



## **High Availability Distributed System on Oracle Configuration Guide for Network Compliance Manager 1.3**

CiscoWorks

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# Table of Contents

<b>Preface .....</b>	<b>5</b>
Document Conventions .....	5
Accessing NCM Documentation .....	5
Obtaining Documentation, Obtaining Support, and Security Guidelines .....	6
<b>Chapter 1: Getting Started .....</b>	<b>7</b>
Terminology .....	7
Overview .....	8
<b>Chapter 2: Installation, Setup, and Upgrading ....</b>	<b>9</b>
Installation Planning .....	10
Installation and Removal.....	12
Unpacking the Replication Script Installation Bundle .....	12
Initial Replication Setup .....	13
Planning .....	13
Implementation.....	17
Setup and Operation Permissions for Non-system Users .....	19
Adding a New NCM Core to an Existing NCM Mesh .....	21
Removing a NCM Core from an Existing NCM Mesh .....	25
Changing the Master Definition Site.....	28
Removing Replication Across the Entire NCM Mesh .....	29
Post Installation Setup.....	31
Upgrading from NCM 1.x to NCM 1.3 .....	32
Preparing for the 1.3 Oracle Multimaster Upgrade .....	32
Upgrading to NCM 1.3 (Linux and Solaris) .....	34
<b>Chapter 3: System Administration .....</b>	<b>41</b>
Getting Started.....	41
NCM Generated Events .....	42
Distributed System - Broken Replication Job .....	42
Distributed System - Fixed Replication Job .....	43
Distributed System - Replication Errors.....	44
Distributed System - Uniqueness Conflict .....	45
Distributed System - Time Synchronization Warning .....	45
Distributed System - RMI Error .....	46
Using the NCM Distributed System Pages .....	47
Navigating to Distributed Systems Pages .....	47

Distributed Monitor Results Page.....	48
Distributed Error List .....	50
View Distributed Error Page.....	52
Distributed Conflict List.....	53
View Distributed Conflict Page .....	55
Site Reassignment Page .....	56
List Cores Page.....	57
Edit Core Page.....	59
Device Password Rule Priority Reset Page.....	61
Renew Configuration Options Page .....	62

**Chapter 4: Failover and Recovery ..... 63**

Failover .....	63
Recovery .....	63
Loss of Network Connectivity.....	64
Loss of a NCM Server .....	65
Loss of a Database Server.....	66

**Chapter 5: Troubleshooting ..... 67**

Oracle Replication Setup .....	67
Removing In-Memory and Database Information.....	68
Replication Tools and Commands .....	69
Common Errors .....	70

**Appendix A: Restoring NCM Replication  
After Upgrading to Oracle 10g (10.2.0.2) ..... 73**

Getting Started.....	73
Removing Replication Before Upgrading The Database .....	74
Restoring NCM Replication After Upgrading to Oracle 10g (10.2.0.2).....	76

**Appendix B: Extracting Data from the NCM  
Database ..... 77**

**Index..... 81**

# Preface

This document contains information on installing, configuring, and administering the High Availability Distributed System on Oracle for Network Compliance Manager 1.3.

**Note:** The High Availability Distributed System on Oracle for Network Compliance Manager 1.3 requires Oracle Enterprise Edition, version 9i (9.2.0.1) or 10g (10.2.0.2).

## Document Conventions

The following table explains the conventions used in this guide.

Convention	Description/Action
<i>Italic</i>	Used for system messages, paths, file names, and Web URLs. For example, <code>C:\cisco\client\sdk\docs</code>
<a href="#">Link</a>	Moves you from one location to another within the document, opens Web pages, or opens a new email message. In the guide, cross-references are contained within quotation marks and include a page number, while links to URLs and email addresses appear as underlined text.
Enter	Indicates that you should type the text or command that follows, then press the Enter key on the keyboard.
< >	Indicates variable information, such as a name or folder that you must supply. Do not include the angle brackets when replacing the placeholder.

## Accessing NCM Documentation

To access NCM documentation:

- *User Guide for Network Compliance Manager 1.3* — To view the PDF version, after logging in to NCM, on the menu bar click Docs. The Network Compliance Manager Documentation page opens. Select *User Guide for Network Compliance Manager 1.3* from the list.

- Online HTML Help Files — To view the Online HTML Help files, after logging in to NCM, click the Help icon at the top of any UI page.
- *Device Driver Reference for Network Compliance Manager 1.3* — To view the PDF version, after logging in to NCM, on the menu bar click Docs. The Network Compliance Manager Documentation page opens. Select *Device Driver Reference for Network Compliance Manager 1.3*.
- Integration API — To view the PDF version of *Java*, *PERL*, and *SOAP API Reference Guides*, after logging in to NCM, on the menu bar click Docs. The Network Compliance Manager Documentation page opens. Select either *PERL API Reference Guide*, *Java API Reference Guide*, or *SOAP API Reference Guide*.
- CLI Help — To view the command line Help on the server computer, click Start → Programs → CWNCM → CWNCM Client and login. There are two ways to view Help for CLI commands. Enter: `help` to see a list of all commands. Enter `help <command name>` to see detailed help on a specific command.

## Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly What's New in Cisco Product Documentation, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

# Chapter 1: Getting Started

Use the following table to quickly locate information in this chapter.

Topic	Refer to:
Terminology	<a href="#">"Terminology" on page 7</a>
Overview	<a href="#">"Overview" on page 8</a>

## Terminology

The following terms are used throughout this guide:

- **NCM Core** — A single CiscoWork Network Compliance Manager (NCM) Management Engine, associated services (Syslog and TFTP), and a single database. A NCM Core can manage multiple Sites.
- **Site** — A set of devices with unique IP addresses. A Site is managed by one (and only one) NCM Core. Multiple Sites can be managed by a single NCM Core. Refer to the *User Guide for Network Compliance Manager 1.3* for information on segmenting devices.
- **NCM Mesh** — Multiple NCM Cores connected via multi-master replication.
- **Multi-master replication** — Replication where all data is kept consistent across all database servers.
- **Master Definition Site** — Oracle replication requires that one database in a multi-master replication NCM Mesh hold the definition of the replication setup. This database is called the Master Definition Site.

## Overview

The NCM Distributed System on Oracle is a multi-master system where the data from each NCM Core in a NCM Mesh is accessible to all other NCM Cores. This provides a comprehensive view of your data and allows for redundant data and failover in the event of a problem with a single NCM Core. The multi-master features include both database data and certain file system data, such as software images and device driver packages. Keep in mind that software images and device driver packages are also replicated across the NCM Mesh.

The following functionality is included in a NCM Distributed System:

- The concept of a NCM Core and a Site:
  - A device is associated with a single Site.
  - A Site is associated with a single NCM Core.
  - A task is associated with a specific NCM Core.
- Multi-master replication on Oracle:
  - Conflict resolution in the event data modification occurs on two different NCM Cores. This conflict is typically resolved using the latest timestamp method.
  - Replication monitoring and conflict notification is built into NCM. You can manage Oracle replication conflicts and view replication job statuses from within the NCM UI.
  - The NCM scheduler is multi-core aware. You can schedule group tasks containing devices that are associated with different NCM Cores. The system will run these tasks on the correct NCM Core. You do not have to schedule tasks on the appropriate NCM Core.

System setup requires a thorough understanding of Oracle and NCM. Installation includes number of steps that must be performed on the various servers. In addition, certain network changes may be necessary to allow connections between the servers. Once setup is complete, you will need to partition your devices into Sites to ensure proper NCM Core access to devices. Refer to the *User Guide for Network Compliance Manager 1.3* for information on segmenting devices.

**Note:** The NCM High Availability Distributed System on Oracle requires 32-bit versions of Oracle Enterprise Edition 9.i (9.2.0.1) or 10g (10.2.0.2) Database Server.

# Chapter 2: Installation, Setup, and Upgrading

Use the following table to quickly locate information in this chapter.

Topic	Refer to:
Installation Planning	<a href="#">"Installation Planning" on page 10</a>
Installation and Removal	<a href="#">"Installation and Removal" on page 12</a>
Unpacking the Replication Script Installation Bundle	<a href="#">"Unpacking the Replication Script Installation Bundle" on page 12</a>
Initial Replication Setup	<a href="#">"Initial Replication Setup" on page 13</a>
Setup and Operation Permissions for Non-system Users	<a href="#">"Setup and Operation Permissions for Non-system Users" on page 19</a>
Adding a New NCM Core to an Existing NCM Mesh	<a href="#">"Adding a New NCM Core to an Existing NCM Mesh" on page 21</a>
Removing a NCM Core from an Existing NCM Mesh	<a href="#">"Removing a NCM Core from an Existing NCM Mesh" on page 25</a>
Changing the Master Definition Site	<a href="#">"Changing the Master Definition Site" on page 28</a>
Removing Replication Across the Entire NCM Mesh	<a href="#">"Removing Replication Across the Entire NCM Mesh" on page 29</a>
Post Installation Setup	<a href="#">"Post Installation Setup" on page 31</a>
Upgrading from NCM 1.x to NCM 1.3	<a href="#">"Upgrading from NCM 1.x to NCM 1.3" on page 32</a>

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## Installation Planning

To properly install the Distributed System software, you must first complete:

- Device partitioning planning across CiscoWorks Network Compliance Manager (NCM) Cores
- Network configuration planning for connectivity between NCM servers and Oracle servers in the NCM Mesh
- Network configuration planning for connectivity between NCM servers and devices. For example, what network connectivity is required to support failover for device access? The ability of a NCM Mesh to failover for device access depends in part on proper network setup to ensure access to devices. In some cases, you might not want to have failover work for complete device access, but instead have it ensure access to data while corrective action is taken to restore the network connectivity to the affected NCM Core.
- Network configuration planning for connectivity and bandwidth between the different servers (NCM and database) that comprise the NCM Mesh. The different NCM Cores in the NCM Mesh will also need bandwidth between them equal to the bandwidth provided between a single NCM server and its database in a single NCM Core.
- Oracle server setup planning. Keep in mind that the database properties required for replication can be set on initial database creation. You do not need to wait until replication setup to set these parameters.

Keep in mind that data is dumped from a running NCM server. This could take time and use disk space as the database is copied. In addition, when data is copied from one database to another, there must be ample bandwidth between the two (or more) servers. It will also take time to import the exported database into the other NCM Cores.

You can estimate the time it will take to copy data from server to server given the bandwidth between servers. You can also calculate the disk space requirements for the export (and subsequent import) operations by looking at the size of your database. If you want to export or import data from the same server as the database, the disk space requirement is  $N*2$ .

**Note:** Estimating time for the import and export operations could be difficult. You should allocate a lengthy time frame to complete this work. In addition, the NCM server(s) must be off during the export and import steps. A sufficiently long maintenance window should be planned for.

You will also have to ensure:

- Time synchronization setup for the NCM servers in the NCM Mesh
- Users are instructed to login to their “closest” NCM Core
- Access to an Oracle DBA to support the NCM Distributed System installation

To assist in planning, please note the following limitations and suggestions concerning the NCM Distributed System:

- NCM currently does not support joining multiple NCM installations into a NCM Mesh. You can only create a NCM Mesh from a single, existing NCM server, adding new NCM Cores as appropriate. You can also create a NCM Mesh from scratch.
- Users should not share logins. Due to the replication system used to share data across NCM Cores, two users should never use the same login name to connect to two different NCM Cores at the same time. If they do so, the system will likely require additional work by the system administrator to ensure that the effected user's profile is properly synced up across the NCM Mesh.
- NCM currently assumes that all servers in the Mesh (NCM and database) share a single timezone.
- Future NCM upgrades will take longer and require more down-time due to the need to both update the replication setup and to update all servers in the NCM Mesh. (NCM does not support rolling upgrades where one part of the NCM Mesh is running a version of NCM while the rest of the NCM Mesh is running a different version.)
- The ReplicationScript.sql script updates the RN\_CORE table. When the replication script runs, the RN\_CORE changes. There is no need for it to UPDATE and INSERT into the RN\_CORE table on both Cores because replication is already running. The database changes will be pushed via replication to the second database. The contents of the RN\_CORE tables on both databases should match whatever is setup in their ReplicationScript.sql.

## Installation and Removal

This section includes information on:

- Initial setup of a NCM Mesh on two servers
- Addition of a server to an existing NCM mesh
- Removal of a NCM Core from a NCM Mesh
- Removing replication across the entire NCM Mesh
- Modification of the replication master definition core

**Note:** Refer to "[Chapter 5: Troubleshooting](#)" on [page 67](#) for information on Troubleshooting the installation.

## Unpacking the Replication Script Installation Bundle

The setup files for the NCM Distributed System are the standard setup files for a normal NCM installation, with the addition of the *ReplicationScriptToolBundle.zip* file. This file should be unzipped onto a system that is running a Java 1.6 VM (such as a standard NCM server system), as it includes a Java program that is used to generate scripts for replication setup.

## Initial Replication Setup

This section includes information for initial replication setup on a Master Definition Site (Master 1) and one additional Master Site (Master 2). Keep in mind that NCM will be off-line during initial replication. It is recommended that you carefully read the following sections so as to streamline the replication process.

