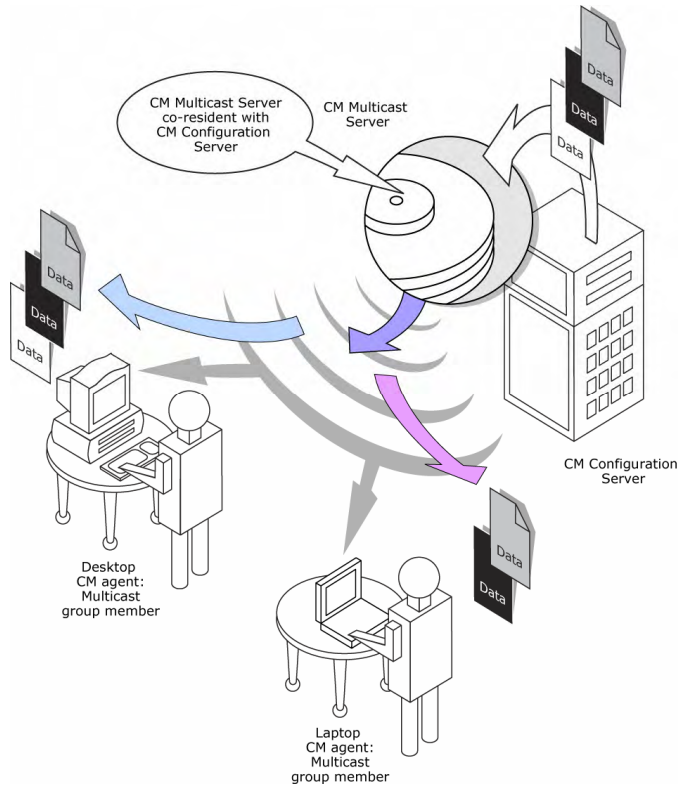


Distribution Phase

(CM agents – CM Multicast Server – CM Configuration Server)

The third phase is the actual multicast transmission of the files (see [Figure 7](#) on page 25). The CM Multicast Server retrieves required files from the CM Configuration Server, and then transmits a single data-stream that contains only the files and components that have been defined by the CM agents involved. As files arrive, they are checked (in the MMCLIST object) by the CM agent to determine if they are required. If required, they are read from the multicast stream and marked to indicate that they have been received.

Figure 7 **Distribution Phase**

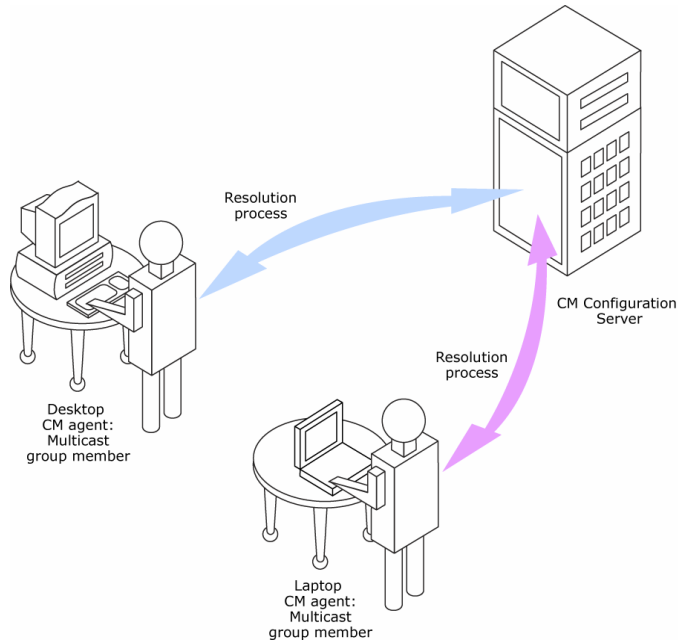


Clean up-and-Reporting Phase

(CM agents – CM Configuration Server)

The final phase of the process runs when all required files have been received by the CM agent, or the distribution time window has expired. At this time, the CM agent checks for the presence of all required resources, and uses standard CM communications techniques to obtain, from the CM-CSDB, any that are missing. Installation activities are then run for the resources; the completion status (including error information and multicast file-transfer statistics) is reported to the CM-CSDB (Figure 8).

Figure 8 Clean up-and-Reporting Phase



Completion Status Information

Unlike most multicast implementations, which are fundamentally file transfer utilities, the CM Multicast Server provides full status information on the completion and installation of the distribution for each connecting CM agent.

See Appendix B, [Multicast Results for Reporting](#) for more information on how multicast session results can be used for auditing and reporting.

3 Installing the CM Multicast Server

Multicasting Components

The HP Configuration Management Multicast Server (CM Multicast Server) is implemented in the standard Configuration Management (CM) product architecture which contains, at a minimum, a CM Configuration Server and multiple CM agents.

- ▶ CM Configuration Server Database interaction in the multicast process is two-fold—its role in the CM agent connect, and as the repository of the database files. There are no CM Configuration Server changes required in order to enable multicasting.

The CM Configuration Server Database

The CM Configuration Server Database (CM-CSDB) is the repository from which the CM Multicast Server will obtain the files that will be transmitted to the CM agents during the multicast.

- ▶ Although the CM Multicast Server does not have to be on a machine that houses a CM Configuration Server, HP strongly recommends it.

Also, the CM-CSDB contains the information that is needed in order to:

- Determine whether a CM agent is eligible for multicast.
- Determine whether a required service is eligible for multicast.
- Assign the CM agent to a multicast group.
- Inform the CM agent of the files it needs in order to achieve its desired state.

- ▶ All installation and testing of CM multicasting should be performed on a *copy of the production CM-CSDB*, prior to introducing it to a production environment.

CM Multicast Server Directories

Table 3 lists the directories of the CM Multicast Server, and the files contained therein.

Table 3 CM Multicast Server Directories and Contents

Directory	Contents
<code>multicast_server</code>	Platform-specific directories that contain the CM Multicast Server code and execution engine.
<code>multicast_test_modules</code>	<p>This directory contains:</p> <ul style="list-style-type: none">• the broadcast and multicast receive files (<code>BRECV.COMD</code> and <code>MRECV.COMD</code>)• the broadcast and multicast receive files (<code>BSEND.COMD</code> and <code>MSEND.COMD</code>)• the receive executable (<code>radcrecv.exe</code>)• the send executable (<code>radcsend.exe</code>)• the image-deployment send files (<code>gdmcsend.exe</code> and <code>gdmsend.cmd</code>)• two application <code>.dll</code> files• four test files (<code>TESTDATA000n</code>) of varying sizes <p>Note: For information on these test modules, see Appendix C, Network Test Modules, which describes the test programs for broadcast and multicast file transfers.</p>

Installation



Before beginning this installation consult the section, [Operational Requirements](#) (on page 19).

This section describes the CM Multicast Server installation. Although this exercise is performed in a Windows environment, the UNIX steps are similar, but with the expected platform differences. Also, there are pre-installation steps for a UNIX environment described in the next section.

UNIX Pre-Installation Notes

- Make sure the user performing the installation has adequate UNIX operating system rights in order to create and update the target installation directory.
- Make sure the user performing the installation has a `home` directory on the UNIX workstation, and is not logged in as `root`.
- The logon user ID should be the same user ID as that which was used to install the CM Configuration Server. (This will ensure that the correct CM Configuration Server profile is queried in order to locate the CM-CSDB.)
- To start the UNIX installation of the CM Multicast Server, type `./setup.exe`, on the command line. (Depending on how the UNIX operating system mounts the media, it might require the user to specify the installation program (in uppercase) as `./SETUP.EXE`.)

To install the CM Multicast Server in a UNIX environment

- 1 Open a UNIX shell window at the console, or through an X-Windows emulator, logged on as the UNIX user ID who will be running the CM software.
- 2 Insert the installation media into the CD/DVD drive.
- 3 Change the current directory to the directory on the CD/DVD drive that contains the installation program, `setup.exe`.
- 4 Press **Enter**.
- 5 At the prompt, type,
`./setup`
- 6 Press **Enter**.

The installation program will start. Continue with the steps outlined in the next section, CM Multicast Server Installation.

To install the CM Multicast Server in a Windows environment

- 1 Insert the installation media into the CD/DVD drive.
- 2 Navigate through the installation media to
Infrastructure\extended_infrastructure\multicast_server\win32.

The contents of the CM Multicast Server media are displayed.

- 3 Double-click `setup.exe`.

The installation program will start. Continue with the steps outlined in the next section, CM Multicast Server Installation.

CM Multicast Server Installation

The Radia Multicast Server Install Welcome window opens.

- 1 Click **Next**.

(At any time during the installation, click **Cancel** to exit the installation.)

The Radia Multicast Server Install End User Licensing Agreement window opens.

- 2 Click **Accept**.



If **Accept** is not selected, the CM Multicast Server installation program will terminate.

The Radia Multicast Server Install Resource Location window opens.

In this window, select one of the locations in which the CM Multicast Server files will be stored.

- Select **Radia Configuration Server database** or,
- Select **Radia Proxy Server static cache**.



For this exercise, **Radia Configuration Server database** was selected.

If **Radia Proxy Server static cache** is selected, a similar series of windows will be seen.

- 3 Click **Next**.

The Radia Multicast Server Install HP License File window opens.

In this window:

- Specify the location of the license file, or click **Browse** to navigate to the license file.

4 Click **Next**.

The Radia Multicast Server Install CM Configuration Server Resource Location window opens.

This window displays the location of the CM-CSDB.

- Accept the default directory that is specified in this window. (*Recommended*)
- Or specify a different location.

5 Click **Next**.

The Radia Multicast Server Install Port window opens.

This window displays the communications port that the CM Multicast Server will use.

- Accept the default port (**3463**) that is specified in this window. (*Recommended*)
- Or specify a different port for CM Multicast Server communications.

6 Click **Next**.

The Radia Multicast Server Install Summary window opens.

This window presents all the information that was specified during the CM Multicast Server installation. This is the final opportunity to review and modify the specified settings.

- If you discover any errors, or wish to modify any of the entries, click **Back** until you reach the appropriate windows, and make the necessary changes.

The information that was entered in the other windows will not be affected. After making the changes, click **Next** repeatedly, until you arrive back at the Summary window.

7 To continue, click **Install**.

When the installation is complete, the Radia Multicast Server Install Finish window opens.

8 Click **Finish**.

The CM Multicast Server has been installed successfully.

Windows Service

In a Windows environment, the CM Multicast Server should now be present as a Windows service in the **Services** list. It will be listed as:

CM Multicast Server (mcast)

UNIX Post-Installation Note

Unlike the Windows installation, on UNIX systems the CM Multicast Server is not automatically started by the installation program. The start and stop shell scripts (`startmcast` and `stopmcast`) are provided in the `media` directory. These scripts can be used as-is, or tailored to the host system.

Windows Services

The CM Multicast Server is automatically installed as the service **mcast** on Windows platforms. Its startup configuration (**Automatic**, **Manual**, **Disable**) can be specified in the **Startup Type** area on these platforms.

For more information, consult the documentation that is specific to the operating system on which the CM Multicast Server has been installed.

Chapter 4, [Configuring a CM Multicast Server Environment](#), discusses the multicast-specific features of the CM-CSDB and describes the changes that are required using the CM Configuration Server Database Editor. Chapter 5, [Using the Multicast Server](#), contains an example of how to set up a multicast session on a CM agent machine.

4 Configuring a CM Multicast Server Environment

The HP Configuration Management Multicast Server (CM Multicast Server) is a processing engine that requires access to the resources in the CM Configuration Server Database (CM-CSDB). After the CM Multicast Server has been installed, it is necessary to make a few modifications to the CM-CSDB.

When the CM agent connects to the CM Multicast Server, it sends up the **MULTICAST** object, from which the CM Multicast Server obtains control information for the multicast session. The CM agent also sends up the list of required files in an object called **MMCLIST**. The CM Multicast Server collects the file lists in groups based on the multicast address.

The parameters needed for the multicast session are stored in the **MULTICAST** object (see [The **MULTICAST** Class](#) on page 34) in the CM-CSDB. They are delivered to the CM agent during normal resolution, and are stored in the CM agent's subdirectory for each service.

CM Configuration Server Changes

In order for multicasting to execute properly, a few modifications must be made to the CM-CSDB. These changes are described in this section, starting with the **MULTICAST** Class—the database class that controls the multicast session. Following that are the details of variables that deal with:

- multicast eligibility (**MCELIGBL**),
- the delivery and installation of mandatory services (**MCORDER**),
- the delivery of multicast-specific CM agent objects (**BYPASCON**), and
- the duration of a multicast session (**MWINDOW**).

The MULTICAST Class

The MULTICAST Class of the POLICY Domain is where a CM multicasting session is configured and scheduled. In order to perform these tasks, access the CM Administrator Configuration Server Database Editor (CM Admin CSDB Editor) by clicking **Start, Programs, HP OVCM Administrator, and CM Admin CSDB Editor**.

The MULTICAST Class should not be modified during a multicast session.



Before starting the editing process, do the following.

On the CM Admin CSDB Editor tool bar, click **View, List View**, and select **Details**.

On the CM Admin CSDB Editor tool bar, click **View**, and select **Options**. Then:

- 1 On the **General** tab, select the check box for **Show Class Names Next to Descriptions**.
- 2 On the **Instance Options** tab, under **When Displaying Instance Attributes, Show Attribute**, select **Both**.

Table 4 contains the instance attributes (with a description and a sample value) of the MULTICAST Class. Configure your environment-specific multicast scenario by specifying these attributes with the appropriate values.

Table 4 MULTICAST Class instance attributes

Attribute	Value	Description
DOMAIN	&(ZOBJDOMN)	Specifies the domain name. Note: Do not change this value.
CLASS	&(ZOBJCLAS)	Specifies the class name. Note: Do not change this value.
INSTANCE	&(ZOBJNAME)	Specifies the instance name. Note: Do not change this value.
MCAST	Y or N	A flag to indicate if multicast is enabled. The default is Y .
MODE	B or M	Broadcast or Multicast. The default is M . Notes: If MODE = M, the ADDRESS variable should be specified in the standard Internet dotted-decimal format, and should be between 225.0.0.0 and 239.255.255.255. (Multicast addresses are defined as IP class-D addresses

Attribute	Value	Description
		<p>in this range. Avoid using the extreme low end of the range—224.0.0.1 – 224.255.255.255—as most of these are reserved for specific purposes.)</p> <p>The B option is for those network configurations (primarily satellite and single sub-area networks) that do not support IGMP.</p>
MCORDER	B, A, or S	For information about this attribute, see MCORDER on page 40. The default is S .
ADDRESS	229.0.0.0	<p>Specifies a valid broadcast/multicast address.</p> <p>Also, this attribute can accept up to 19 characters in order to accommodate a range of addresses, which is important to the dynamic multicast feature. For more information, see ADDRESS on page 38.</p>
PORT	9512	Broadcast or Multicast UDP port.
DELAYFP	20	Delay (milliseconds) after the first packet is sent.
DELAYBP	5	<p>Delay (milliseconds) between packets.</p> <p>For information on calculating this value, see Calculate DELAYBP and MWINDOW, on page 67.</p>
RESENDS	1	<p>Number of re-sends.</p> <p>Note: Multicast is designed to re-send all packets if RESENDS > 0. It will send STORE number of packets and then re-send that group for RESENDS times.</p>
STORE	20	<p>Number of packets to buffer for resends.</p> <p>Note: Multicast is designed to re-send all packets if RESENDS > 0. It will send STORE number of packets and then re-send that group for RESENDS times.</p>
CGMTDATE	19991213	<p>The start date of the collection period. The format is YYYYMMDD.</p> <p>Also, this attribute is important to the dynamic multicast feature. For more information, see CGMTDATE on page 39.</p>
CGMTTIME	14:00:00	<p>The start time of the collection period. The format is HH:MM:SS, expressed in base-24 time.</p> <p>Also, this attribute is important to the dynamic multicast feature. For more information, see</p>

Attribute	Value	Description
		CGMTTIME on page 39. Note: This variable is specified in GMT. See the section Time Zone Adjustments on page 53 for important time zone information.
CWINDOW	60	Duration (in minutes) of collection phase for all CM agents to register their list of required files. This attribute, as it relates to the dynamic multicast feature, is discussed in the section, Multicast Dynamic Windows starting on page 37. Note: When specifying the duration of your collection window, be sure it is sufficient to collect all the files in the request list.
MDELAY	1	Delay between close of collection and start of multicast (minutes).
MWINDOW	60	For information on this attribute, see MWINDOW on page 41. Note: For information on calculating this value, see Calculate DELAYBP and MWINDOW on page 67.
TTL	3	Number of router “hops.”
BYPASCON	UserJoe	For information on this attribute, see BYPASCON on page 41.
ALTADDRM	208.244.225.46	The IP address of CM Multicast Server for object exchange.
ALTPORTM	3463	The port of CM Multicast Server for object exchange. Notes: This is the TCP/IP port that the CM Multicast Server listens on, not the multicast transmission port. The default is 3463 . This port was chosen to avoid conflicts with known CM ports (such as the CM Configuration Server and CM Staging Server ports). Therefore, be prepared to adjust accordingly, as other network software might also conflict.
MINREF	1	The minimum number of CM agents that must request a file in order for it to be considered for multicast.
MINSIZE	1024	The minimum size a file must be in order to be

Attribute	Value	Description
		considered for multicast.
<u>_ALWAYS_</u>	SYSTEM. ZMETHOD. MULTICAST	A CM Configuration Server REXX method.

Example

In the following example, the five primary multicast variables are specified, followed by the result of these specifications.

```
CGMTDATE = 20071016
CGMTTIME = 14:00:00
CWINDOW = 45
MDELAY = 2
ALTADDRM = 208.244.225.46
```

Result

With the parameters above specified, a multicast session will be initiated on October 16, 2001 at 2 P.M. Greenwich Mean Time (**GMT**). The collection phase (**CWINDOW**) will last 45 minutes. When the end of the collection window has been reached, the CM Multicast Server stops the collection process.

There will then be a 2-minute delay (**MDELAY**) before the transmission begins. At the designated multicast start time ($CGMTTIME + CWINDOW + MDELAY = 14:47:00$ GMT), the CM Multicast Server (specified by **ALTADDRM**) starts multicasting the files that are on the list it compiled from the various eligible CM agents.

Multicast Dynamic Windows

To further increase the effectiveness of the CM Multicast Server, it offers the ability to configure dynamic (collection and transmission) windows. This means that for a logical distribution group, multiple multicast distributions can be concurrently active, allowing the delivery of data to members of the group falling into different time windows.

This is accomplished by specifying a range of valid IP addresses in the ADDRESS field and leaving blank either the CGMTDATE or CGMTTIME field.

Assume that:

- Most connections occur in a concentrated time-period (such as morning logons, between 8:00 and 10:00 A.M.) and
- There is a need to optimize the distribution by allocating collection windows for a relatively small duration (such as 30 minutes).

With the dynamic windows feature, the overlap will be avoided because a different address will be used.

ADDRESS

A range of (inclusive) addresses can be specified in order to avoid multiple distributions overlapping on the same multicast address. The range must consist of an IP address, followed by dash, and a valid decimal value for the last octet (as shown in the following example).

- ▶ All addresses in the range must be valid within the IGMP class-D IP address range (225.0.0.0 – 239.255.255.255).

ADDRESS = 225.0.0.000-034

Note that the first three octets (**225.0.0**) are fixed and the range is only in the last octet (**000-034**). The addresses in this range will be used sequentially to accommodate overlapping windows for a group.

The CM Multicast Server will keep a list of addresses that are currently in use for each MULTICAST instance. When a new multicast session is created, the CM Multicast Server will look for a valid, available address (within the range specified in ADDRESS), assign it to the new session, and add the address and the associated session to the in-use list. When a session completes its transmission, the address is removed from the in-use list and is available once again. If all of the addresses in the range are in use, the CM agent will be informed that no IGMP address is available.