### Planning

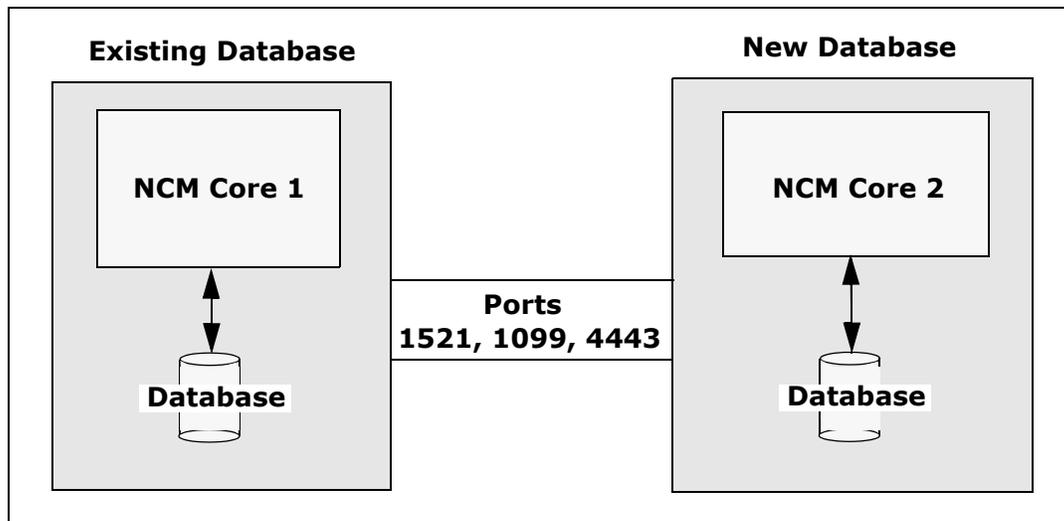
When initially setting up replication, complete the following table before starting.

Replication User: \_\_\_\_\_ (The default is repadmin.)

Password: \_\_\_\_\_

	Master 1	Master 2
SID:		
NCM Server:		
RMI Port:		
Database Server:		
Database Name:		
Database User:		
Database Password:		
Timezone Offset:		

The following figure provides an overview of the replication process.



## 1. System Setup

- a) A current, up-to-date 1.3 database on Master 1.
- b) A NCM server (NCM Core 1) connected to the database (Master 1).
- c) A database with no data or NCM schema setup (Master 2).
- d) A network connection from the Master 1 servers to the Master 2 servers (and vice-versa) that enables ports 1521 (Oracle only), 1099, and 4443 (or appropriate variations) to be connected between these servers. Port 1521 must be open between the Oracle servers. The remaining ports must be open between the NCM servers.
- e) The *ReplicationScriptTool bundle* files installed on a Java-capable system (such as NCM Core 1).

2. Obtain the following information:
  - a) Login/password/SID for NCM into the two databases (on Master 1 and Master 2).
  - b) Decide on a replication password. The user "repadmin" will be created and assigned this password. You can use a different replication username if needed. This user will be used to manage replication in your system.
  - c) DatabaseIdentifier (SID), NCM server hostname, NCM server RMI listening port, database hostname, and database listening port for Master 1 and Master 2.
  - d) The timezone offset (integer from UTC) for the entire NCM Mesh. This must be a constant across the NCM Mesh. Do not consider daylight savings time when setting this value.
3. Set (or verify) the following database parameters on each Master database:

**Note:** The parameters must be set on each database in the NCM Mesh. The parameters could have been be setup when the database is first created. If not, they must be modified at this point.

- a) `global_names = TRUE`
  - b) `open_links = at least 4 (increase this by 1 for each additional server in the NCM Mesh beyond 2)`
  - c) `open_links_per_instance = at least 4 (same as open_links)`
  - d) `parallel_min_servers = 2`
  - e) `parallel_automatic_tuning = TRUE` (**Note:** If you are running Oracle 10g, there is no need to configure this parameter.)
  - f) `shared_pool_size = increase current value by 40m to support replication`
4. Ensure that all database server and NCM server systems are set to use the same time and timezone.
  5. Unpack the *ReplicationScriptToolBundle.zip* file on NCM Core 1 (or any NCM installation).

6. Update the following variables for Master 1 and Master 2 in the *ReplicationScriptTool.properties* file located in the directory where *ReplicationScriptToolBundle.zip* was unpacked.

- Replication user
- Password
- Replication group name
- Timezone offset

Ensure that you modify all "REPLACEME" text entries in the *ReplicationScriptTool.properties* file with the appropriate values for your environment. In addition, make sure the mode property is set to "initial". These properties are described in detail in the *ReplicationScriptTool.properties* file.

7. If you want to run replication as a non-system user, execute the scripts listed in the ["Setup and Operation Permissions for Non-system Users"](#) on [page 19](#).

8. Run the ReplicationScriptTool via the following command:

```
java -classpath . ReplicationScriptTool
```

9. Create the database on Master 2.

10. Add Master 2's database information to the local *TNSNAMES.ora* on Master 1. Verify that Master 1's database information exists in the local *TNSNAMES.ora* on Master 1. If Master 1's database information does not exist, add it same way as other entries. Be sure to verify that the NAMES.DEFAULT\_DOMAIN property is commented out in *SQLNET.ora* on Master 1.

**Note:** You may need to make modifications to the *LISTENER.ora* and *SQLNET.ora* files depending on how your Oracle servers are configured. Consult with your Oracle DBA.

11. Add Master 1's database information to the local *TNSNAMES.ora* on Master 2. Verify that Master 2's database information exists in the local *TNSNAMES.ora* on Master 2. If Master 2's database information does not exist, add it same way as other entries. Be sure to verify that the NAMES.DEFAULT\_DOMAIN property is commented out in *SQLNET.ora* on Master 2.

12. Ensure that you have a server and a directory (typically on one of the database system), where you can run a copy of SQLPlus that can access all NCM Cores in the NCM Mesh. To verify this, connect to one database with SQLPlus and issue the `CONNECT <USER>/<PASSWORD>@<SID>` command for each different SID in the Mesh. This is necessary because the script issues `CONNECT` commands to change which database it is running procedures against.
13. Copy the newly generated SQL file (typically named *ReplicationScript.sql* depending on what value was set in the *ReplicationScriptTool.properties* file), from the ReplicationScriptTool working directory to the server and directory where you plan to run SQLPlus.

**Note:** Make sure that files named *\*\_spool.txt* do not exist in the directory. When run, the script will log its actions to a file with that suffix. In addition, if you are installing on a Linux system, you must have the following entry in the */etc/hosts* file:

```
<host ip address> <hostname> localhost.localdomain localhost
```

This must be entered directly above the following:

```
127.0.0.1 <hostname> localhost.localdomain localhost
```

## Implementation

1. Turn off the NCM server that is accessing the database on Master 1.
2. Dump the Master 1 database using the following command on the database server for Master 1:

```
EXP <USER>/<PASSWORD>@<MASTER1_SID> TABLES=RN_% FILE=<filename>
```

where `<USER>`, `<PASSWORD>`, and `<MASTER1_SID>` were collected in Step 2.

**Note:** Make sure you log the output of this command to a file for examination later if there are errors.

3. Copy the file from Step 2 to the database server for Master 2.

4. Import into the Master 2 database using the following command on the database server for Master 2:

```
IMP <USER>/<PASSWORD>@<MASTER2_SID> TABLES=RN_% FILE=<filename>
```

where <USER>, <PASSWORD>, and <MASTER2\_SID> were collected in Step 2.

**Note:** Make sure you log the output of this command to a file for examination later if there are errors.

5. On either Master 1 or Master 2, ensure that you have two SQLPLus windows open before running the script: One connected as the NCM user and one connected as the SYSTEM user.
6. Run the replication script in the SQLPlus window connected as the NCM user using @ReplicationScript.sql.
7. Follow the instructions provided by the script at several points as it runs. This will involve running other commands in the second SQLPlus window to verify that certain operations necessary for later steps in the script have completed.

**Note:** If you skipped or misconfigured any of the above steps, and as a result see errors during replication setup, refer to ["Removing Replication Across the Entire NCM Mesh" on page 29](#) before performing initial replication setup again.

8. Exit from SQLPlus once the script completes. This ensures that all actions are logged to the spool file.
9. Verify that the replication is working correctly. Make sure:
  - The spool file generated by running the replication SQL script contains no errors.
  - The RN\_CORE table on each database contains the appropriate list of servers in the NCM Mesh.
  - Verify (using Oracle's Enterprise Manager) that each database in the NCM Mesh has replication set up, is in the "Normal" state, and has purge, push, and repcat\_admin jobs installed correctly. Consult your Oracle DBA for assistance.
10. Install a NCM server, pointing it to an existing database on Master 2.
11. Stop the NCM server running on Master 2.

12. Copy the *distributed.rcx* file to each NCM server in the NCM Mesh (in the same location as *appserver.rcx*).
13. Start the NCM server on NCM Core 1.
14. Start the NCM server on NCM Core 2.
15. Verify the NCM installation:
  - Edit an object on one NCM server (for example, a Comments field for a device).
  - Wait a minute and then verify that the updated comment exists on the second server.
  - Check the status of the Oracle Distributed Monitor in the NCM UI to ensure that no problems are being reported. (Refer to **"Distributed Error List"** on page 50 for information.)

## Setup and Operation Permissions for Non-system Users

The following permissions are required for the NCM Distributed System setup process and operation if you are running the NCM servers under a non-system user.

**Note:** NCMUSER is the username under which you are running NCM. This is required to be the same on all NCM Cores in the Mesh. Be sure to replace NCMUSER with your username.

For replication setup:

```
GRANT EXECUTE ON "SYS"."DBMS_REPCAT_ADMIN" TO "NCMUSER";
GRANT EXECUTE ON "SYS"."DBMS_DEFER_SYS" TO "NCMUSER";
GRANT CREATE PUBLIC DATABASE LINK TO "NCMUSER";
GRANT CREATE USER TO "NCMUSER";
GRANT CREATE PROCEDURE TO "NCMUSER";
```

For normal operation of replication:

```
GRANT EXECUTE ON "SYS"."DBMS_REPUTIL" TO "NCMUSER";
GRANT SELECT ON "SYS"."DBA_CONSTRAINTS" TO "NCMUSER";
GRANT SELECT ON "SYS"."DBA_CONS_COLUMNS" TO "NCMUSER";
GRANT SELECT ON "SYS"."DBA_REPCOLUMN" TO "NCMUSER";
```

**For normal operation of replication on Oracle 10g:**

```
GRANT GRANT CREATE DATABASE LINK TO "ADMIN";  
GRANT CREATE SEQUENCE TO "ADMIN";  
GRANT CREATE SESSION TO "ADMIN";  
GRANT CREATE TABLE TO "ADMIN";  
GRANT SELECT ANY DICTIONARY TO "ADMIN";
```

**For replication deletion:**

```
GRANT DROP USER TO "NCMUSER";  
GRANT DROP PUBLIC DATABASE LINK TO "NCMUSER";  
GRANT DROP ANY PROCEDURE TO "NCMUSER";
```

## Adding a New NCM Core to an Existing NCM Mesh

Master 1 is the existing Master Definition Site and Master 2 is the new NCM Core being added.

1. System Setup:
  - a) A current, up-to-date 1.3 database on Master 1.
  - b) A NCM server of NCM Core 1 connected to the database on Master 1.
  - c) A database with no data or NCM schema setup on Master 2.
  - d) A network connection from the Master 1 servers to the Master 2 servers (and vice-versa) that allows ports 1521, 1099, and 4443 (or appropriate variations) to be connected between these servers. Port 1521 must be open between the Oracle servers and the remaining ports must be open between the NCM servers.
  - e) The *ReplicationScriptTool bundle* files installed on a Java-capable system.
2. Obtain the following information:
  - a) Login/password/SID for NCM into the two databases (on Master 1 and Master 2). This is necessary for Steps 5, 6, 11, 13, and 14 below.
  - b) The replication password for the existing repadmin user. This is necessary for Steps 9 and 14 below.
  - c) DatabaseIdentifier (SID), NCM server hostname, NCM server RMI listening port, database hostname, and database listening port for Master 2. This is necessary for Step 14 below.
  - d) The timezone offset (integer from UTC) for the entire NCM Mesh. This must be a constant across the NCM Mesh. This is necessary for Step 14 below.
  - e) The existing replication group name. This is necessary for Steps 9 and 14 below.

3. Set (or verify) the following database parameters for Master 2:

**Note:** These parameters could have been set up when the database is first created. If not, they must be modified at this point.

- a) `global_names = TRUE`
  - b) `open_links = at least 5` (increase this by 1 for each additional server in the NCM Mesh beyond 2)
  - c) `open_links_per_instance = at least 5` (same as `open_links`)
  - d) `parallel_min_servers = 2`
  - e) `parallel_automatic_tuning = TRUE` (**Note:** If you are running Oracle 10g, there is no need to configure this parameter.)
  - f) `shared_pool_size = increase current value by 40m` to support replication
4. Increase the `open_links` and `open_links_per_instance` on existing databases in the NCM Mesh.
5. Add Master 2's database information to the local *TNSNAMES.ora* on Master 1. Verify that Master 1's database information exists in the local *TNSNAMES.ora* on Master 1. If Master 1's database information does not exist, add it same way as other entries. Be sure to verify that the `NAMES.DEFAULT_DOMAIN` property is commented out in *SQLNET.ora* on Master 1.