- ▶ Although the range is limited to the last octet of the IP address, this should not be a significant limitation because there are 255 possible entries. Even if the collection windows were as small as 15 minutes, for a full 24 hours, only 96 (4 * 24) addresses would be needed. The 255 possible entries allow more than two-and-a-half days of continuous collection windows.

CGMTDATE

If the CGMTDATE field is empty and CGMTTIME has a valid time, a multicast session will be run once a day. Its collection window will start at the same time (as specified by CGMTTIME) each day.

- ▶ The duration specified in the CWINDOW field, as well as all other duration-type fields, will be used as described in [Table 4](#) on page 34.

CGMTTIME

Conversely, if the CGMTTIME field is empty and the CGMTDATE field has a valid date, multiple multicast sessions can run throughout the specified date. In this situation, the collection window will begin when the first CM agent connects and transmits the MULTICAST object to the CM Multicast Server. This collection window will remain open for the CWINDOW duration, and multicast-eligible CM agents that connect after to this will use this collection window until it closes.

The first CM agent to connect after this window closes will cause the CM Multicast Server to create a new collection window, subject to the availability of a valid IGMP address different from that of the first session. This is determined when a range of addresses is specified in the ADDRESS field.

- ▶ This variable is specified in base-24 time, in relation to its offset from GMT. For additional GMT-offset information, see [Appendix A, Time Zone Adjustments](#).

CGMTDATE and CGMTTIME Not Specified

If CGMTDATE and CGMTTIME are blank, the MULTICAST instance can be used continually, over any range of dates and times, subject to the availability of an IGMP address.

Time Zone Offsets

In order for a multicast session to execute when you want, time-zone offsets must be taken into consideration. Since the CM Multicast Server/CM Configuration Server and CM agent might be in different time zones, all multicast times are specified in GMT. As an administrator, you must determine the GMT offsets of your servers and CM agents.



All CM multicast software converts the local system clock to GMT prior to doing any comparisons or calculations.

For an overview of GMT and time zone calculations, see [Appendix A](#), Time Zone Adjustments.

Advanced Multicast Configuration Options

Three multicast-specific variables (MCORDER, MWINDOW, and BYPASCON) are in the MULTICAST Class. A fourth, MCELIGBL, is in the ZSERVICE Class. This section describes these variables, and how they can be customized using the CM Admin CSDB Editor.

MCELIGBL

In order to participate in a multicast session, services must be individually defined as multicast-eligible. This is done with the MCELIGBL variable, found in PRIMARY.SOFTWARE.ZSERVICE. All services that are instances of the ZSERVICE Class will, by default, be multicast-eligible because the CM Configuration Server installation sets MCELIGBL=Y.

If a service is not to be distributed via multicast, edit only that service by specifying MCELIGBL=N.



Do not edit the `_BASE_INSTANCE_`.

MCORDER

If a service is mandatory but not eligible for multicast, it will be downloaded to and installed on the CM agent directly from the CM-CSDB. MCORDER enables an administrator to specify when to download and when to install mandatory services that are not multicast eligible.

Services can be configured as mandatory with the on/off switch, **ZSVCMO**, an instance attribute of all services. For more information on the deployment of mandatory services and ZSVCMO, refer to the *CM Application Manager and Application Self-service Manager Guide*.


The MCORDER attribute is located in the PRIMARY.POLICY.MULTICAST Class. It has three values, as described in [Table 5](#) on page 41.

Table 5 **MCORDER Values**

Value	Result
B	Download the service and install it on the CM agent BEFORE the multicast session.
A	Download the service and install it on the CM agent AFTER the multicast session.
S	SPLIT the process so that it downloads the service to the CM agent before the multicast, and installs the service after the multicast session. This is the default.

MWINDOW

This variable controls the amount of time (in minutes) for a CM agent to run before terminating its multicast receive activity. The default is **0**, which allows a CM agent to maintain the receive mode for as long as is necessary to receive all the requested data. This will not affect the duration of the multicast session; it will ensure only that the CM agent process does not run longer than is necessary to receive the data it requested.

 For more information on calculating a value for MWINDOW, see Appendix D, [Implementation and Diagnostics](#).

BYPASCON

When multicast processing occurs, each CM agent connects to the CM Configuration Server and the CM Multicast Server. The CM agents then send a **control object** and the list of required resource files (a *needs list*) to the CM Multicast Server.

However, if all the CM agents' data payloads are identical, CM multicasting can be configured to save on network bandwidth usage by limiting which CM agents send which data to the CM Multicast Server. This is accomplished with the BYPASCON variable (of the PRIMARY.POLICY.MULTICAST Class). BYPASCON has three values.

BYPASCON=

All CM agents will exchange a control object and a needs list object with the CM Multicast Server.

BYPASCON=UserJoe

The CM agent with this user ID will send both objects to the CM Multicast Server, and the other CM agents will send only the control object.

BYPASCON=UserJoe 2 (user ID followed by a space and the numeral 2)

The CM agent with this user ID will send both objects to the CM Multicast Server; no other CM agents will be part of the object exchange.

- ▶ This option requires that the local time on the clock of the machine that houses the CM Multicast Server be in synchronization with all multicast-eligible CM agents.

Creating a Multicast Instance

Multicast instances must be created and then connected to users, workgroups, and departments in order for them to be included in a multicast session. This section describes how to create a multicast instance. [Associating Groups with a Multicast Instance](#) on page 43 describes how to associate workgroup and department instances with a multicast instance.

To create a multicast instance

- 1 From the **Start** menu, select **Programs, HP OVCM Administrator, and CM Admin CSDB Editor**.
- 2 In the tree-view, double-click the following icons to open them:
PRIMARY, POLICY, and MULTICAST.
- 3 Right-click **MULTICAST** and select **New Instance** from the shortcut menu.
The Create Instance dialog box opens.
- 4 Type an instance name (for example, **MCAST1**), and click **OK**.
The MCAST1 Instance is now displayed in the tree view and the list view of the CM Admin CSDB Editor as an instance of the MULTICAST Class.
- 5 Double-click **MCAST1** in the list view and verify that it has inherited the attributes of the **_BASE_INSTANCE_**.

A multicast instance has been successfully created.

- ▶ To create additional multicast instances, repeat steps 3 and 4.

By creating several instances in the MULTICAST Class (for example MCAST1, MCAST2, etc.), multiple multicast sessions can easily be customized and scheduled for various CM agents.

Associating Groups with a Multicast Instance

In order to be included in a multicast session, a CM agent must be part of a group (such as a workgroup or a department) that is associated with a multicast instance. After a user is connected to a group, it will automatically be included in any multicast session for which the group is configured. Since, in a typical scenario, there will be more than one CM agent, and each CM agent will likely be affiliated with more than one group, it is far more efficient to associate a multicast instance with a group.

Typically, users will be assigned to groups based on department or geography. Bandwidth capacity might be another consideration when assigning users and groups. Although a CM agent can be associated with several multicast sessions, at any given time, only one session can be active for a CM agent.

This section describes how to create this association using the CM Admin CSDB Editor. For detailed instructions, refer to the *CM Administrator Guide*.



Refer to the *CM Application Manager and Application Self-Service Manager Guide* for comprehensive information on how to include users in workgroups and departments.

To associate a group with a multicast instance

- 1 Open the CM Admin CSDB Editor, and navigate to and open PRIMARY.POLICY.WORKGRP.
- 2 Right-click on the workgroup that you want to associate with multicast, and from the shortcut menu that appears, select **Show Connections**.
- 3 From the drop-down list in the resulting dialog box, select **POLICY**, and then double-click **MULTICAST**.

Now, MCAST1 should be in the list view of the CM Admin CSDB Editor, and the PRIMARY.POLICY.WORKGRP Class should be open in the tree view.

- 4 Left-click (and hold) the **MCAST1** icon.
- 5 Drag the **MCAST1** icon (still holding down the left button of the mouse) to the selected instance of PRIMARY.POLICY.WORKGRP.

As you drag the MCAST1 icon, a circle with a slash will appear. This will change to a paper-clip icon when you place it on the selected instance. This indicates that the connection is allowed.

- 6 Complete the connection by dropping (releasing the left button of the mouse) the MCAST1 icon on the instance.

The Select Connection Attribute dialog box opens.

- 7 Click **Copy** (MCAST1 instance to PRIMARY.POLICY.WORKGRP._BASE_INSTANCE_).

In the tree view, MCAST1 will be listed under the associated instance, and POLICY.MULTICAST.MCAST1 will be listed as an `_ALWAYS_` connection in the list view.

The MCAST1 instance has been successfully connected to the WORKGRP class.

Multicast and the CM OS Manager

The HP Configuration Management OS Manager (CM OS Manager) supports guaranteed-delivery multicast so that large numbers of operating system images can be concurrently rolled out.



This section explains how to configure the CM Multicast Server for use with the CM OS Manager.

For information on the CM OS Manager, refer to the *HP Configuration Management OS Manager System Administrator Guide (CM OS Manager Guide)*.

Requirements

In order for the CM Multicast Server to work with the OS Manager, the requirements that are listed in this section must be met.

- The CM Multicast Server must be installed on a Windows machine.
- The CM Multicast Server must be, at a minimum, version 3.1.
- The CM OS Manager System Agent (CM OSM System Agent) must be version 2.0 or above (support of a multicast-aware version of ROMA).

- The operating system images will be downloaded only if the **Service Multicast Eligible** option is selected for the operating system service.

To do this:

- a Open the HP Configuration Management Portal (CM Portal) administrative interface and go to the appropriate operating system service.
- b Click **Modify**.
- c Click **Advanced**.
- d Scroll to near the bottom of the screen and make sure that **Service Multicast Eligible** is selected.

Configuring Multicast for use with the CM OS Manager System Agent

The following steps detail how to configure the CM Multicast Server for use with the HP Configuration Management OS Manager System Agent (CM OSM System Agent).