**Note:** You may need to make modifications to the *LISTENER.ora* and *SQLNET.ora* files depending on how your Oracle servers are configured. Consult with your Oracle DBA.

6. Add Master 1's database information to the local *TNSNAMES.ora* on Master 2. Verify that Master 2's database information exists in the local *TNSNAMES.ora* on Master 2. If Master 2's database information does not exist, add it same way as other entries. Be sure to verify that the `NAMES.DEFAULT_DOMAIN` property is commented out in *SQLNET.ora* on Master 2.

**Note:** You may need to make modifications to the *LISTENER.ora* and *SQLNET.ora* files depending on how your Oracle servers are configured. Consult with your Oracle DBA.

7. Ensure that all database server and NCM server system are set to use the same time and timezone.
8. Turn off all NCM servers in the existing NCM Mesh.
9. As the **repadmin** user, execute the following command using SQLPlus on Master 1 to quiesce the replication group:

```
EXEC DBMS_REPCAT.SUSPEND_MASTER_ACTIVITY('<replication_group_name>');
```

where `<replication_group_name>` is from Step 2.

10. Wait for the replication group to quiesce. Do this by executing the `SELECT GNAME, STATUS FROM DBA_REPGROUP` command to check on the status. Wait until the status is listed as QUIESCED.
11. Dump the Master 1 database using the following command on the database server for Master 1:

```
EXP <USER>/<PASSWORD>@<MASTER1_SID> TABLES=RN_% FILE=<filename>
```

where `<USER>`, `<PASSWORD>`, and `<MASTER1_SID>` were collected in Step 2.

12. Copy the file `<filename>` to the database server for Master 2.
13. Import into the Master 2 database using the following command on the database server for Master 2:

```
IMP <USER>/<PASSWORD>@<MASTER2_SID> TABLES=RN_% FILE=<filename>
```

where `<USER>`, `<PASSWORD>`, and `<MASTER2_SID>` were collected in step 2.

14. Update the variables for all masters in the *ReplicationScriptTool.properties* file. Ensure that you modify all "REPLACEME" text entries in the *ReplicationScriptTool.properties* file with the appropriate values for your environment.

**Note:** The master being added must be the last master entry and Master Definition Site must be the first entry. In addition, be sure to update the replication user, password, replication group name, and timezone offset in the *ReplicationScriptTool.properties* file if needed. Make sure the "mode" property is set to "add\_server". All other masters should also be listed.

15. Run the ReplicationScriptTool via the following command:

```
java -classpath . ReplicationScriptTool
```

16. Ensure that you have a server and a directory (typically on one of the database system), where you can run a copy of SQLPlus that can access all NCM Cores in the NCM Mesh. To verify this, connect to one database with SQLPlus and issue the `CONNECT <USER>/<PASSWORD>@<SID>` command for each different SID in the NCM Mesh. This is necessary because the script issues `CONNECT` commands to change which database it is running procedures against.
17. Copy the newly generated SQL file (typically named *ReplicationScript.sql* depending on what value was set in the *ReplicationScriptTool.properties* file), from the *ReplicationScriptTool* working directory to the server and directory where you plan to run SQLPlus.

**Note:** Make sure that files named *\*\_spool.txt* do not exist in the directory. When run, the script will log its actions to a file with that suffix

18. Ensure that you have two SQLPlus windows open before running the script: One connected as the NCM user and one connected as the SYSTEM user.
19. Run the replication script copied in the previous step in the SQLPlus window connected as the NCM user using `@ReplicationScript.sql`.
20. Follow the instructions provided by the script at several points as it runs. This will involve running other commands in the second SQLPlus window to verify that certain operations necessary for later steps in the script have completed.

**Note:** If you skipped or misconfigured any of the above steps, and as a result see errors during replication setup, refer to ["Removing Replication Across the Entire NCM Mesh" on page 29](#) before performing initial replication setup again.

21. Exit from SQLPlus once the script completes. This ensures that all actions are logged to the spool file.
22. Verify that the replication is working correctly. Make sure:
  - The spool file generated by running the replication SQL script contains no errors, other than the following warning:  
`'ORA-23326: object group <yourgroup>.<your_replication_group> is quiesced'` that occurs after the `DBMS_REPCAT.SUSPEND_MASTER_ACTIVITY` command.

- The RN\_CORE table on each database contains the appropriate list of servers in the NCM Mesh. (Refer to ["List Cores Page Fields"](#) on [page 57](#) for information.)
  - Verify (using Oracle's Enterprise Manager) that each database in the NCM Mesh has replication set up and is in the "Normal" state, and has purge, push, and repcat\_admin jobs installed correctly. Consult your Oracle DBA for assistance.
23. Install a NCM server. Be sure to point it to an existing database on Master 2.
24. Add the *distributed.rcx* file to the new NCM server in the NCM Mesh (in the same location as *appserver.rcx*).
25. Start all of the NCM servers in the NCM Mesh.
26. Verify the NCM installation. To do this:
- Edit an object on one NCM server (for example, a Comments field for a device).
  - Wait a minute and then verify that the updated comment exists on the second server.
  - Check the status of the Oracle Distributed Monitor in the NCM UI to ensure that no problems are being reported. (Refer to ["Distributed Error List"](#) on [page 50](#) for information.)

## Removing a NCM Core from an Existing NCM Mesh

**Warning:** *Once you remove a NCM Core from a NCM Mesh, the data in that NCM Core's database will no longer remain in sync with the data in the rest of the NCM Mesh. The data cannot be merged back into the NCM Mesh.*

To remove a NCM Core from a NCM Mesh:

1. If the NCM core you want to remove is the Master Definition Site, change the Master Definition Site to be another NCM Core. (Refer to the instructions below.)
2. Install the *ReplicationScriptTool bundle* files on a Java-capable system.
3. Ensure that all NCM devices belong to Sites on NCM Cores that are not going to be removed.

4. Modify all Sites to point to a NCM Core that is not going to be removed. (Alternatively, you can remove those Sites.)
5. Turn off the NCM server from the NCM Core that is being removed.
6. Delete the RN\_CORE entry that was removed using the following commands:

```
DELETE FROM RN_CORE
```

```
where CoreID = <ID>;
```

```
COMMIT; (using SQLPlus)
```

7. Update the variables for all masters in the *ReplicationScriptTool.properties* file. Ensure that you modify all "REPLACEME" text entries in the *ReplicationScriptTool.properties* file with the appropriate values for your environment.

**Note:** The master being deleted must be the last master entry and the Master Definition Site must be the first entry. In addition, update the replication user, password, and replication group name in the *ReplicationScriptTool.properties* file if needed. Make sure the "mode" property is set to "delete\_server".

8. Run the ReplicationScriptTool via the following command:

```
java -classpath . ReplicationScriptTool
```

9. Ensure that you have a server and directory (typically on one of the database systems) where you can run a copy of SQLPlus that can access all NCM Cores in the NCM Mesh. To verify this, connect to one database with SQLPlus and issue the `CONNECT <USER>/<PASSWORD>@<SID>` command for each different SID in the NCM Mesh. This is necessary because the script issues `CONNECT` commands to change which database it is running procedures against.
10. Copy the newly generated SQL file (typically named *ReplicationScript.sql* depending on what value was set in the *ReplicationScriptTool.properties* file), from the ReplicationScriptTool working directory to the server and directory where you plan to run SQLPlus.

**Note:** Make sure that files named "\*\_spool.txt" do not exist in that directory. When run, the script will log its actions to a file of that suffix.

11. Ensure that you have two SQLPlus windows open before running the script: One connected as the NCM user and one connected as the SYSTEM user.
12. Run the replication script copied in the previous step in the SQLPlus window connected as the NCM user using `@ReplicationScript.sql`.
13. Follow the instructions provided by the script at several points as it runs. This will involve running other commands in the second SQLPlus window to verify that certain operations necessary for later steps in the script have completed.
14. Exit from SQLPlus once the script completes. This ensures that all actions are logged to the spool file.
15. Verify that the replication is working correctly. Make sure:
  - The spool file generated by running the replication SQL script contains no errors.
  - The RN\_CORE table on each database contains the appropriate list of servers in the NCM Mesh. Refer to ["List Cores Page Fields" on page 57](#) for information.
  - Verify (using Oracle's Enterprise Manager) that each database in the NCM Mesh has replication setup and is in the "Normal" state, and has purge, push, and repat\_admin jobs installed correctly. Consult your Oracle DBA for assistance.
16. Remove the NCM server from the NCM Core that was removed.
17. Restart the NCM servers in the NCM Mesh.

## Changing the Master Definition Site

It may be necessary to change the Master Definition Site in the event of failure of that Site or when you want to remove a NCM Core from the NCM Mesh. To change the Master Definition Site:

1. If the old Master Definition Site is accessible (for example in the case where it is being removed from the NCM Mesh), as the "repadmin" user on the existing Master Definition Site, execute the following command using SQLPlus:

```
BEGIN
    DBMS_REPCAT.RELOCATE_MASTERDEF (
        gname => '<REPLICATION GROUP NAME>',
        old_masterdef => '<OLD MASTERDEF SID>',
        new_masterdef => '<NEW MASTERDEF SID>',
        notify_masters => TRUE,
        include_old_masterdef => TRUE);
END;
/
COMMIT;
```

2. If the old Master Definition Site is not accessible (for example in the case of failure of the Master Definition database server), as the "repadmin" user on the existing Master Definition Site, execute the following command using SQLPlus:

```
BEGIN
    DBMS_REPCAT.RELOCATE_MASTERDEF (
        gname => '<REPLICATION GROUP NAME>',
        old_masterdef => '<OLD MASTERDEF SID>',
        new_masterdef => '<NEW MASTERDEF SID>',
        notify_masters => TRUE,
        include_old_masterdef => FALSE);
END
/
COMMIT;
```

3. For both cases, as the NCM database login user, modify the RN\_CORE table entries:

```
UPDATE RN_CORE SET IsMasterDef = 0 WHERE CoreID = <ID OF OLD MASTERDEF>;
COMMIT;
```

```
UPDATE RN_CORE SET IsMasterDef = 1 WHERE CoreID = <ID OF NEW MASTERDEF>;
COMMIT;
```

## Removing Replication Across the Entire NCM Mesh

**Warning:** All NCM servers participating in the NCM Mesh will now operate as independent NCM installations. The data cannot be merged once they are no longer in sync.

To remove replication across the entire NCM Mesh:

1. Make sure that the *ReplicationScriptTool* bundle files are installed on a Java-capable machine.
2. Turn off the NCM server on all NCM Cores.
3. Update the variables for all masters in the *ReplicationScriptTool.properties* file. Ensure that you modify all "REPLACEME" text entries in the *ReplicationScriptTool.properties* file with the appropriate values for your environment.

**Note:** The Master Definition Site must be the first entry. In addition, update the replication user, password, and replication group name in that file if needed. Make sure the "mode" property is set to "delete".

4. Run the *ReplicationScriptTool* via the following command:  

```
java -classpath . ReplicationScriptTool
```
5. Ensure that you have a server and directory (typically on one of the database systems) where you can run a copy of SQLPlus that can access all NCM Cores in the NCM Mesh. To verify this, connect to one database with SQLPlus and issue the `CONNECT <USER>/<PASSWORD>@<SID>` command for each different SID in the NCM Mesh. This is necessary because the script issues `CONNECT` commands to change which database it is running procedures against.
6. Copy the newly generated SQL file (typically named *ReplicationScript.sql* depending on what value was set in the *ReplicationScriptTool.properties* file), from the *ReplicationScriptTool* working directory to the server and directory where you plan to run SQLPlus.

**Note:** Make sure that files named `"*_spool.txt"` do not exist in that directory. When run, the script will log its actions to a file of that suffix.

7. Ensure that you have two SQLPlus windows open before running the script: One connected as the NCM user and one connected as the SYSTEM user.

8. Run the replication script copied in the previous step in the SQLPlus window connected as the NCM user using `@ReplicationScript.sql`.
9. Follow the instructions provided by the script at several points as it runs. This will involve running other commands in the second SQLPlus window to verify that certain operations necessary for later steps in the script have completed.
10. Exit SQLPlus once the script completes (this ensures that all actions are logged to the spool file).
11. Verify that the replication has been removed correctly. Make sure:
  - The spool file generated by running the replication SQL script contains no errors.
  - Verify (using Oracle's Enterprise Manager) that each database in the NCM Mesh does not have replication setup. Consult your Oracle DBA for assistance.
12. Remove the *distributed.rcx* file from each NCM server machine.
13. Restart the NCM servers.
14. For each server, ensure that devices are deleted or associated with Sites that map to the local NCM Core as needed.
15. For each database, remove all entries from RN\_CORE except for the local NCM Core system's entry.
16. Restart each NCM server to enable the NCM Core changes to take effect.

## Post Installation Setup

Once you have a functioning replication system, there are additional steps you can take to complete setup:

1. Add new Sites — This will enable you to partition your devices across the different NCM Cores in the NCM Mesh.
2. Add new Realm definitions — A Realm is a network segment. A Site is not required to be in the same Realm as its managing NCM Core. Keep in mind that a Realm is a large area that can include many Sites. However, a Realm does not have to include any NCM Cores. Typically, a Realm is identified by a set of unique IP addresses. For example, a Realm cannot contain two devices numbered as 10.255.111.128. Instead, the devices must be broken out into separate Realms. (Refer to the *User Guide for Network Compliance Manager* for information.)

## Upgrading from NCM 1.x to NCM 1.3

During the NCM upgrade process, the NCM Cores need to be completely offline. You will be upgrading the:

- NCM application servers
- NCM database schema
- Replication between the database cores

Keep in mind that these upgrade instructions only work on a current, up-to-date NCM 1.x system with a NCM 1.x database running on all servers.

## Preparing for the 1.3 Oracle Multimaster Upgrade

Upgrading NCM with a Multimaster NCM Mesh can take substantially longer than upgrading a single NCM Core. Make sure that you have allocated enough time for the upgrade.

1. What NCM installation files and documentation do I need?
  - *Setup.bin* — The installer setup program that upgrades NCM 1.x to NCM 1.3.
  - *ReplicationScriptToolBundle.zip* — The set of files that provides the replication upgrade to NCM 1.3.
  - *Release Notes for CiscoWorks Network Compliance Manager 1.3, Quick Start Guide for CiscoWorks Network Compliance Manager 1.3, and this guide.*

You should have received these files and documentation from Support when you requested the NCM 1.3 upgrade. Please contact Support if you are missing any of these items.

2. What executables and/or programs do I need to upgrade?

You must be able to run the following programs and/or executables or you will not be able to perform the upgrade:

- SCP or FTP Server (Linux/Solaris only) — You can use SCP or FTP to copy the setup program and replication files onto the NCM application server.

- SQLPlus — You must run SQLPlus from the command line on the Oracle database server. Also, you must be able to run SQLPlus so that it can access all NCM Cores in the NCM Mesh.
- Oracle Enterprise Manager — You are required to validate the database and replication status in Oracle Enterprise Manager and validate that each database in the NCM Mesh has replication set up in the “Normal” state and has purge, push, and repcat\_admin jobs installed correctly.

### 3. What level of system access do I need?

You must have the following level of access or you will not be able to perform the upgrade:

- Root access on the NCM application server
- Command line access on the Oracle database server to run the SQLPlus program
- Schema username and password access to the Oracle database application (**Note:** This is typically the username and password NCM uses to connect to its Oracle database.)
- Oracle SYSTEM account (i.e. system user’s password) access

### 4. What usernames and passwords do I need?

You must know the following sets of credentials or you will not be able to perform the upgrade:

- Root password to the NCM application server
- Username and password to the database server to access the CLI
- Oracle SYSTEM username and password to the Oracle server
- Username and password that NCM uses to connect to the databases in the NCM Mesh
- The replication username and password used for replication between NCM Cores

### 5. What additional information do I need?

- The exact version of NCM you are currently running, for example 1.0).

- For each of the NCM Application Cores in the environment, you will need the NCM application server hostname and the NCM application server RMI listening port.
- For each of the NCM Database Cores in the environment, you will need the NCM database server hostname, the NCM database server listening port, and the Database Identifier (SID).
- Timezone offset (integer from UTC) for the entire NCM Mesh.
- The existing replication group name.

**Note:** Much of the data in Step 5 can be obtained by locating and reviewing the existing *ReplicationScriptTool.properties* file. This file should have been created when you first setup and configured replication. You can get the required values, such as the timezone offset and replication group name, from this file. If you do not have access to the file, you can extract some of this data from the NCM database, with the exception of the replication group name and the replication password. Refer to ["Appendix B: Extracting Data from the NCM Database" on page 77](#) for instructions. You must get the replication group name and replication password from your DBA if you do not know them

## Upgrading to NCM 1.3 (Linux and Solaris)

**Warning:** *You must follow all steps precisely. Any skipped steps or misconfigurations will result in having to completely remove and restore replication. Take extreme care to ensure you are completing the steps correctly to avoid additional downtime.*

1. Before beginning the upgrade process, verify that you can do the following:
  - Validate that you can run SQLPlus so that it can access all NCM Cores in the NCM Mesh. To verify this, connect to one database with SQLPlus and issue the `CONNECT <USER>/<PASSWORD>@<SID>` command for each different SID in the NCM Mesh. This is necessary because the replication upgrade script issues `CONNECT` commands to change which database it is running procedures against.
2. FTP or SCP the files in the *Setup.bin* and *ReplicationScriptToolBundle.zip* files to each NCM application server.
3. Set the *setup.bin* file to be executable: `chmod +x setup.bin`

4. On one NCM application server, unzip the `ReplicationScriptToolBundle.zip` file to a directory, for example `\opt\NCMfiles\replicationScripts\`.
5. Open the `ReplicationScriptTool.properties` file and edit the variables for all servers in your Multimaster Distributed System environment.
  - Ensure that you modify all "REPLACEME" text entries in the `ReplicationScriptTool.properties` file with the appropriate values for your environment. You collected this data when you prepared for the install.
  - If currently running NCM version 1.0, open the `ReplicationScriptTool.properties` file and set the mode property to "upgrade\_from\_1\_0". For example: `mode=upgrade_from_1_0`. Be sure to save the changes to the file.
  - All NCM servers must be listed in the `ReplicationScriptTool.properties` file.
  - Be sure to save all changes to the file.

**Note:** If easier, you can modify this file on your workstation and then copy it to the directory containing the unzipped `ReplicationScriptToolBundle.zip` files on the NCM server.

**Warning:** Do not change the name of the `ReplicationScriptTool.properties` file or the system will not be able to generate the SQL upgrade script.

**Example:**

Let's say you have a two NCM Core Multimaster Mesh with the following settings:

NCM Version: 1.0

**Core 1**

- NCM application server hostname: 10.255.132.177
- NCM application server RMI listening port: 1099
- NCM database server hostname: 10.255.55.30
- NCM database server listening port: 1521
- Database Identifier (SID): core1

**Core 2**

- NCM application server hostname: 10.255.136.203
- NCM application server RMI listening port: 1099
- NCM database server hostname: 10.255.56.30
- NCM database server listening port: 1521
- Database Identifier (SID): core2
- NCM DB Username: admin
- NCM DB Password: NCM
- Replication username: repadmin
- Replication password: reppasswd
- The existing replication group name: REPLNCM
- Timezone offset: -8

Once you fill in the required values, the *ReplicationScriptTool.properties* file looks like this:

```
# This .0 server will be the master definition site, and is the default
# initial core installed.
db.server.0=10.255.55.30
db.port.0=1521
db.name.0=core1
db.username.0=admin
db.password.0=rendition
NCM.server.0=10.255.132.177
NCM.rmiport.0=1099
NCM.corename.0=Core 1

# Second Master site
db.server.1=10.255.56.30
db.port.1=1521
db.name.1=core2
db.username.1=admin
db.password.1=rendition
NCM.server.1=10.255.136.203
NCM.rmiport.1=1099
NCM.corename.1=Core 2

# From UTC
timezone_offset=-8
replication_user=repadmin
replication_password=reppasswd
replication_group_name=REPLNCM
#initial, add_server, delete, delete_server, upgrade_from_6_0
mode=upgrade_from_6_0
script.file=ReplicationScript.sql
```

**Note:** Make sure you fill in the mode value to tell NCM which version you are upgrading from.

6. Enter into the directory where you unzipped the *ReplicationScriptToolBundle.zip* file. Issue the following command:

```
java -classpath . ReplicationScriptTool
```

This will compile the appropriate SQL Script to upgrade your replication to version 1.3. Once complete, you will find a new, generated SQL file in the directory. This is always named *ReplicationScript.sql* unless you changed this value in the *ReplicationScriptTool.properties* file. You will use this file later in the upgrade process.

7. Stop the NCM application service running on each NCM application server. This is required to stop all database updates. For example: `/etc/init.d/truecontrol stop`
8. Choose one NCM instance and backup the NCM database to a safe location. In case of a serious upgrade failure, you can restore your NCM instance from this backup.  
`EXP <USER>/<PASSWORD>@<MASTER1_SID> TABLES=RN_% FILE=<filename>`  
where `<USER>`, `<PASSWORD>`, and `<MASTER1_SID>` were collected for one NCM database of existing NCM Cores.
9. Choose one NCM application server and backup the NCM application directory on that server to a safe location. For example, if NCM was installed in `/opt/rendition`, copy this entire directory to `/opt/backup_rendition`. You will need to do this to reuse your license key and to retrieve any specific customizations you made.
10. Take the generated SQL file, `ReplicationScript.sql`, that you generated in Step 6 and copy it to the server and directory where you plan to run SQLPlus to upgrade the Oracle database and replication. Make sure that files named `*_spool.txt` do not exist in the directory. When run, the script will log its actions to a file with that suffix.
11. Ensure that you have two SQLPlus windows open before running the script: One connected as the NCM user and one connected as the SYSTEM user.
12. Run the replication script copied in the previous step in the SQLPlus window connected as the NCM user using `@ReplicationScript.sql`.
13. Follow the instructions provided by the script at several points as it runs. This will involve running other commands in the second SQLPlus window to verify that certain operations necessary for later steps in the script have completed. Keep in mind that the replication script can take a long time to complete, depending on the size of your database.  
  
**Note:** If you skipped or misconfigured any of the above steps, and as a result see errors during replication setup, refer to ["Removing Replication Across the Entire NCM Mesh" on page 29](#) before performing the upgrade.
14. Exit from SQLPlus once the script completes. This ensures that all actions are logged to the spool file.

15. Verify that the replication is working correctly. Make sure:
  - The spool file generated by running the replication SQL script contains no errors, other than the following warning:  
ORA-23326: object group <yourgroup>.<your\_replication\_group> is quiesced  
This warning occurs after the DBMS\_REPCAT.SUSPEND\_MASTER\_ACTIVITY command.
  - Verify (using Oracle's Enterprise Manager) that each database in the NCM Mesh has replication set up and is in the "Normal" state, and has purge, push, and repcat\_admin jobs installed correctly. Consult your Oracle DBA for assistance.
16. Upgrade each NCM server following the instructions. Make sure you choose to "use existing DB". The scripts for the database upgrade have already been handled by running the replication script in Step 12.
17. Copy the *distributed.rcx* file from the *ReplicationScriptToolBundle* of the upgraded version of NCM to the NCM server at <NCM\_HOME>/jre.
18. Start all of the NCM servers in the NCM Mesh.
19. Verify the NCM installation. To do this:
  - a) Edit an object on one NCM server (for example, a Comments field for a device).
  - b) Wait a minute and then verify that the updated comment exists on the second server.
  - c) Check the status of the Oracle Distributed Monitor in the NCM UI to ensure that no problems are being reported. Refer to "**Distributed Error List**" on page 50 for information.



# Chapter 3: System Administration

Use the following table to quickly locate information in this chapter.

Topic	Refer to:
Getting Started	<a href="#">"Getting Started" on page 41</a>
NCM Generated Events	<a href="#">"NCM Generated Events" on page 42</a>
Distributed Monitor Results	<a href="#">"Distributed Monitor Results Page" on page 48</a>
Distributed Error List page	<a href="#">"Distributed Error List" on page 50</a>
View Distributed Error page	<a href="#">"View Distributed Error Page" on page 52</a>
Distributed Conflict List	<a href="#">"Distributed Conflict List" on page 53</a>
View Distributed Conflict page	<a href="#">"View Distributed Conflict Page" on page 55</a>
Site Reassignment page	<a href="#">"Site Reassignment Page" on page 56</a>
List Cores page	<a href="#">"List Cores Page" on page 57</a>
Edit Core page	<a href="#">"Edit Core Page" on page 59</a>
Device Password Rule Priority Reset page	<a href="#">"Device Password Rule Priority Reset Page" on page 61</a>
Renew Configuration Options page	<a href="#">"Renew Configuration Options Page" on page 62</a>

## Getting Started

In general, a CiscoWorks Network Compliance Manager (NCM) server that is part of a Distributed NCM Mesh should be transparent to users. However, there are a number of operations that the system administrator may need to do to keep the Distributed NCM Mesh functioning properly.

## NCM Generated Events

By default, NCM generates system events. Event rules can alert you to certain error conditions requiring attention. Each event is listed below, along with an explanation and required action to be taken.

### Distributed System - Broken Replication Job

Event format:

```
Job ID: <ID>
Job Type: <push to <host>, purge, or repcat admin>
Database Host: <hostname>
Database SID: <SID>
Stalled: <true or false>
```

Broken jobs can occur because an Oracle server cannot push transactions to another server due to that server being down or in the event of a network connectivity loss. Replication jobs can also become broken because they stall. Stalled replication jobs represent a hang in an internal Oracle process. This event is sent only once for each broken replication job (unless the NCM server is restarted, in which case the event will be resent if the job is still broken). If a stalled replication job is detected, it is best to restart the Oracle server.

For broken replication jobs that are not stalled, the course of action depends on the job type. If the job type is "purge" or "repcat admin," consult with your Oracle DBA. Failure of these jobs represents an internal problem or resource limit in the Oracle server that will need to be investigated.

For "push to <host>" job types, the typical failure will be loss of connectivity to the other host, either through a network problem, outage of the Oracle server, or outage of the database host system itself. NCM will restart this job automatically once the connectivity problem has been remedied.

To troubleshoot this problem, make sure:

1. The host that the server cannot connect to is up and running.
2. The Oracle instance on that host is running.
3. From a command line enter `ping <host>` to ensure that network connectivity exists between servers.
4. From a command line enter `tnsping <OTHER_SID>` to ensure that Oracle is accepting connections.
5. Ensure that database links are working:
  - Using SQLPlus, enter `SELECT CURRENT_TIMESTAMP FROM DUAL@<OTHER_SID>;`
  - Using SQLPlus, enter `SELECT DBLINK FROM DBA_REPSITES;`

Failures of any of these steps will point to corrective actions needed.