To configure guaranteed-delivery multicast

- 1 Go to the appropriate Behavior instance.
- 2 Click **Advanced** to access the advanced options.
- 3 Modify the CM OSM System Agent **Parameters** field as follows:

```
-multicast multicastIPAddress:3463 -mcastretrycount 1  
-mcastretrywait 240
```

The following table describes the CM OSM System Agent parameters.

Table 6 CM OSM System Agent parameters described

Parameter	Description
multicastIPAddress	Refers to the CM Multicast Server host; <i>host name</i> can be used also; 3463 is equal to the CM Multicast Server port.
mcastretrycount	Specifies the number of times that multicast will be retried if there is a failure. The default is 1 .

Parameter	Description
mcastretrywait	Specifies how long to wait before starting the retry. The default is 240 (seconds; 4 minutes).

- If necessary, modify the CM Multicast Server configuration file, `mcast.cfg`, which is located in `SystemDrive:\Program Files\Hewlett-Packard\CM\MulticastServer\etc`.

The following table describes the parameters of `mcast.cfg`.

Table 7 MCAST.cfg parameters described

Parameter	Description
root	The root directory from which the CM Multicast Server will retrieve resources.
address	A range of IP addresses for use with <i>dynamic windows</i> . See Multicast Dynamic Windows on page 37.
minref	The minimum number of CM agents that must request a file in order for it to be considered for multicast.
cwindow	The duration (in minutes) of the collection phase during which all CM agents must register their list of required files.

- If changes were made to `mcast.cfg`, restart the CM Multicast Server service, **CM Multicast Server (mcast)**, to implement the changes.

Multicast and the CM Proxy Server


Preloading a CM Proxy Server

The CM Multicast Server can be used to preload the static cache of an HP Configuration Management Proxy Server (CM Proxy Server).

- *Preloading* is the loading, onto a CM Proxy Server, of the applications that it is configured to distribute to CM agents, before CM agents request the application, and in anticipation of such requests.

This practice eliminates the need to involve the CM Configuration Server.


CM Proxy Servers that are preloaded are configured in the same way as CM agents that receive resources from a CM Multicast Server.

 Optionally, the CM Multicast Server dynamic windows feature can be used to preload CM Proxy Servers (see [Multicast Dynamic Windows](#) on page 37).

For additional information on preloading CM Proxy Servers, refer to the *CM Proxy Server Guide*.

The following section details how to preload a CM Proxy Server; it assumes that an administrator has a working knowledge of the CM Admin CSDB Editor. For additional instructions, refer to the *CM Administrator Guide*.

To preload a CM Proxy Server

 HP recommends that administrators become familiar with the operation of the CM Multicast Server before using it to preload a CM Proxy Server.

- 1 For the CM Proxy Servers that will participate in the preload, use the CM Admin CSDB Editor to create, in the CM-CSDB, a POLICY.USER instance that matches the user ID that was specified during the CM Proxy Server installation, or later specified in the `-static-user` parameter in the `/etc/rps.cfg` file.

The default user ID is **RPS**. However, it is often set to `RPS_machine_name`.

- 2 Use the CM Admin CSDB Editor to create a POLICY.WORKGROUP instance for the CM Proxy Servers in order to specify their distribution model for the preload of the static cache.
- 3 Use the CM Admin CSDB Editor to create a POLICY.MULTICAST instance (for example, MCPRELOAD) that is exclusively for CM Proxy Server preloads.
- 4 Edit the MCPRELOAD instance attribute values as follows.
 - **ALTADDRM**: Specify the IP address of where the CM Multicast Server is installed.
 - **CGMTDATE** and **CGMTTIME**: Specify a multicast session start date and time that will be active when the CM Proxy Server preload command is executed.

- ▶ The CM Proxy Server preload command must be issued at the same time as, or shortly after, the multicast collection session starts.

The following figure illustrates an MCPRELOAD Instance with CGMTDATE and CGMTTIME entries that will initiate a multicast session for the CM Proxy Server preload on November 4, 2005 at 2 P.M.

Figure 9 Multicast Class MCPRELOAD Instance Attributes

Name	Attribute Description	Value
DOMAIN	Domain Name	&{ZOBJDOMN}
CLASS	Class Name	&{ZOBJCLAS}
INSTANCE	Instance Name	&{ZOBJNAME}
MCAST	Enable Multicast [Y/N]	Y
MODE	Broadcast or Multicast [M/B]	M
MORDER	Service Installation Order [B/A/S]	S
ADDRESS	Broadcast or Multicast Address	229.0.0.0
PORT	Broadcast or Multicast UDP port	9512
DELAYFP	Delay After First Packet (mil sec)	40
DELAYBP	Delay Between Packets (mil sec)	40
RESENDS	Number of Resends	1
STORE	Backup Packets to Store for Resend	20
CGMTDATE	Collection Start Date (YYYYMMDD)	20051104
CGMTTIME	Collection Start Time GMT(HH:MM:SS)	14:00:00
CWINDOW	Duration of Collection Window (min)	45
MDELAY	Delay Before Multicast Start (min)	2
MWINDOW	Duration of Multicast Window (min)	60
TTL	Number of Router Hops	3
BYPASCON	User to Prime Multicast Server	
ALTADDRM	Multicast Server IP	208.119.233.106
ALTPORTM	Multicast Server Port	3463
MINREF	Minimum Num Clients Requesting File	1
MINSIZE	Minimum File Size for Multicast	1024
ALWAYS	Manager REXX Method	SYSTEM.ZMETHOD.MULTICAST

As shown, the collection window will last 45 minutes—as specified by CWINDOW—after which the CM Multicast Server will stop the collection process.


- There will be a 2-minute delay (MDELAY) before the transmission begins. At the designated multicast start time (CGMTTIME + CWINDOW + MDELAY = 14:47:00 GMT), the CM Multicast Server will start multicasting the files that were requested by the various CM agents.

- 5 Connect the POLICY.WORKGROUP instance for the CM Proxy Server Preload Apps to the POLICY.MULTICAST.MCPRELOAD instance.
For details on making this connection, see [Associating Groups with a Multicast Instance](#) on page 43.
- 6 Issue the CM Proxy Server preload command when the CGMTTIME and CGMTDATE apply.

Preloading a CM Proxy Server with Dynamic Windows

The CM Multicast Server offers the ability to configure dynamic (collection and transmission) windows, as detailed in [Multicast Dynamic Windows](#) on page 37. This means that, for a group of CM Proxy Servers that is being preloaded, multiple multicast distributions can be concurrently active.

The following MULTICAST instance values will initiate a daily (because no value is specified for CGMTDATE) multicast session that will start at 05:01:00 GMT. The multicast session will use up to 22 dynamic windows.

 A CM Proxy Server preload must also be scheduled for this same time each day in order for it to participate in the multicast session.

```
ADDRESS = 235.0.0.000-021
CGMTDATE =
CGMTTIME = 05:01:00

CWINDOW = 45
MDELAY = 2
ALTADDRM = multicast_server_IP
```

Session Logs for a Preload Using Multicast

On a CM Proxy Server that receives a preload from a CM Multicast Server, the preload session logs are found in:

```
<IntegrationServer>\logs\rps.
```

The session logs that trace the activity of the collection, the requests, and the received items in a multicast session are, respectively:

- connect.log
- radreqst.log
- radcrecv.log



On a CM Multicast Server-preloaded CM Proxy Server, `connect.log` includes the collection information that is found in the `radcollect.log` of a CM agent multicast session.

5 Using the CM Multicast Server

Now that the HP Configuration Management Multicast Server (CM Multicast Server) has been installed and configured, it is important to test it before putting it into production to ensure that it will execute as expected. There are three ways to perform a multicast test: one from a CM agent perspective, and two from an administrator perspective.

The CM agent-based method is not efficient in production because it is specific only for that CM agent. However, it is a good test to check the installation and configuration of the CM Multicast Server. The two remaining methods are more suited to a production environment because they offer the ability to include multiple CM agents (as part of a group, as discussed in the previous chapter).

In order to conduct either of these tests, do the following.

- Delete the service that is going to be used for the test from the CM agent machine.
- Connect the multicast instance to the CM agent via a group.
- Set up a multicast instance with an active collection window.

Testing the CM Multicast Server

CM Agent Testing

To test the operation of the CM Multicast Server and the associated CM agent software

► Make sure that the service that is being used for the test has been deleted from the CM Application Manager agent machine on which the test is being conducted.

- 1 On the CM agent machine, open a command window.
- 2 Change the directory to the database location where the CM agent is stored.

3 Type:

```
Radskman.exe mname=serverid,dname=SOFTWARE  
,ipaddr=serverid,port=3464,cat=Y
```

where *serverid* is the network name of the CM Configuration Server.

This method of multicasting files is not suitable in production because these steps would have to be executed on each CM agent machine. The methods that are covered in the next section are more appropriate for production because the CM Configuration Server Database can be accessed and then used to include CM agents in a group, which can then be associated with a multicast instance.

This means that at a central location, multiple CM agents can be configured for a multicast session. Also, the eligibility of a service (MCELIGBL), the parameters for delivering the service (MORDER), and the transmission of the request files (BYPASCON) can be determined.

Administrator Testing

Notify and TIMER

In addition to the CM agent test presented above, the CM Application Manager **Notify** and **Scheduler (TIMER)** features are convenient ways to transmit data to CM Application Manager agent computers.



For comprehensive information on these features, refer to the *CM Application Manager and Application Self-service Manager Guide*.

To determine if the installation (multicast session) was successful, look at `connect.log` and `radrecv.log` in the CM agent's `log` directory.

A Time Zone Adjustments

In order for a multicast session to execute when you want it to, the CGMTTIME Instance of the MULTICAST Class must be correctly configured. Since the CM Configuration Server uses the operating system's clock, it is important that the CGMTTIME instance be properly set—using Greenwich Mean Time (GMT). Also, **base-24** (a.k.a. military) time must be used when configuring this setting.

▶ GMT is a constant and does not adjust for Daylight Saving Time (DST).