## Distributed System - Fixed Replication Job

Event format:

```
Job ID: <ID>
Job Type: <push to host, purge, or repcat admin>
Database Host: <hostname>
Database SID: <SID>
```

This event is sent when the system detects that a previously broken job is now working correctly. This could happen when network connectivity is restored between two database servers, allowing data to be replicated. No action is required when this happens.

**Note:** This event is only sent when the correction occurs while NCM is running. If NCM is stopped while the problem is corrected, when NCM is restarted no event is sent.

## Distributed System - Replication Errors

### Event format:

```
TransactionID: <id>  
Call Number: <n>  
Table Name: <TABLE_NAME>  
Transaction Type: UPDATE  
NCM Source Host: <hostname>  
DB Destination: <SID>
```

NCM sends this event when it encounters a replication error that it cannot resolve on its own. In general, NCM attempts to resolve conflicts automatically. Certain conflict types cannot be resolved using Oracle's built-in methods, but can be resolved by NCM after they occur. In particular, UPDATE conflicts due to out-of-order transactions, causing a primary key or foreign key constraint violation, can be resolved by re-executing the transaction after a short wait.

Additionally, conflicts due to UPDATES of items that have already been deleted can be resolved by removing the failed transaction. These two actions are taken by NCM during its regular replication monitoring run, which happens at several minute intervals. If these corrective actions do not fix the problem, an event is sent.

Typically, to fix an UPDATE error requires editing the object in question to set its values to those expected by the transaction, and then re-executing the transaction (also known as retrying the error). To do this:

1. Open the View Distributed Error page and click the Details option in the Actions column. All of the database attributes of the affected object are displayed. Refer to ["Distributed Conflict List" on page 53](#).
2. Locate the object in the NCM system (or simply update the database directly using SQLPlus or some other tool), and change all of its attributes to those listed in the Original Value column on the View Distributed Error Details page.
3. Retry the error.

## Distributed System - Uniqueness Conflict

Event format:

Server: <host>

Object: <Object>

Conflicting Value: <value>

Refer to the replication documentation for instructions on correcting this conflict.

This event is sent when NCM detects a conflict in a uniqueness constraint. You will receive an event per NCM Core, since the conflicts are local to each NCM Core. To correct a naming conflict, go to one NCM Core and update the names for the affected objects. Both the renamed <NAME>.<SID> and <NAME> should be edited to force an update on the other NCM Cores.

To correct a rule priority conflict, go to the Device Password Rule Priority Reset page click the Reset Priority button. Refer to ["Device Password Rule Priority Reset Page" on page 61](#).

If this does not solve the problem, you will need to manually edit the rules on each NCM Core, setting the priority order correctly and verifying existence of correct rules. When finished, return to the Device Password Rule Priority Reset page and click the Reset Priority button.

## Distributed System - Time Synchronization Warning

Event format:

Time difference: <N> seconds

Local Core: <hostname>

Remote Core: <hostname>

NCM replication conflict resolution depends on a latest timestamp method. To work correctly, this requires different NCM servers' clocks to differ by only a small amount. To correct this problem, make sure that the time is synchronized on the NCM server systems across the NCM Mesh.

## Distributed System - RMI Error

Event format:

```
Local Core: <hostname>  
Remote Core: <hostname>  
Error: <Exception text>
```

This error typically occurs when there are network problems between the NCM servers. To troubleshoot this problem, make sure:

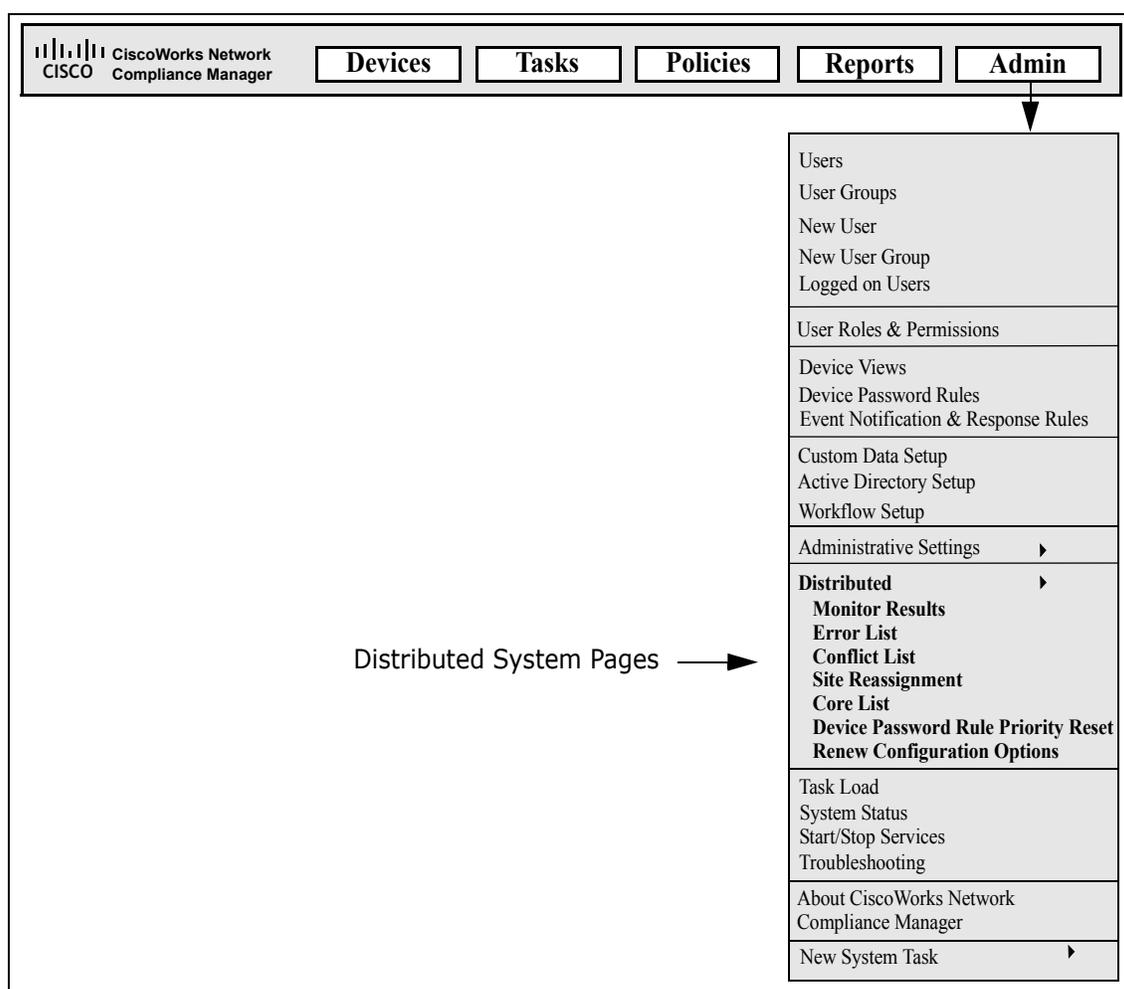
1. The host that the server cannot connect to is up and running.
2. The NCM instance on that host is running.
3. From a command line, enter `ping <host>` to ensure that network connectivity exists between servers.
4. From a command line, enter `telnet <host>` to port 1099 (or whatever your RMI listen port is set to) to ensure that RMI connections are being accepted. If working correctly, you should get back some data that includes the text string "java.rmi.MarshalledObject".

Failures of any of these steps will point to corrective actions needed, such as updating the RMI port being used in the Edit NCM Core page, or restarting NCM to make sure that the RMI port has been bound correctly and is not being used by another application.

## Using the NCM Distributed System Pages

When you install the Distributed System software, the NCM user interface includes specific Distributed System pages to help you monitor and administer the system.

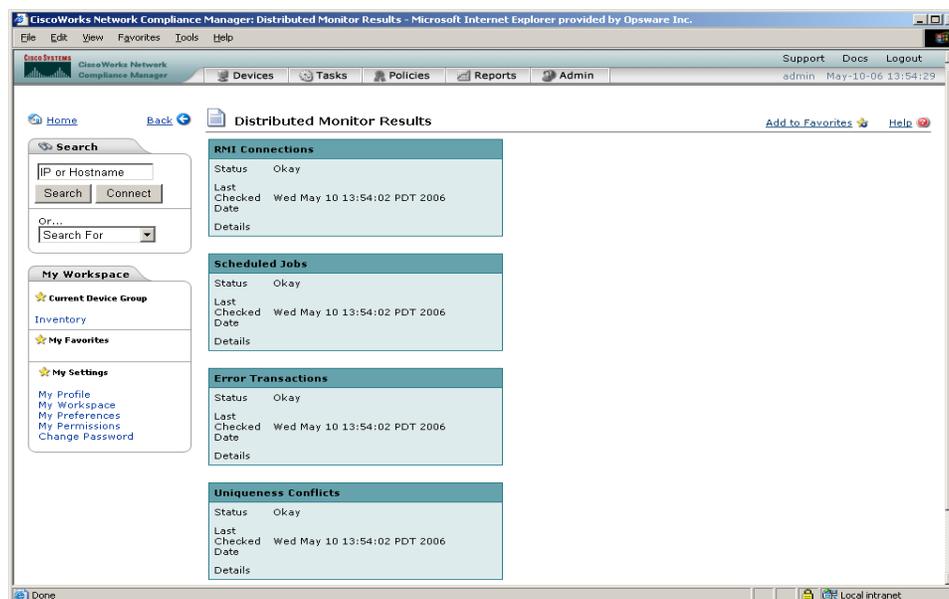
### Navigating to Distributed Systems Pages



## Distributed Monitor Results Page

The Distributed Monitor Results page displays the overall health of the Distributed System.

To open the Distributed Monitor Results page, on the menu bar under Admin select Distributed and click Monitor Results. The Distributed Monitor Results page opens. The following figure shows a sample Distributed Monitor Results page.



NCM monitor several properties necessary for proper functioning of the Distributed System, including:

- **RMI Connections** — RMI (Remote Method Invocation) is Java's remote procedure call protocol. The distributed system makes RMI calls between NCM servers in the NCM Mesh to transfer information about scheduled tasks, system settings, software images, and so on.
- **Scheduled Jobs** — Oracle contains a job scheduler. Replication requires certain jobs be setup using that job scheduler. In particular, there are jobs on each NCM Core database that:
  - Push transactions
  - Purge previously pushed transactions from the log

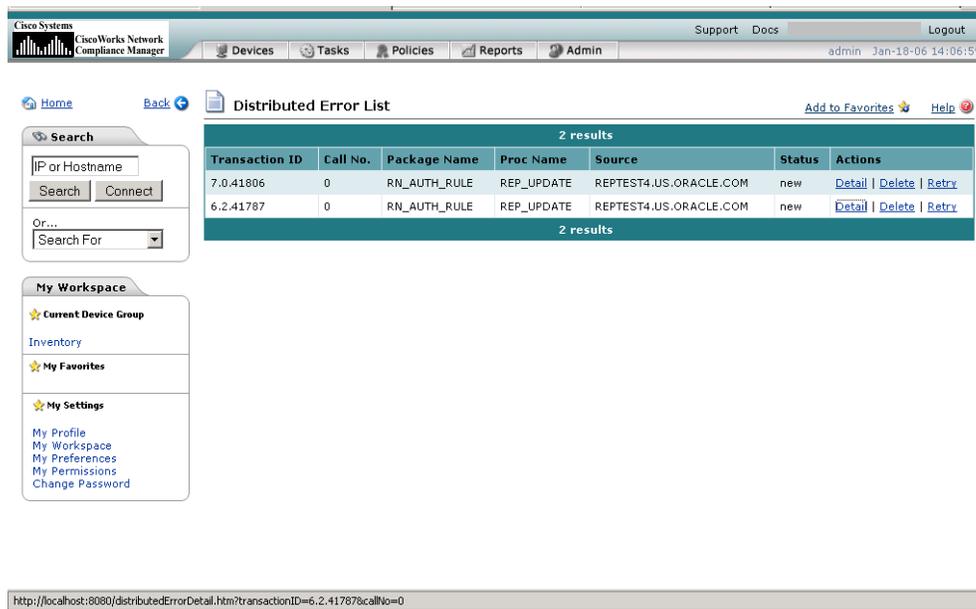
- Handle administrative commands for replication
- **Error Transactions** — Error transactions are transaction that have been pushed from a remote server and for some reason were not able to execute correctly on the local server.
- **Uniqueness Conflicts** — Certain NCM database constraints restrict columns to unique values. In a distributed environment, these constraints can be violated when updates are made on two different NCM Cores where the unique column is set to the same value. These conditions are captured by the Replication Conflict Resolution System and logged. NCM cannot automatically resolve these conflicts. They must be resolved manually.

## Distributed Error List

The Distributed Error List page displays distributed transaction errors on the current NCM Core. This information is useful for finding error conditions that require administrative action. Keep in mind that all conflicts are displayed until they are:

- Manually resolved
- Automatically resolved by NCM
- Manually deleted without resolution (not recommended)

To open the Distributed Error List, on the menu bar under Admin select Distributed and click Error List. The Distributed Error List opens. The following figure shows a sample Distributed Error List page.



## Distributed Error List Page Fields

Field	Description
Transaction ID	The ID of the transaction that was placed in the deferred error queue due to the conflict.
Call No.	A transaction can update more than one row in the database. Each row will have a separate call number. For example, for a transaction that updates seven rows, there will be seven entries with the same Transaction ID, but different call numbers.
Package Name	The name of the table on which the conflict occurred.
Proc Name	The type of transaction, for example UPDATE or DELETE.
Source	The database from which the transaction originated.
Status	<p>Statuses can include:</p> <ul style="list-style-type: none"> <li>• new — This is a new error. The system has not attempted to deal with it yet. Keep in mind that certain types of errors require waiting for other transactions to complete before they can be retried.</li> <li>• alert_sent — The system has sent an alert.</li> <li>• to_retry — The system has noted this error and is waiting before retrying.</li> <li>• old — The system noted the error and retried it. However, the retry did not work.</li> </ul>
Actions	<p>You can select the following options:</p> <ul style="list-style-type: none"> <li>• Detail — Opens the View Distributed Error page, where you can view details about the transaction in that row. Refer to <a href="#">"View Distributed Error Page" on page 52</a>.</li> <li>• Delete — Deletes the error from the database.</li> <li>• Retry — Re-execute the transaction.</li> </ul>

---

## View Distributed Error Page

The View Distributed Error page displays the detail for a particular distributed transaction error. This information is useful for providing the details necessary to correct the error.

To open the View Distributed Error page:

1. On the menu bar under Admin select Distributed and click Error List. The Distributed Error List opens.
2. In the Actions column, click the Detail option. The View Distributed Error page opens. The following figure shows a sample View Distributed Error page.

The screenshot displays the 'View Distributed Error' page in the Cisco Systems interface. The page title is 'View Distributed Error'. On the left, there is a search bar with 'IP or Hostname' and 'Search' and 'Connect' buttons. Below it is a 'My Workspace' sidebar with sections for 'Current Device Group', 'Inventory', 'My Favorites', and 'My Settings'. The main content area is titled 'Distributed Error Detail' and contains the following information:

Transaction ID	4.3.7054
CallNo	0
Package Name	RN_KEY_INCREMENTOR
Proc Name	REP_UPDATE
Arg Count	9
Source	REPTST3.US.ORACLE.COM
Destination	REPTST4.US.ORACLE.COM
Status	old

Below this information is a 'Details' table:

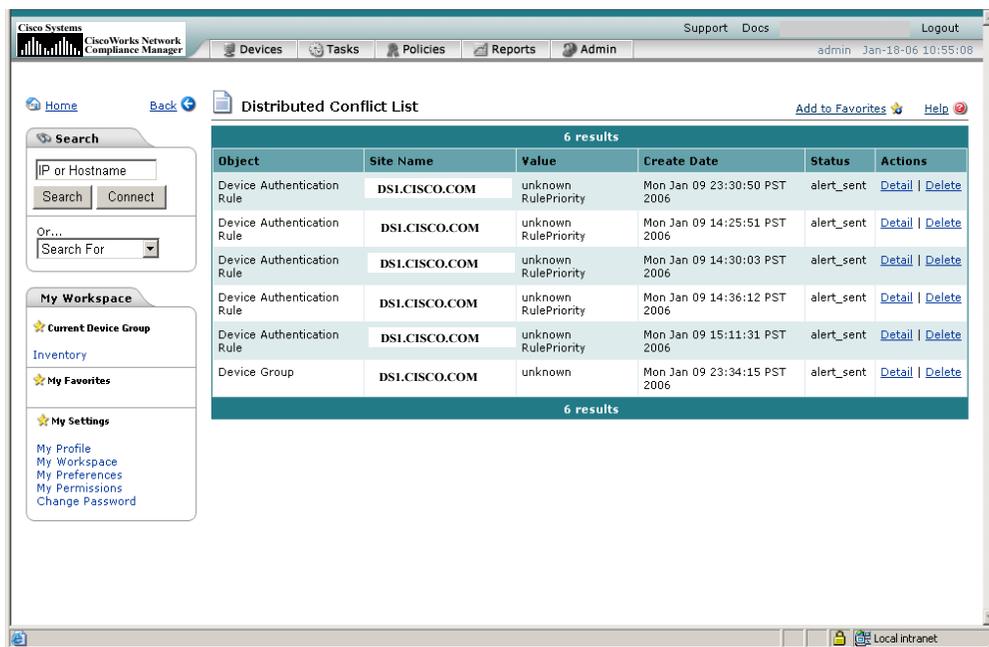
Column	Original Val	New Val	Current Val
COREID	1		1
NAME	ScheduleTask		ScheduleTask
VALUE	161	171	51

The Details section displays the column(s) from the table named in the Package Name field that contains conflicting data.

## Distributed Conflict List

The Distributed Conflict List page displays the uniqueness constraint conflict list. This provides information about uniqueness conflicts that will need to be manually corrected to ensure that the databases in the NCM Mesh are in sync.

To open the Distributed Conflict List, on the menu bar under Admin select Distributed and click Conflict List. The Distributed Conflict List opens. The following figure shows a sample Distributed Conflict List.



### Distributed Conflict List Page Fields

Field	Description
Object	The database table on which the conflict occurred.
Site Name	The core in the NCM Mesh for which the conflict occurred (actually the database SID).
Value	The value of the column for which there was a uniqueness conflict. Keep in mind that NCM does not automatically resolve uniqueness conflicts. NCM simply appends the name of the NCM Core from which the transaction originated to the conflicting value so that the transaction can complete.

Field	Description
Create Date	The Date the conflict occurred.
Status	Statuses include: <ul style="list-style-type: none"><li>• new — This is a new conflict. The system has not yet alerted the system administrator.</li><li>• alert_sent — The system has sent an alert.</li></ul>
Actions	You can select the following options: <ul style="list-style-type: none"><li>• Detail — Opens the View Distributed Conflict page, where you can view details on an individual uniqueness constraint. Refer to <a href="#">"View Distributed Conflict Page" on page 55</a>.</li><li>• Delete — Deletes the conflict from the database.</li></ul>

---

## View Distributed Conflict Page

The View Distributed Conflict page provides details on a specific uniqueness constraint.

To open the View Distributed Conflict page:

1. On the menu bar under Admin select Distributed and click Conflict List. The Distributed Conflict List opens.
2. In the Actions column, click the Detail option. The View Distributed Conflict page opens. The following figure shows a sample View Distributed Conflict page.

The screenshot shows the CiscoWorks Network Compliance Manager interface. The main content area displays the 'View Distributed Conflict' page for Conflict ID 1. The table below shows the details of the conflict.

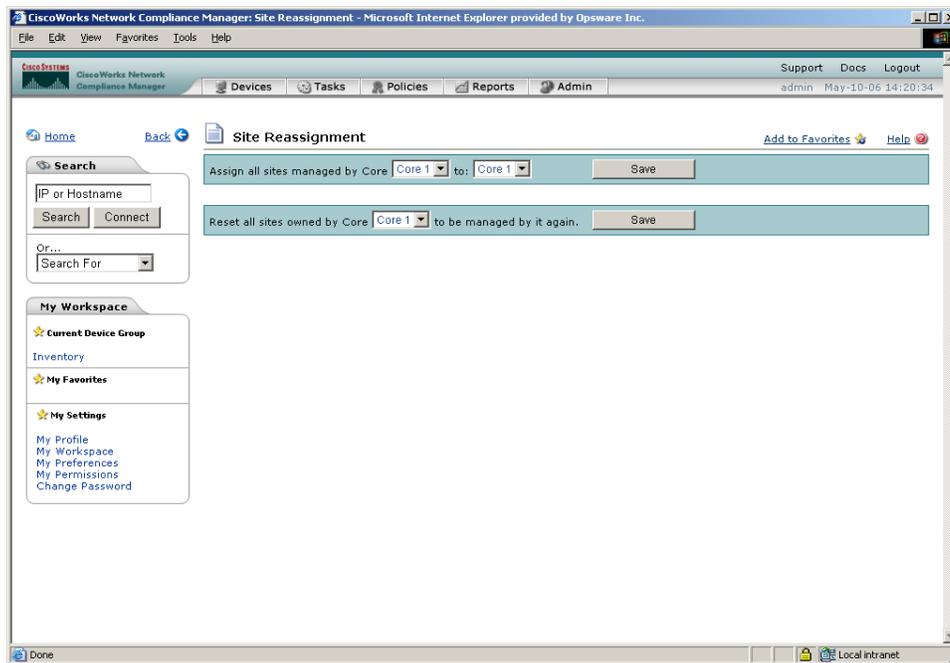
Conflict Detail	
Conflict ID	1
Object	Device Authentication Rule
Value	unknown RulePriority
Conflict Type	UNIQUE
Site Name	CISCO
Table Name	RN_AUTH_RULE
Object ID 1	3101
Object ID 2	2011
Object ID 3	
Create Date	Mon Jan 09 23:30:50 PST 2006
Status	alert_sent

Table Name is the name of the database table on which the uniqueness conflict occurred. Object IDs are the primary keys of the objects in the database. If a key has only one column, it is displayed in Object ID 1 field. Some keys are formed from multiple columns. Consequently, those values are displayed in the Object ID 1, Object ID 2, and Object ID 3 fields.

## Site Reassignment Page

The Site Reassignment page allows the Site-to-NCM Core mapping to be modified. This is useful for failover of Sites from one NCM Core to another and for restoring Sites back to their original NCM Core.

To open the Site Reassignment page, on the menu bar under Admin select Distributed and click Site Reassignment. The Site Reassignment opens. The following figure shows a sample Site Reassignment page.

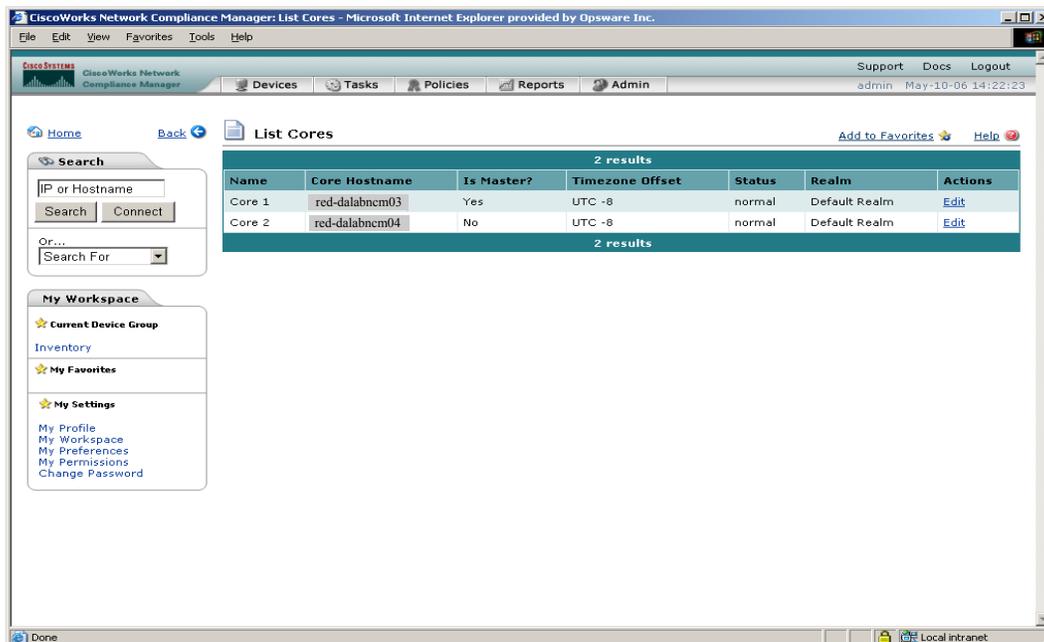


Select NCM Cores from the drop-down menu and click the Save button.

## List Cores Page

The List Cores page lists all NCM Cores in the NCM Mesh. This page provides information to properly manage the Distributed System.

To open the List Cores page, on the menu bar under Admin select Distributed and click Core List. The List Cores page opens. The following figure shows a sample List Cores page.



### List Cores Page Fields

Field	Description
Name	The NCM Core's name.
Core Hostname	The hostname of the NCM Core's NCM server.
Is Master?	Is the NCM Core the Master Definition? (Yes or No)
Timezone Offset	The timezone offset of the actual NCM Core server.
Status	Currently, there is only Normal status.
Realm	The default Realm for the NCM Core.

Field	Description
Actions	You can select the following option: <ul style="list-style-type: none"><li data-bbox="500 478 1377 525">• Edit — Open the Edit Core page. Refer to <a href="#">"Edit Core Page" on page 59</a>.</li></ul>

---

## Edit Core Page

The Edit Core page enables you to edit the NCM Core definition.

To open the Edit Core page:

1. On the menu bar under Admin select Distributed and click Core List. The List Cores page opens.
2. In the Actions column, click the Edit option. The Edit Core page opens. The following figure shows a sample Edit Core page.