Therefore, a CM Configuration Server Database in New York, USA, which is 5 hours (300 minutes) behind GMT during local *standard* time, would need the proper number of adjustment minutes added, in order to be synchronized with GMT. For various sample GMT settings, see the examples that follow.

Example A (DST in effect):

To schedule a multicast session to begin collection on Monday, July 09, 2007 at 2:35:15 (P.M.) local time on a CM Multicast Server in New York, USA, specify:

```
CGMTDATE=20070709
```

```
CGMTTIME=18:35:15
```

▶ The value of the MULTICAST Class instance attribute, CGMTTIME (2:35:15 P.M.), can be calculated as follows:

- Convert the time to base-24 time (2:35:15 becomes 14:35:15).
- Add to this the difference between EDT and GMT (4 hours).

The result is the GMT time (18:35:15) that must be specified for the CGMTTIME attribute in order to schedule the specified multicast session.

Example B (DST *not* in effect):

To schedule a multicast session to begin collection on Monday, November 09, 2007 at 2:35:15 (P.M.) local time, on a CM Multicast Server in New York, USA, specify:

CGMTDATE=20071109

CGMTTIME=19:35:15



The value of the MULTICAST Class instance attribute, CGMTTIME (2:35:15 P.M.), can be calculated as follows:

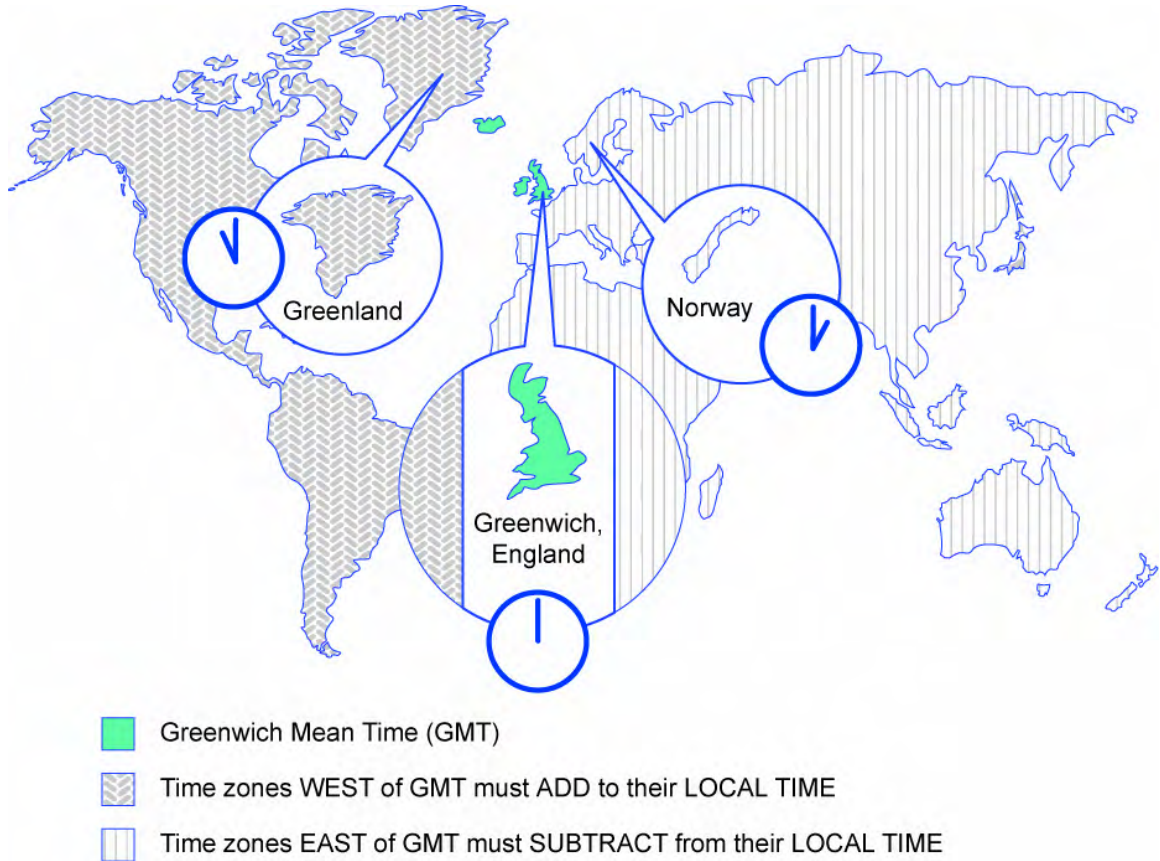
- Convert the time to base-24 time (2:35:15 becomes 14:35:15).
- Add to this the difference between EDT and GMT (5 hours).

The result is the GMT time (19:35:15) that must be specified for the CGMTTIME attribute in order to schedule the specified multicast session.

Time Zone Overview

Figure 10 on page 55 shows a map with a view of the approximate location of GMT, and will help you remember whether to adjust forward or back for various time zones.

Figure 10 Greenwich Mean Time (GMT)



Automatic Adjustments for Daylight Saving Time

If the CM Configuration Server host machine offers the ability to have its clock automatically adjust for the Daylight Saving Time change, we recommend that this feature be activated.

- On a Windows machine, this is accomplished in the **Control Panel** area.
- On a UNIX machine, this is configured during installation. If you need further information, consult the operating system's documentation.

B Multicast Results for Reporting

At the end of a multicast session, the CM Multicast Server accumulates session performance statistics and sends them, via HTTP, to the CM Configuration Server Database (CM-CSDB). These statistics are sent in a Web-based Enterprise Management (**WbEM**) object, **RMSSTATS**, which contains information such as the:

- Number of files requested
- Number of files rejected
- Number of files and bytes transmitted
- Date and time the transmission started

The full list of session performance statistics is detailed in [Table 8](#) below.

RMSSTATS Object

The RMSSTATS object can be sent to the CM-CSDB. The database connections can be configured so that the multicast statistics can be examined.

For more information on the RMSSTATS object in the CM-CSDB, see the section [RMSSTATS and the CM Configuration Server Database](#) on page 59.

RMSSTATS

[Table 8](#) below contains a list of the variables of the RMSSTATS object.

Table 8 Multicast RMSSTATS object variables

Variable	Value
CLASS	NVD_MulticastStatistics
KEY	ServiceID,SourceType,SourceID
NAMESPACE	NVD
PROP000	ServiceID:S= <i>manager.domain.class.instance</i>

Variable	Value
PROP001	Nclients:I= <i>number of clients connected</i>
PROP002	Ndevices:I= <i>number of devices connected</i>
PROP003	SourceType:S=MCS
PROP004	SourceID:S= <i>IPaddr:port.MCinstance</i> <ul style="list-style-type: none"> • <i>IPaddr:port</i> are the address and port that the CM agent uses to connect to the CM Multicast Server. • <i>MCinstance</i> (the multicast instance) distinguishes between multiple sessions on the same machine.
PROP005	NfilesReq:I= <i>number of files requested</i>
PROP006	NbytesReq:I= <i>number of bytes requested</i>
PROP007	NfilesXmt:I= <i>number of files transmitted</i>
PROP008	NbytesXmt:I= <i>number of bytes transmitted</i>
PROP009	NfilesRej:I= <i>number of files rejected</i> Note: The number of files rejected for Nclients < MINREF.
PROP010	NbytesRej:I= <i>number of bytes rejected</i> Note: The number of bytes rejected for Nclients < MINREF.
PROP011	StartTime:T= <i>YYYY-MM-DDThh:mm:ssTZD</i> Note: The start time of the multicast transmission.
PROP012	Duration:I= <i>duration of download(seconds)</i>
STATUS	N/A
TYPE	WbEM
ZOBJDATE	<i>YYYYMMDD</i>
ZOBJTIME	<i>Hh:mm:ss</i>
ZOBJNAME	<i>service_name</i>
ZUSERID	<i>Hostname</i>

Multicast Durations

For the CM Multicast Server, the reported duration of the multicast session might be greater than that of the same session as reported by the CM agent. Since the CM Multicast Server transmits files in the order of *most_files_requested* to *least_files_requested*, a CM agent needing only the last file will record a duration that is much longer than the actual file transmission time. It is likely that 90% of the time a CM agent will discard packets until its requested files are transmitted. Therefore, multicast durations need to be properly computed before being specified.

RMSSTATS and the CM Configuration Server Database

The CM Configuration Server can be used to view the reporting statistics of a multicast session. In order to use it, an appropriate `nvdcast.rc` file must be present and configured on the CM Multicast Server host machine.



The `nvdcast.rc` file is for reporting purposes only; it is not required for standard multicast operations.

Multicast statistics can be mined and viewed with the CM Configuration Server Database Editor. To enable this feature, configure the database connections that are shown in the following table.

Table 9 Database Connections for Multicast Statistics

Connect...	To...
PROCESS.RMSSTATS	ZMETHOD.RMSSTATS
PROCESS.CLISTATS	ZMETHOD.CLISTATS

C Network Test Modules

HP Configuration Management Multicast Server (CM Multicast Server) media contains a `multicast_test_modules` directory. These modules are provided in order to help you tune the multicast and broadcast parameters for a network configuration.

The `multicast_test_modules` directory contains:

- the **broadcast** send and receive files (`BRECV.COMD` and `BSEND.COMD`),
- the **multicast** send and receive files (`MRECV.COMD` and `MSEND.COMD`),
- the receive executable (`radcrecv.exe`),
- the send executable (`radcsend.exe`),
- the image-deployment send files (`gdmcsend.exe` and `gdmsend.cmd`),
- two application `.dll` files, and
- four test files (`TESTDATA000n`) of varying sizes.



The parameters that are specified in earlier sections of this document might not be suited to all network configurations. Specify values in accordance with the needs of the environment.

RADCSEND and RADCRECV

Two programs (`RADCSEND` and `RADCRECV`) perform broadcast and multicast file transfers, based on command line parameters. On Windows, these can be run from the command line using the `.cmd` files that are provided.

- 1 Copy the contents of `multicast_test_modules` to a temporary directory on the destination computer.
- 4 Run `mrecv.cmd`.
- 5 Copy the contents of `multicast_test_modules` to the source computer.
- 6 Run `msend.cmd`.