The screenshot shows the 'Edit Core' page in the CiscoWorks Network Compliance Manager. The page is titled 'Edit Core' and contains the following fields:

Field	Value
*Name	Core 1
Database Identifier	ds3
*Core Hostname	red-dalabncm03
*RMI Port	1099
Database Hostname	red-dalabncm03
Database Port	1521
Timezone Offset	UTC -8
Replication Admin User	repadmin
Replication Password	*****
Confirm Replication Password	*****
Comments	null
Realm Name	Default Realm

A 'Save Core' button is located at the bottom of the form.

Complete the following fields and click the Save Core button.

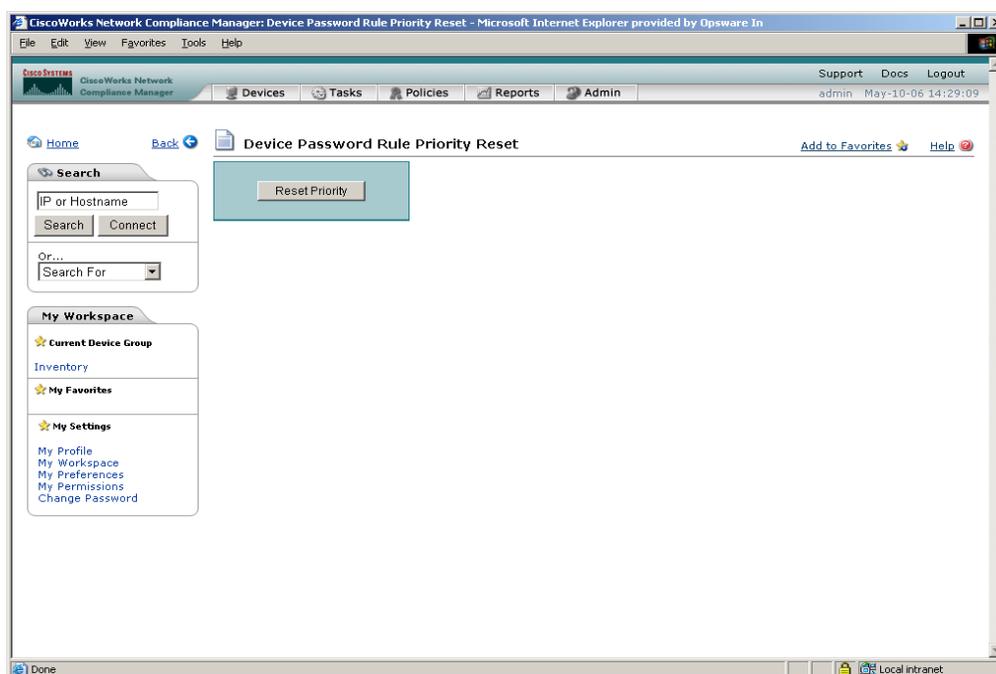
- Name — Enter the NCM Core name.
- Database Identifier — Enter the Database Identifier. This is the name of the NCM Core's database as it appears in the *tnsnames.ora* file. The Database Identifier corresponds to Oracle's SID (System Identifier). This information is needed to make connections to a particular Oracle instance on a server. Multiple instances may be running on any given server, but each will have different SIDs.
- Core Hostname - Enter the hostname of this NCM Core's server.

- RMI Port — Enter the RMI port. RMI (Remote Method Invocation) is Java's remote procedure call protocol. The distributed system makes RMI calls between NCM servers in the NCM Mesh to transfer information about scheduled tasks, system settings, software images, and so on.
- Database hostname — Enter the Database hostname.
- Database Port — Enter the port on the database server with which NCM communicates with the database.
- Timezone Offset — Select a Timezone offset from the drop-down menu.
- Replication Admin User — Enter the name of the Replication Admin user. The Replication Admin user is created and used by the Oracle database to manage replication.
- Replication Password — Enter the Replication Admin user's password.
- Confirm Replication Password — Re-enter the Replication Admin user's password.
- Comments — Add any comments about the NCM Core.
- Realm Name — Enter the Realm in which the NCM Core resides. For information on segmenting devices, refer to the *User Guide for Network Compliance Manager 1.3*.

## Device Password Rule Priority Reset Page

The Device Password Rule Priority Reset page enables you to reset device password rule priorities in the event that a uniqueness constraint conflict occurs for those objects.

To open the Reset Password Priority page, on the menu bar under Admin select Distributed and click Device Password Rule Priority Reset. The Device Password Rule Priority Reset page opens. The following figure shows a sample Device Password Rule Priority Reset page.

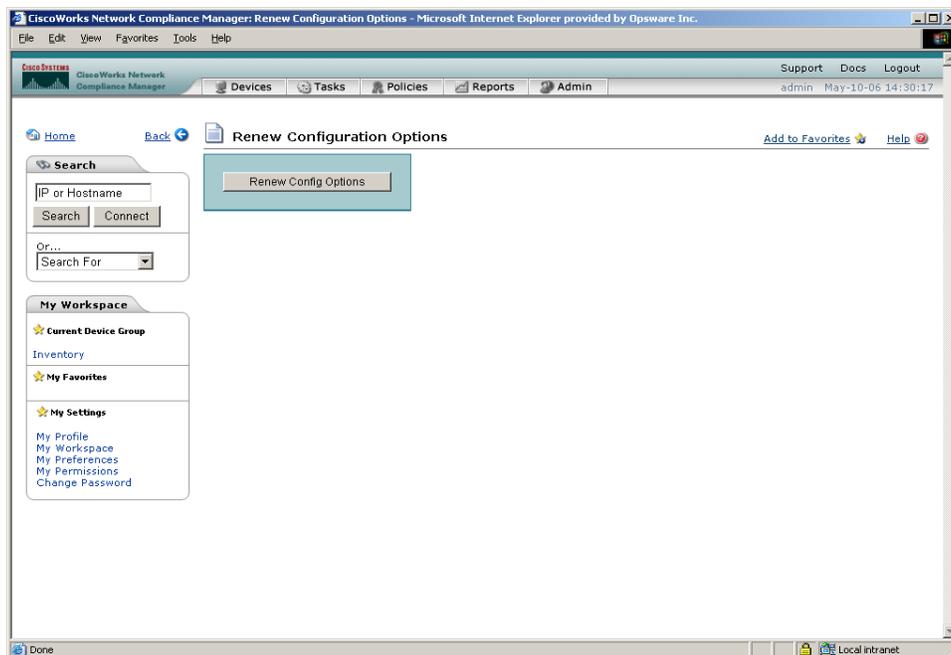


Click the Reset Priority button to reset the device password rule priorities.

## Renew Configuration Options Page

The Renew Configuration Options page enables you to reset the configuration options when the configuration options on a NCM Core become out-of-sync with other servers in the NCM Mesh.

To open the Renew Configuration Options page, on the menu bar under Admin select Distributed and click Renew Configuration Options. The Renew Configurations Options page opens. The following figure shows a sample Renew Configuration Options page.



Click the Renew Config Options button to ensure that all options on the NCM Core are in sync with the rest of the NCM Mesh.

# Chapter 4: Failover and Recovery

Use the following table to quickly locate information in this chapter.

Topic	Refer to:
Failover	<a href="#">"Failover" on page 63</a>
Recovery	<a href="#">"Recovery" on page 63</a>

## Failover

If the network has been configured to failover, if a CiscoWorks Network Compliance Manager (NCM) Core fails, users can continue to access all data in the system using a different NCM Core. All Sites that were originally managed by the failed NCM Core can be pointed to a new NCM Core using the Site Reassignment page. Refer to ["Site Reassignment Page" on page 56](#) for information. Procedures for system recovery will vary depending on how the remote server failed.

## Recovery

There are three basic recovery scenarios:

- Loss of network connectivity
- Loss of a NCM server
- Loss of a Database server

## Loss of Network Connectivity

In the case of lost network connectivity, failover occurred due to network issues. No problems occurred with the NCM server or with the Oracle database server. Recovery consists of the following steps:

1. Resolve the network issues.
2. Reset Sites that had been reassigned back to their original NCM Core. This can be accomplished in NCM. Refer to ["Site Reassignment Page" on page 56](#).
3. If any drivers have been added to the system during the outage, click the "Reload Drivers" button on the Start/Stop Services page. This action reloads the driver files and pushes them across to other NCM Cores in the NCM Mesh. This action should be performed on the NCM server where the drivers were added. Refer to the *User Guide for Network Compliance Manager 1.3* for information.
4. If any system settings have been modified during the outage, use the "Renew Config Options" page to make sure options are synced across the NCM Mesh. Refer to ["Renew Configuration Options Page" on page 62](#).

Once the network issues are resolved, the system should recover as replication syncs data between the databases.

## Loss of a NCM Server

In cases where the NCM server suffers a failure that requires re-installation of the server, recovery consists of the following steps:

1. During NCM installation, select the "Use existing database" option. In addition, the database selected should be the one the failed server was previously using.
2. Add the *distributed.rcx* file from the *ReplicationScriptToolBundle* to the directory where the *appserver.rcx* file resides.
3. Re-add any NCM Core-specific special case options for patches and support issues.
4. Restart NCM.
5. Reset Sites that had been re-assigned back to their original NCM Core. This can be accomplished in NCM. Refer to ["Site Reassignment Page" on page 56](#).
6. If any drivers have been added to the system during the outage, click the "Reload Drivers" button on the Start/Stop Services page. This action reloads the driver files and pushes them across to other NCM Cores in the NCM Mesh. This action should be performed on the NCM server where the drivers were added. Refer to the *User Guide for Network Compliance Manager 1.3* for information.
7. If any system settings have been modified during the outage, use the "Renew Config Options" page to make sure options are synced across the NCM Mesh. Refer to ["Renew Configuration Options Page" on page 62](#).
8. Edit the original NCM Core to modify any parameters that may be different (perhaps the installation happened on a new server with a different hostname).
9. Copy the software images repository from a good NCM Core to the recovered NCM Core.

## Loss of a Database Server

In the case of a lost database server, the NCM server is still running but cannot access the database. The database will need to be rebuilt and replication setup again on the database. Recovery consists of the following steps:

1. Pause or delete any tasks that appear to be stuck waiting or pending and not running because they are associated with the lost server. You can perform this action on another NCM server in the NCM Mesh.
2. If the server that was lost is the Master Definition server for replication, the procedure described for relocating the Master Definition server should be performed. Refer to ["Changing the Master Definition Site" on page 28](#).
3. Refer to ["Adding a New NCM Core to an Existing NCM Mesh" on page 21](#) for instructions on adding a new NCM Core.
4. Reset Sites that had been reassigned back to their original NCM Core. This can be accomplished in NCM. Refer to ["Site Reassignment Page" on page 56](#).
5. In NCM, edit the NCM Core that was recovered to make sure all information is correct for the new setup. Refer to the *User Guide for Network Compliance Manager 1.3* for information.

# Chapter 5: Troubleshooting

Use the following table to quickly locate information in this chapter.

Topic	Refer to:
Oracle Replication Setup	<a href="#">"Oracle Replication Setup" on page 67</a>
Replication Tools and Commands	<a href="#">"Replication Tools and Commands" on page 69</a>
Common Errors	<a href="#">"Common Errors" on page 70</a>

## Oracle Replication Setup

Oracle's replication setup process is complicated. The following guidelines will help prevent problems with replication setup.

- Ensure that the *tnsnames.ora* file is setup correctly on each system. You can verify correct setup by running SQLPlus on each system to make certain that you can connect to other databases. For example, if you have two systems (A and B), run SQLPlus on A to connect to the database on B using the following command:  

```
sqlplus USER/PWD@DATABASE_B.
```
- It may be necessary to remove or comment out the `NAMES.DEFAULT_DOMAIN` property entry from the *sqlnet.ora* file for the appropriate connections to work. Consult with your Oracle DBA if you have questions.
- If the replication setup process fails at any step, it is recommended that you run the following steps:
  - a) Delete the `RN_CORE` entry that was removed:

```
DELETE FROM RN_CORE
```

```
where CoreID = <ID>;
```

```
COMMIT; (using SQLPlus)
```

- b) Update the variables for all masters in the *ReplicationScriptTool.properties* file.

**Note:** The master being deleted must be the last master entry and the Master Definition Site must be the first entry. In addition, update the replication user, password, and replication group name in the *ReplicationScriptTool.properties* file if needed. Make sure the "mode" property is set to "delete\_server".

- c) Run the ReplicationScriptTool via the following command:  
`java -classpath . ReplicationScriptTool`
- d) Using Oracle's Enterprise Manager tool, verify the removal of the replication group, database links, and replication user.

## Removing In-Memory and Database Information

To ensure proper removal of all in-memory and database information, and to avoid replication conflicts due to matching timestamps, CiscoWorks Network Compliance Manager (NCM) active tasks are automatically deleted on the NCM Core with which they are associated. An active task is any task that does not have the "Succeeded," "Failed," "Duplicate", "Skipped", or "Warning" status.

Keep in mind that deleted tasks could be displayed in task lists for a few moments while the replication process pushes the deletes to other NCM Cores in the system. In addition, if the NCM Core from which the task originated is not accessible, the delete will fail.

## Replication Tools and Commands

The following tools and commands can help to isolate problems with replication setup.