TESTDATA0001 – TESTDATA0003 will be sent to the destination computer via multicast.

RADCRECV will create the log and data files in the current directory.



If Configuration Management is not installed, logs are created in the respective, current directories of each program. Otherwise, look for the `radcrecv.log` in the `log` subdirectory.

If either `IDMSYS` or `IDMLOG` (in `win.ini` or `nvd.ini`) is defined, it will make use of directories for the data and log files.

Syntax

The syntax for the `RADCSSEND` and `RADCRECV` programs is shown below. Following the syntax, [Table 10](#) below defines the parameters.

RADCRECV

```
RADCRECV M|B [address] port buffers timeout (min) [Object with  
file names]
```

RADCSSEND

```
RADCSSEND M|B address port filename file number delay after  
first packet delay between packets time-to-live buffers resends  
last-file-flag[1] packet data size [n-to-drop[0]]
```

Table 10 Syntax parameters defined

Parameter	Definition
M B	M = Multicast, B = Broadcast
<i>address</i>	The target network IP address (<code>xxx.xxx.xxx.xxx</code>). Note: This parameter must be omitted for <code>RADCRECV</code> in Broadcast mode, and always used for <code>RADCSSEND</code> .
<i>port</i>	The IP port that is associated with the (broadcast or multicast) transmission.
<i>filename</i>	The name of the file to be sent.
<i>file number</i>	The relative file number (if more than one file is to be sent, increment this by 1 for each successive file). <code>RADCSSEND</code> expects to find these files in the directory from which it is executed.

Parameter	Definition
<i>delay after first packet</i>	The delay (in milliseconds) after the first packet before sending the remaining packet. The delay gives the receiver time to open and compare the file.
<i>delay between packets</i>	The delay (in milliseconds) between data packets (packet size approximately 1 KB).
<i>time-to-live</i>	The IP TTL value (maximum number of routers to traverse).
<i>buffers</i>	The number of packets to buffer when packet-retransmits (resends) are specified.
<i>resends</i>	The number of retransmits for each grouping of <i>buffers</i> packets.
<i>last-file-flag</i>	Indicates the last file to be transmitted. This will cause the receiver to terminate execution at the end of this file. The default is 1 (true). Set to zero for all but the last file, if multiple files are sent.
<i>packet size</i>	The maximum number of data bytes transmitted per packet.
<i>n-to-drop</i>	Set this to a non-zero value to simulate packets being dropped by the transmission network. RADCSND will randomly drop packets so that $(100 / n\text{-to-drop})$ percent of the packets will not be sent, and therefore, not received by RADCRECV. This value is optional and the default is 0 .
<i>Object with file names</i>	Multicast only. This value is optional. RADCRECV will store files in IDMDATA as named in this object. If not specified, the received file is stored in the same directory as RADCRECV. The object must have the same format as MMCLIST. RADCRECV also looks in IDMLIB for the object, MULTICAST, which is also optional. To set the parameters log level (default = 40) and resends (default = 0), ZTRACEL and RESENDS are set here.
<i>timeout (min)</i>	Maximum time that RADCRECV will accept data before stopping (failsafe mechanism for live run).



If MULTICAST.ZTRACEL is set to 55 or greater, RADCRECV will log header information for every packet that gets to the GetControlInfo routine. (RADCRECV bypasses packets that are “malformed” or not intended for the multicast/broadcast session it is looking for.)

BROADCAST Tests

The contents of the `BSEND.COMD` file are:

```
radcsend B 231.1.222.6 9511 TESTDATA000n 1 50 50 2 20 1 1 1020
```

where:

Table 11 RADCSSEND Parameters for BROADCAST

B	Indicates Broadcast
231.1.222.6	<i>address</i> (specified on the command line)
9511	<i>port</i>
TESTDATA000n	<i>filename</i> (specified on the command line)
1 (2, 3, ...)	<i>file number</i>
50	<i>delay after first packet</i>
50	<i>delay between packets</i>
2	<i>time-to-live</i>
20	<i>buffers</i>
1	<i>resends</i>
1	<i>last-file-flag</i>
1020	<i>packet data size</i>
	<i>n-to-drop</i> (optional, not used in the above example)

To run, type:

```
BSEND dest_IP_address filename
```



The receive program must be started first, in order to receive the file.

The contents of the `BRECV.COMD` file are:

```
radcrecv B 9511 10 45
```

where:

Table 12 RADCRECV Parameters for BROADCAST

B	Indicates Broadcast
9511	<i>port</i>

10	<i>buffers</i>
45	<i>timeout (minutes)</i>

To run, type:

BRECV

MULTICAST Tests

The contents of the `MSEND.COMD` file are:

```
radcsend M 231.1.222.6 9511 TESTDATA0001 1 50 50 2 20 1 0 1020
radcsend M 231.1.222.6 9511 TESTDATA0002 2 50 50 2 20 1 0 1020
radcsend M 231.1.222.6 9511 TESTDATA0003 3 50 50 2 20 1 1 1020
```

where:

Table 13 RADCSSEND Parameters for MULTICAST

M	Indicates Multicast
231.1.222.6	<i>address (specified on the command line)</i>
9511	<i>port</i>
TESTDATA000 <i>n</i>	<i>filename (specified on the command line)</i>
1 (2, 3, ...)	<i>file number</i>
50	<i>delay after first packet</i>
50	<i>delay between packets</i>
2	<i>time-to-live</i>
20	<i>buffers</i>
1	<i>resends</i>
1	<i>last-file-flag</i>
1020	<i>packet data size</i>
	<i>n-to-drop (optional, not used in the above example)</i>

To run, type:

MSEND



The receive program must be started first, in order to receive the file.

The contents of the `MRECV.CMD` file are:

```
radcrecv M 231.1.222.6 9511 20 45
```

where:

Table 14 RADCRECV Parameters for MULTICAST

M	Indicates Multicast
231.1.222.6	<i>address</i>
9511	<i>port</i>
20	<i>buffers</i>
45	<i>timeout (minutes)</i>
	<i>Object with file names (optional, not used in the above example)</i>

To run, type:

MRECV

D Implementation and Diagnostics

This appendix offers information on:

- Implementing the multicast process
 - Preliminary Parameter Calculation, below
 - Pre-Multicast Session Checklist on page 70
 - Multicast Program-Call Schematic on page 71
- Diagnosing the multicast process to assist in problem resolution
 - Querying the Various Logs on page 73
 - Troubleshooting Tips on page 75

Preliminary Parameter Calculation

Before attempting to run a multicast session, it is necessary to:

- 1 Calculate the DELAYBP and MWINDOW values.
- 7 Test the network (using the multicast test modules, RADCSSEND and RADCRECV) to ensure that it is properly configured for multicast.
- 8 Examine the test logs.

Calculate DELAYBP and MWINDOW

DELAYBP

$$\text{DELAYBP} = (8 * P / N)$$

- **P** is the *packet size* (typically, **1020** bytes) and
- **N** is the *network bandwidth* (in this example, **16** kilobits/second).

Therefore, **8** multiplied by **1020** (P) divided by **16384** (16*1024) equals **0.498** seconds, which rounds to **0.5** second.

So, **DELAYBP = .5 second.**

MWINDOW

$$\mathbf{MWINDOW} = D * (T/P) * (R + 1)$$

- **D** is the DELAYBP (as computed above),
- **T** is the *total bytes* (to be transmitted),
- **P** is *packet size* (from DELAYBP example), and
- **R** is the *number of resends*.

Assuming values of: **R = 1** and **T = 10MB** (10,000,000 bytes), the value of MWINDOW computes as follows: **0.5** (D) multiplied by **10,000,000** divided by **1020** (T/P) multiplied by **2** (R + 1) equals **9803.9215** seconds, which rounds to **9804** seconds.

So, **MWINDOW = 2 hours, 44 minutes.**

Test the Network

Run the network test modules as discussed in [Appendix C](#), Network Test Modules but substitute the value of DELAYBP with that which pertains to your network.

- ▶ Considering the MWINDOW value previously calculated, it is recommended that, if testing on a 16-Kbps network, a smaller test file (such as 10 KB) be used. This should take approximately 10 seconds.
- ▶ MWINDOW is only a fail-safe to ensure termination of the receive program (RADCRECV). Use it in production—not for testing, where you are observing the test. Typically, it is used as an estimate of the end of the transmission. In practice, add time for a margin of safety.

Examine the Test Logs

- ▶ The following examples contain explanatory comments (*italicized test within parentheses*) that will not be in the log.

RADCRECV

The `radcrecv.log` is in the same directory as the program. If the CM agent is on the same machine, the log is in the `log` subdirectory of the CM agent installation directory, `IDMSYS`. At the end of the log is the summary information (shown below with irrelevant text removed):

```
08:50:57   Number of times Each Packet is Sent [1] (RESENDS + 1,
no bearing on receiver)
08:50:57   Multicast Packet Inactivity Timeout [5] (minutes)
08:50:57   Multicast IP address [231.1.222.6] mode [M]
08:50:57   Port [9511]
08:50:57   Number of buffers: [20]
08:50:57   MWINDOW value in (sec): [2700]

09:30:20   Packets received: 39216 dropped(est): 0 (The number of
unique packets received, not counting resends. The number dropped is an
estimate, based on the gaps in the packet number sequence.)
09:30:20   Done
```

RADCSSEND

The `radcsend.log` (in earlier versions, this was `edmcSEND.log`), is always in the program's directory. The log has this information before the start:

(Test with: 20ms delay, 2 resends, 40MB file, MWINDOW of 2353 seconds = 39.2 minutes)

```
EDMCSEND started on [Wed Nov 20 08:44:58 2002]
Mode selected is: [M]
Destination address is: [231.1.222.6]
Destination port is: [9511]
Processing file: [TESTDATA0004]
Relative file number: [1]
Delay after the first packet: [20]
Delay between packets: [20]
Number of packets to re-send: [20]
Number of resends: [2]
Time to live: [3]
Last file flag: [1]
Packet Data Size: [1020]
File Size: [40000000]
```

(And at the end:)

```
Total Packets: 117648
Exiting on [Wed Nov 20 09:24:11 2002]: [Done]
```

(From this, the following can be computed:

Effective delay between packets: 2353 seconds divided by 117648 packets = 20 ms/packet(?).