To ensure that database links are working:

- Using SQLPlus, enter: `SELECT CURRENT_TIMESTAMP FROM DUAL@<OTHER_SID>;`
- Using SQLPlus, enter: `SELECT DBLINK FROM DBA_REPSITES;`
- From a command line, enter: `tnsping <OTHER_SID>`
- From a command line, enter: `ping <HOST>`

To ensure the replication group is working:

- Using SQLPlus, enter: `SELECT GNAME, STATUS FROM DBA_REPGROUP;`

To ensure there are no errors for replication admin requests:

- Using SQLPlus, enter: `SELECT STATUS, REQUEST, ONAME FROM DBA_REPCATLOG;`

## Common Errors

Some errors can occur during replication setup. Ones that have been reported are noted below, with suggested corrective action. In some cases, it might be necessary to remove replication across the NCM Mesh and re-setup replication.

### Error

```
SQL> EXEC DBMS_REPCAT.RESUME_MASTER_ACTIVITY(gname=>'<REPGROUP_NAME>');BEGIN DBMS_REPCAT.RESUME_MASTER_ACTIVITY(gname=>'<REPGROUP_NAME>'); END;
```

\*

ERROR at line 1:

```
ORA-23419: regenerate replication support before resuming master activity
```

...

### Corrective Action

An internal Oracle error has prevented replication support from being generated correctly for one or more objects. To correct this, it will be necessary to remove and re-setup replication for the NCM Mesh.

### Error

```
BEGIN DBMS_REPCAT.DROP_MASTER_REPOBJECT('SYSTEM',  
'RN_DEVICE_VIEW', 'TABLE', FALSE)  
; END;
```

\*

ERROR at line 1:

```
ORA-00060: deadlock detected while waiting for resource
```

...

### Corrective Action

Rerun the deletion script you were running when this occurred. You may see other errors due to certain actions already having been done, but that is expected.

### **Error**

```
BEGIN DBMS_REPCAT.DROP_MASTER_REPOBJECT('SYSTEM', '
RN_DEVICE_VIEW', 'TABLE', FALSE)
; END;
```

\*

ERROR at line 1:

ORA-23308: object SYSTEM.RN\_DEVICE\_VIEW does not exist or is  
invalid

...

### **Corrective Action**

Rerun the deletion script you were running when this occurred. You may see other errors due to certain actions already having been done, but that is expected.



# Appendix A: Restoring NCM Replication After Upgrading to Oracle 10g (10.2.0.2)

This appendix includes the steps for upgrading from Oracle 9i (9.2.0.1) to Oracle 10g (10.2.0.2) and how to restore NCM replication after the upgrade.

## Getting Started

Before upgrading from Oracle 9i (9.2.0.1) to Oracle 10g (10.2.0.2), do the following:

1. Make sure that a current NCM 1.3 Oracle 9i (9.2.0.1) database is running on all Masters.
2. Make sure that the *ReplicationScriptTool bundle* files are installed on a Java-capable system.
3. Obtain the following information:
  - Login/password/SID for NCM into all databases in the NCM Mesh.
  - The replication password for the existing 'repadmin' user.
  - DatabaseIdentifier (SID), NCM server hostname, NCM server RMI listening port, database hostname, and database listening port for all Masters.
  - The timezone offset (integer from UTC) for the entire NCM Mesh. This must be a constant across the NCM Mesh. Refer to **"Initial Replication Setup" on page 13** for information.
  - The existing replication group name.

## Removing Replication Before Upgrading The Database

To remove replication across the entire NCM Mesh, do the following:

1. Modify all NCM Sites to point to a NCM Core that is the Master Definition Site.
2. Shut down all NCM management engines so as to remove replication across the entire NCM Mesh.
3. Update the variables for all Masters in the *ReplicationScriptTool.properties* file. Ensure that you modify all "REPLACEME" text entries in the *ReplicationScriptTool.properties* file with the appropriate values for your environment.

**Note:** The Master Definition Site must be the first entry. In addition, be sure to update the replication user, password, and the replication group name as needed. Also, make sure the "mode" property is set to "delete".

4. Run the ReplicationScriptTool using the following command:  

```
java -classpath . ReplicationScriptTool.
```
5. Make sure that you have a server and directory (typically on one of the database systems) where you can run a copy of SQLPlus that can access all NCM Cores in the NCM Mesh. To verify this, connect to a database with SQLPlus and issue the `CONNECT <USER>/<PASSWORD>@<SID>` command for each unique SID in the NCM Mesh. This is necessary because the script issues `CONNECT` commands to change which database it is running procedures against.
6. Copy the newly generated SQLPlus file (typically named *ReplicationScript.sql*, depending on what value was set in the *ReplicationScriptTool.properties* file), from the *ReplicationScriptTool* working directory to the server and directory where you plan to run SQLPlus.

**Note:** Make sure any files named "\*\_spool.txt" do not exist in the directory. When run, the script will log its actions to a file with that suffix.

7. Ensure that you have two SQLPlus windows open before running the script: One SQLPlus window connected as the NCM user and one connected as the SYSTEM user.

8. Run the replication script copied in Step 6 above in the SQLPlus window connected as the NCM user using `@ReplicationScript.sql`.
9. Follow the instructions provided by the script at several points as it runs. This includes running other commands in the second SQLPlus window to verify that certain operations necessary for later steps in the script have completed.
10. Exit SQLPlus once the script completes. This ensures that all actions are logged to the Spool file.
11. Verify that the replication has been removed correctly. Make sure:
  - The Spool file generated by running the replication SQLPlus script contains no errors.
  - Verify (using Oracle's Enterprise Manager) that each database in the NCM Mesh does not have replication setup. If needed, consult your Oracle DBA for assistance.
12. Remove the *distributed.rcx* file from each NCM server.

**Note:** Only the Master Definition Site database is used for restoring replication.
13. Restart the NCM servers that point to the Master Definition Site. Make sure all of the NCM Core changes are complete. Check to see that the devices are associated with NCM Sites that map to the NCM Core, as needed.
14. Once again, shut down the NCM management engines that point to the Master Definition Site.
15. Upgrade the Oracle database from 9i (9.2.0.1) to 10g (10.2.0.2), including the database for the Master Definition Site. If needed, consult your Oracle DBA for assistance.

## Restoring NCM Replication After Upgrading to Oracle 10g (10.2.0.2)

To restore NCM replication, do the following:

1. Dump the Master Definition Site database using the following command:

```
EXP <USER>/<PASSWORD>@<MASTER_SID> TABLES=RN_% FILE=<filename>  
where <USER>, <PASSWORD>, and <MASTER_SID> were collected in Step 3  
in the "Getting Started" section. Refer to "Getting Started" on page 73  
for information.
```

**Note:** Make sure you log the output of this command to a file for examination later if needed.

2. Set up replication again with the existing data from Step 1 above. Refer to "Initial Replication Setup" on page 13 for instruction on how to set up initial replication.

**Note:** Create a NCM 1.3 database on Oracle 10g (10.2.0.2) so as to have an up-to-date NCM 1.3 database for replication. This is an added step in the "Initial Replication Setup" on page 13. You could receive an error message regarding the *RN\_CORE* table during initial replication setup. You can ignore this error message. However, you will need to manually update the *RN\_CORE* table after restoring replication.

Use the following command to create a NCM 1.3 database on Oracle 10g (10.2.0.2):

```
IMP <USER>/<PASSWORD>@<MASTER1_SID> TABLES=RN_% FILE=<filename>  
where <USER>, <PASSWORD>, and <MASTER1_SID> were collected in the initial  
replication setup.
```

3. After finishing initial replication setup, update the *rn\_core* table on one of the NCM Cores to make sure it includes the correct information in all columns regarding the new replication system. If needed, consult your Oracle DBA for assistance.

# Appendix B: Extracting Data from the NCM Database

This appendix includes the steps for extracting information about the Multimaster Mesh from the NCM database.

To extract this data from the NCM database, run the following SQL queries against the NCM database. The query will return multiple rows, one row for each database core.

For the NCM application server hostname, run the following:

```
SELECT corehostname FROM rn_core;
```

For the NCM application server RMI listening port, run the following:

```
SELECT corermiport FROM rn_core;
```

For the Database Identifier (SID), run the following:

```
SELECT databaseidentifier FROM rn_core;
```

For the NCM database server hostname, run the following:

```
SELECT databasehostname FROM rn_core;
```

For the NCM database server listening port, run the following:

```
SELECT databaseport FROM rn_core;
```

For the Timezone offset, run the following:

```
SELECT timezoneoffset FROM rn_core;
```

For the Replication User Name, run the following:

```
SELECT replicationadminuser FROM rn_core;
```

For example, in a two NCM Core Multimaster Mesh, if you run the following queries:

```
SELECT corehostname FROM rn_core;  
SELECT corermiport FROM rn_core;  
SELECT databaseidentifier FROM rn_core;  
SELECT databasehostname FROM rn_core;  
SELECT databaseport FROM rn_core;  
SELECT timezoneoffset FROM rn_core;  
SELECT replicationadminuser FROM rn_core;
```

You will receive the following:

```
SQL> SELECT corehostname FROM rn_core;
COREHOSTNAME
-----
10.255.132.177
10.255.136.203
SQL> SELECT corermiport FROM rn_core;
CORERMIPORT
-----
1099
1099
SQL> SELECT databaseidentifier FROM rn_core;
DATABASEIDENTIFIER
-----
core1
core2
SQL> SELECT databasehostname FROM rn_core;
DATABASEHOSTNAME
-----
10.255.55.30
10.255.56.30
SQL> SELECT databaseport FROM rn_core;
DATABASEPORT
-----
1521
1521
SQL> SELECT timezoneoffset FROM rn_core;
TIMEZONEOFFSET
-----
-8
-8
SQL> SELECT replicationadminuser FROM rn_core;
REPLICATIONADMINUSER
-----
readmin
readmin
```

From this data, you can start filling out the *ReplicationScriptTool.properties* file as follows:

```
# This .0 server will be the master definition site, and is the default
# initial core installed.
db.server.0=10.255.55.30
db.port.0=1521
db.name.0=core1
db.username.0=admin
db.password.0=rendition
ncm.server.0=10.255.132.177
ncm.rmiport.0=1099
ncm.corename.0=Core 1

# Second Master site
db.server.1=10.255.56.30
db.port.1=1521
db.name.1=core2
db.username.1=admin
db.password.1=rendition
ncm.server.1=10.255.136.203
ncm.rmiport.1=1099
ncm.corename.1=Core 2

# From UTC
timezone_offset=-8
replication_user=repadmin
replication_password=<YOU WILL NEED TO GET THIS FROM YOUR DBA>
replication_group_name=<YOU WILL NEED TO GET THIS FROM YOUR DBA>
```



# Index

## B

- Buttons
  - Renew Config Options 62
  - Reset Priority 61

## C

- Common errors 70

## D

- Device Password Rule Reset page 61
- Distributed Conflict List 53
- Distributed Error List 50
- Distributed Monitor Results page 48
- Distributed systems
  - Failover 63
  - Installation 10
  - Overview 8
  - Recovery 64
  - Terminology 7
  - Troubleshooting 67

## E

- Edit Core page 59
- Error transactions 49
- Events
  - Broken replication job 42
  - Fixed replication job 43
  - Replication errors 44
  - RMI error 46
  - Time synchronization warnings 45
- Extracting data 77

## F

- Failover
  - Loss of a database server 66
  - Loss of a NCM server 65

## Files

- LISTENER.ora 16
- ReplicationScriptTool 14, 16, 65
- SQLNET.ora 16
- TNSNAMES.ora 16

## I

- Installation
  - Adding a NCM Core 21
  - Adding new Realm definitions 31
  - Adding new sites 31
  - Initial replication setup 13
  - Oracle server setup 10
  - Planning 10
  - Removing a NCM Core 25
  - Unpacking the Replication script 19

## L

- List Cores page 57

## M

- Master Definition Site
  - Changing 28
  - Overview 7
  - Restarting 75
- Monitor results 48
- Multi-master replication 7

## N

- NCM
  - Core 7, 74
  - Device Password Rule Reset page 61
  - Distributed Conflict List 53
  - Distributed Error List 50
  - Distributed Monitor Results page 48
  - Documentation 5
  - Edit Core page 59
  - List Cores page 57
  - Mesh 7, 73
  - Renew Configuration Options 62
  - Site Reassignment page 56
  - View Distributed Conflict page 55
  - View Distributed Error page 52

NCM scheduler 8

## O

Object IDs 55

Oracle

9i to 10g 73

Common errors 70

Multi-master replication 8

Replication commands 69

Replication setup 67

Replication tools 69

Server setup 10

Troubleshooting 67

## P

Permissions

Non-system users 19

Setup 19

## R

Recovery

Loss of network connectivity 63

Replication data 64

Removing database information 68

Renew Configuration Options 62

Replication

Events 42, 43

Master definition site 7

Monitoring 8

Password 15

Restoring 73

Setup 13

Unpacking 12

ReplicationScriptTool 74

RMI connections 48

## S

Scheduled jobs 48

Site name 53

Site Reassignment page 56

SQL queries 77

SQLPlus 24, 26

Status

Alert\_sent 54

New 54

Old 51

To\_retry 51

System administration

List Cores 57

Monitor results 48

NCM generated events 42

NCM UI pages 46, 47

Site reassignment 56

Transaction errors 50

Uniqueness conflicts 53

## T

Terminology 7

Timezone offset 57, 60

Transaction errors 50

Troubleshooting

Common errors 70

Oracle replication setup 67

Replication commands 69

## U

Uniqueness conflicts 49

Upgrading 73

## V

View Distributed Conflict page 55

View Distributed Error page 52