Thruput: 40MB divided by 2353 sec = 0.017 MB/sec [remember, there were 2 resends])

Pre-Multicast Session Checklist

Prior to starting a multicast session, do the following:

- 1 Be sure that each SERVICE to be multicast is defined as MANDATORY.
- 2 Specify MCELIGBL = Y for SERVICES to be multicast.
- 3 Connect the SERVICE instances and the MULTICAST instance to the USER or WORKGROUP instance.
- 4 Set the MULTICAST instance parameters, as outlined below:

The most common problems are determining the start time and duration of the Collection window (CGMTTIME and CWINDOW). The Collection window should be long enough to allow CM agents to:

- Connect to the CM Configuration Server to determine the needed resources, and
- Connect to the CM Multicast Server to exchange the request information.



Be advised that the internal clocks on the machines (CM agents and servers) should be synchronized to within a few minutes of each other, *with respect to GMT*. This means that CGMTTIME should be a few minutes *earlier* than the time that the CM agents are expected to connect, and the CWINDOW time should be a few minutes *later* than the time that the last CM agent is expected to complete the collection/request phase of multicast.

- 5 Specify identical values for the parameters DELAYBP and DELAYFP.



The value of DELAYBP is determined by the calculations shown in [Calculate DELAYBP and MWINDOW](#) on page 67 and modified by the results of the tests shown in [Examine the Test Logs](#) on page 68.

The value of MWINDOW (calculated in [Calculate DELAYBP and MWINDOW](#) on page 67) should be padded 20–50% to allow for unforeseen influences, such as network congestion.



Remember to base these calculations on the total number of bytes of all the files that are expected to be transmitted.

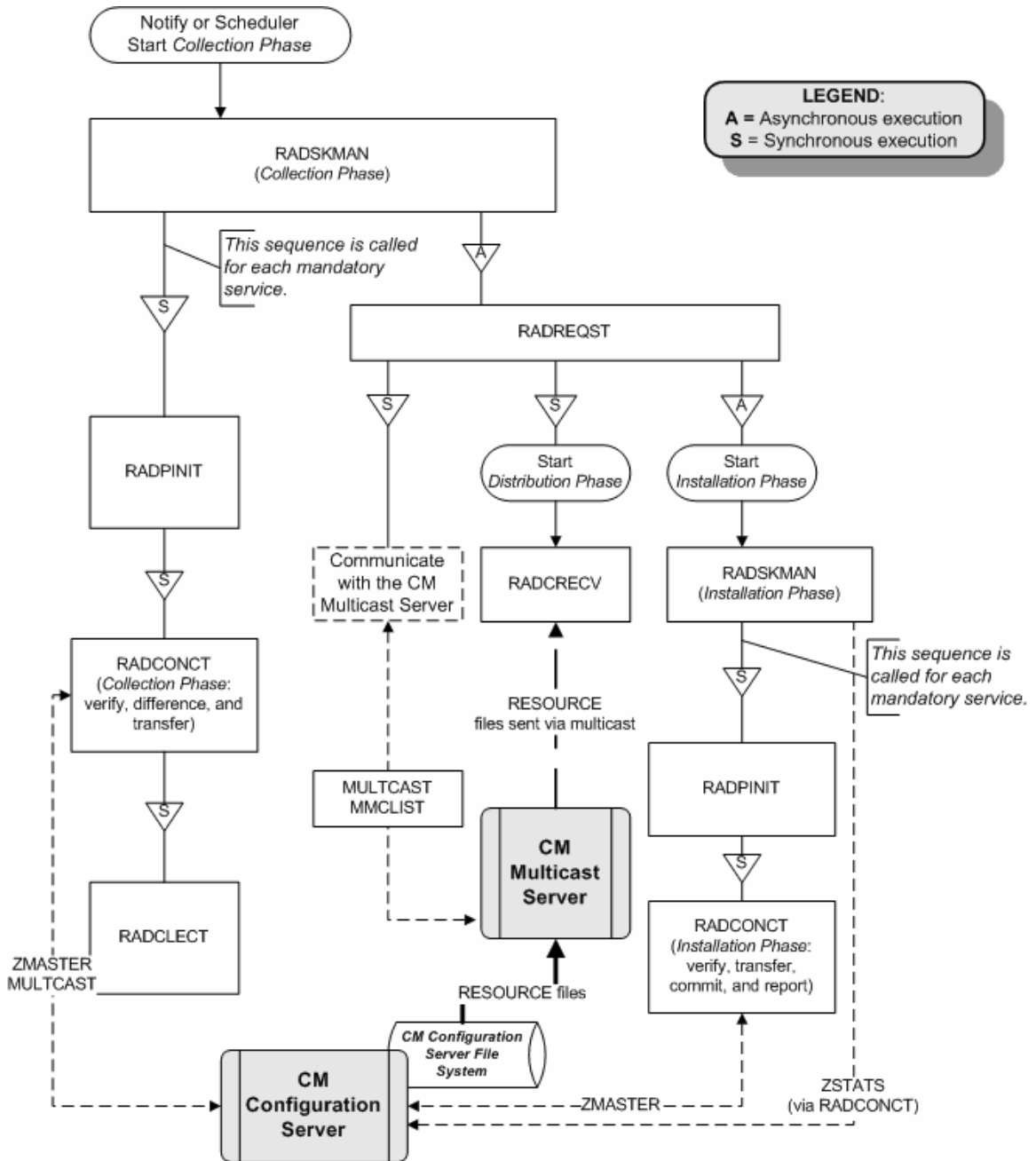
Multicast Program-Call Schematic

Figure 11 on page 72 illustrates the sequence in which the various programs are called during a multicast session.



The execution flows from *left to right* and *top to bottom*.

Figure 11 Call sequence of the multicast session programs



Troubleshooting

Querying the Various Logs

This section provides information on what to look for in the CM agent logs (located in `IDMSYS\log`) when running a multicast session. This process works backwards through the logs in order to determine the point at which a problem occurred.

[RADCRECV.log](#)

Does it exist? If NO, check `RADREQST.log` (see [RADREQST.log](#) below).

- If YES, were all files received? If YES, done.
- If NO:
 - Was there a timeout? If YES, increase `MWINDOW` (or set to 0, don't use).
 - Were too many packets dropped? If YES, increase `DELAYBP` or `RESENDS`.
 - Did a file already exist?
 - Does `RADCLECT.log` show files rejected because of size?
 - Does `NVDCAST.log` show files rejected because of too few requests?
 - If none of the above, check `RADREQST.log`.

[RADREQST.log](#)

Does it exist? If NO, check `RADCLECT.log` (see [RADCLECT.log](#) on page 74).

- If YES, look at the last line of the log.

```
Sleeping for n seconds - OK; more than 2 minutes before
multicast.
```

Ending with code:
 - **240** – OK, normal completion of multicast.
 - **241** – Can't open *object_name*.
 - **244** – Outside collection window (check times and time zone in log.).
 - **246** – No MMCLIST object; nothing to process. (See `RADCLECT.log`.)

- **016** – (CM Multicast Server error returned; refer to error message text.)

RADCLECT.log

Does it exist? If NO, look at `CONNECT.log` (see [CONNECT.log](#) below).

```
Added heaps: 1 with STATUS = RMS_REQ, 0 with STATUS = REJ_SIZ
- Normal operation.
```

(If no heaps are added, there will be no multicast.)

Note that if some files are not sent by multicast, this program will be called again, but will end with code **241** – “Multicast done.”

Ended with code:

```
241 - Multicast NOT enabled - OK
Multicast done - OK
APPINFO.MCELIGBL = N, application not eligible for
multicast. - OK
Incorrect NVDLIB - Check the directory structure.
Can't open [object_name]

243 - OK, normal completion of first pass.
```

CONNECT.log

Does it exist? If NO, it has been deleted or the CM agent never ran. The normal sequence of events is (look for these lines in the log, in this order):

- a** Multicast available; starting Phase 1
- b** Adding Branch [MULTICAST] Priority [50]
- c** Requesting [n] files via multicast
- d** [ZGETAFIL] is launching program [RADCLECT.exe]
- e** END RADCLECT.exe ----- rc = [243]
- f** Collector loaded MMCLIST with [n] Files [1048576] Bytes
- g** RADCONCT exit status [859]
- h** RADCONCT [Installation is not complete (phased install process)]

(Steps **c** through **h** will be repeated for each service that requires resources.)

- i** Receiver launched [C:\PROGRA~1\Program Files\Hewlett-Packard\CM\RADREQST.exe] rc[0]

j RADSKMAN Exit code [859]

Wait for multicast to finish, unless some condition causes RADREQST to prematurely terminate.

k CMD LINE = mname=engsvr1,dname=SOFTWARE,ip=engsvr1
,port=3464,cat=n,mcast=2
(*This is the start of the second phase, after multicast has finished.*)

Troubleshooting Tips

This section provides information on how CM multicast determines if it is within the collection window, and how to troubleshoot a failed multicast session.

[How does CM multicast determine if it is within the collection window?](#)

When the CM agent exchanges objects with the CM Configuration Server, a MULTICAST object is returned to the CM agent. During the resource determination the CM agent puts, into the MULTICAST object, the time that it (the MULTICAST object) was downloaded. The variable is LCLTIME.

When the CM agent has collected all the resource requirements, it opens the MULTICAST object again and performs the following sequence:

- Computes the CM Configuration Server GMT time from ZMGRDATE, ZMGRTIME, and ZMGRTMZN.
- Obtains its LCLTIME and computes the clock difference as *CM-CS_GMT_time* minus *agent_GMT_time*.
- Computes the current *CM-CS_time* by adding the clock difference to the current *agent_time*.
- Compares the current *CM-CS_time* with the Collection *start* and *end* times (which are computed using CGMTTIME, CGMTDATE, and CWINDOW).
 - If the current *CM-CS_time* is between the Collection *start* and *end* times, it proceeds to exchange, with the CM Multicast Server, the MULTICAST and MMCLIST objects.
 - If the current *CM-CS_time* is not between the Collection *start* and *end* times, it immediately starts phase 2.
- If the CM Multicast Server has an existing, but un-started, session for the MULTICAST instance and IGMP address that were sent by the CM agent, the CM agent's requests are processed.


- If the transmission has started, the CM Multicast Server returns an error, indicating that the collection window is closed.
- If there is no session for these parameters and the collection window is open, the CM Multicast Server will create a session.
- The CM agent re-computes the clock difference, based on the time returned by the CM Multicast Server. Two minutes before the scheduled transmission start time, the CM agent will awaken and start the receiver.

How can this sequence fail?

- If the CM Multicast Server is not on the same machine as the CM Configuration Server, and the clocks are not synchronized, the check done by the CM agent against the CM Configuration Server clock might pass, but the check done by the CM Multicast Server might not.
- If a MULTICAST object already exists on the CM agent (perhaps left over from an aborted connection), the CM agent will be using old time stamps. Therefore, when the CM Multicast Server receives the request from the CM agent, the request will not be in the collection window.
- It is possible that the CM agent is very near the end of the collection window, and by the time it communicates with the CM Multicast Server, the collection window will be closed.
- If the CM agent has an extensive list of resource requirements, the collection window might close before all of them have been submitted to the CM Multicast Server.
 - Those that are submitted after the window closes but before the transmission begins will be accepted.
 - Those that are submitted after the transmission begins will be rejected, and the CM agent will receive only those that were submitted prior to transmission.

If the multicast process terminates abnormally during testing and the logs have been examined, perform the following steps to ensure a clean restart.

- 1 Stop the CM Configuration Server, delete all of its logs, and restart it.
- 2 Stop the CM Multicast Server, delete all NVDCAST logs, and restart it.
- 3 On the CM agent: delete all logs, and delete any MULTICAST and MMCLIST objects in the CM agent subdirectories.

- 4 Use Configuration Management to uninstall the applications that are to be used for testing.
 -  Ensure that all the files are deleted as well.
- 5 Set up the MULTICAST object with new collection window.
- 6 Start the CM agent process.

E Product Name Changes

If you have used Radia in the past, and are not yet familiar with the newly rebranded HP terms and product names, [Table 15](#) below will help you identify naming changes that have been applied to the Radia brand.

Table 15 Product Name and Term Changes

New Name/Term	Old Name/Term
CM agents	Radia clients
HP Configuration Management Administrator	Radia Administrator Workstation
HP Configuration Management	Radia
HP Configuration Management Application Manager	Radia Application Manager, RAM
HP Configuration Management Configuration Server	Radia Configuration Server, RCS
HP Configuration Management Configuration Server Database	Radia Configuration Server Database, Radia Database
HP Configuration Management OS Manager	Radia OS Manager, ROMS
HP Configuration Management Portal	Radia Management Portal, RMP
HP Configuration Management Multicast Server	Radia Multicast Server, RMS
HP Configuration Management Proxy Server	Radia Proxy Server

Index

.
./install, 29

A

ADDRESS field, 39
address parameter, 62
address parameter, mcast.cfg file, 46
advanced configuration options
 BYPASCON, 40
 MORDER, 40
 MWINDOW, 40
agent time, 75
APPINFO, 74

B

brecv, 64
broadcast
 radcrecv, 64
 radcsend, 64
 tests, 64
bsend, 64
buffers parameter, 63
BYPASCON, 33, 41, 52

C

calculating parameters, 67
CGMTDATE, 39, 75
CGMTTIME, 39, 70, 75
checklist, multicast session, 70
clean up and reporting phase, 25
CM Application Manager, 19
CM Configuration Server, 19, 59

 configuring, 33
 nvdcast.rc, 59

CM Configuration Server Database, 27, 57, 59
 and RMSSTATS, 59

CM Configuration Server Database Editor, 59

CM Multicast Server

 and CM OS Manager, 44
 configuring the environment, 33
 configuring with CM OS Manager System Agent,
 45
 installation, 29
 introduction, 17
 testing
 administrator, 52
 CM agent, 51
 Notify, 52
 Timer, 52
 using, 51
 variables

 BYPASCON, 41
 CGMTDATE, 39
 CGMTTIME, 39
 MCELIBL, 40
 MORDER, 40
 MWINDOW, 41

CM OS Manager, 13, 44
 operating system images, 45

CM OS Manager System Agent, 44
 parameters, 45
 described, 45

CM OSM System Agent. *See* CM OS Manager System Agent

CM Portal, 45

CM Proxy Server, 13, 19
 preloading, 47
 dynamic windows, 49

CM-CS time, 75

collection phase, 23
Collection start and end times, 75
configuration phase, 22
configuring

- CM Configuration Server, 33
- CM Multicast Server, 33
- time zone offsets, 39

connect.log, 74
creating a multicast instance, 42
customer support, 5
CWINDOW, 39, 70, 75
cwindow parameter, mcast.cfg file, 46

D

Daylight Saving Time. *See* DST
delay after first packet parameter, 63
delay between packets parameter, 63
DELAYBP, 67, 68, 70, 73
DELAYFP, 70
distribution phase, 24
document map, 13
documentation updates, 4
DST, 53, 55
dynamic multicast windows, 37

- CM Proxy Server preloading, 49
- preloading CM Proxy Server, 49

E

edmcsend.log, 69

F

file number parameter, 62
filename parameter, 62

G

GMT, 53, 75
Greenwich Mean Time. *See* GMT

H

HP Configuration Management OS Manager, 44
HP Configuration Management Portal, 45
HTTP, 19

I

IDMSYS, 69
IDMSYS.log, 73
IGMP, 12, 19

- address, 75

installing the CM Multicast Server, 29
Internet Group Management Protocol. *See* IGMP

K

killmcast, 32

L

last-file-flag parameter, 63
LCLTIME, 75
logs, 73

- querying, 73

M

mandatory services, 19
mcast.cfg, 46

- parameters
 - address parameter, 46
 - described, 46
 - minref parameter, 46
 - root parameter, 46

mcast.cfg file, 46
mcastretrycount, 45
mcastretrywait, 46
MCELIGBL, 33, 40, 52, 70, 74
MORDER, 33, 40, 52

- values, 41

minref parameter, mcast.cfg file, 46

- MMCLIST, 73, 75, 76
- MMCLIST object, 23, 24, 33
- mrecv, 61, 66
- msend, 61, 65
- MULTICAST, 33, 39, 70, 75, 76
- MULTICAST Class, 34
 - instance attributes, 34
- MULTICAST object, 22, 33
- multicast
 - completion status, 26
 - configuring with CM OS Manager System Agent, 45
 - dynamic windows, 37
 - CM Proxy Server preloading, 49
 - preloading CM Proxy Server, 49
 - instances
 - associating with a group, 43
 - creating, 42
 - process, 20
 - phases, 20
 - radcrecv, 66
 - radcsend, 65
 - reporting, 57
 - session checklist, 70
 - session statistics, 57
 - tests, 65
- multicast phases
 - clean up and reporting, 25
 - collection, 23
 - configuration, 22
 - distribution, 24
- multicasting
 - benefits, 17
 - centralized configuration, 17
 - delivery, 18
 - network efficiency, 18
 - description, 12
 - operational requirements, 19
 - prerequisites, 19
- multicastIPAddress, 45
- MWINDOW, 33, 41, 67, 68, 71, 73

N

- network bandwidth, 67
- n-to-drop parameter, 63
- number of resends, 68
- NVDCAST, 76
- nvdcast.log, 73
- nvdcast.rc, 59
- NVDLIB, 74

O

- Object with file names parameter, 63
- operating system images, 45
- Operating System Manager. *See* CM OS Manager

P

- packet size, 67, 68
- packet size parameter, 63
- parameter calculation, 67
- performance statistics, 57
- port parameter, 62
- post-installation notes, Windows, 32
- pre-installation notes, UNIX, 29
- preloading
 - CM Proxy Server, 47
 - dynamic windows, 49
- preloading, definition, 46
- pre-multicast session checklist, 70

Q

- querying logs, 73

R

- raddlect.log, 73, 74
- radcrecv, 61, 68, 69
 - broadcast, 64
 - multicast, 66
 - syntax, 62

- RADCRECV, 67
- radcrecv.log, 69, 73
- radcsend, 61, 69
 - broadcast, 64
 - multicast, 65
 - syntax, 62
- RADSEND, 67
- radcsend.log, 69
- radreqst, 75
- radreqst.log, 73
- radskman.exe, 52
- reporting, 57
- RESENDS, 73
- resends parameter, 63
- RMSSTATS, 57, 59
 - and CM Configuration Server Database, 59
 - variables, 57
- root parameter, mcast.cfg file, 46

S

- services, mandatory, 19
- session checklist, 70
- session statistics, 57
- startmcast.sh, 32
- support, 5
- syntax, 62
 - parameters defined, 62
 - radcrecv, 62
 - radcsend, 62

T

- technical support, 5
- test modules, 61
 - receive, 61

- send, 61
- testing the CM Multicast Server
 - administrator, 52
 - CM agent, 51
 - Notify, 52
 - Timer, 52
- tests
 - broadcast, 64
 - multicast, 65
- time zone
 - adjustments, 53
 - automatic adjustments, 55
 - offsets, configuring, 39
- timeout (min) parameter, 63
- time-to-live parameter, 63
- total bytes, 68
- troubleshooting, 73

U

- unicasting, description, 11
- UNIX pre-installation notes, 29
- updates to doc, 4
- using the CM Multicast Server, 51

W

- WbEM, 57
- Web-based Enterprise Management. *See* WbEM
- Windows post-installation notes, 32
- Windows Services, 32

Z

- ZMGRDATE, 75
- ZMGRTIME, 75
- ZMGRTMZN, 75