Horizontal Scalability User Guide for CiscoWorks Network Compliance Manager 1.8

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Text Part Number: OL-27501-01

Horizontal Scalability User Guide for CiscoWorks Network Compliance Manager 1.8

Contents

1 Introduction

This guide describes the CiscoWorks Network Compliance Manager Software (NCM) Horizontal Scalability functionality. It includes information on:

- What is NCM Horizontal Scalability
- Configuring NCM Horizontal Scalability on a two NCM Core configuration
- Adding additional NCM Cores to an NCM Horizontal Scalability configuration

Terminology

The following terms are used throughout this guide:

- **NCM Core:** A single NCM Management Engine, associated services (Syslog and TFTP), and a single database. An NCM Core can manage multiple Sites.
- **Partition:** A set of devices. A Partition is managed by one (and only one) NCM Core. Multiple Partitions can be managed by a single NCM Core. For information on segmenting devices, see the *User Guide for CiscoWorks Network Compliance Manager 1.8*.
- **NCM Mesh:** Multiple NCM Cores connected via replication.

Supported Databases and System Requirements

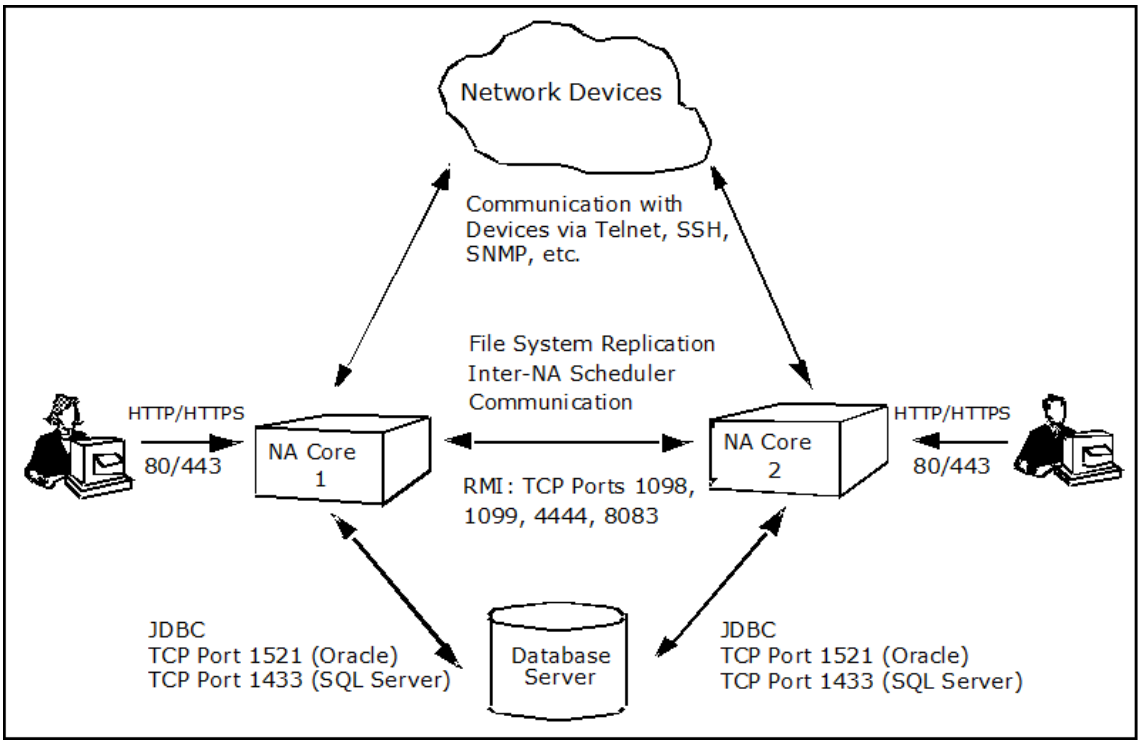
The maximum number of NCM Cores supported is five.

Horizontal Scalability system requirements are equivalent to those for standard NCM installations, as are the required database settings. However, the Horizontal Scalability system is not designed to be used over WANs where NCM Cores and the database are separated by large geographic distances. For information on standard database server hardware requirements see *NCM Support Matrix*.

What is NCM Horizontal Scalability?

NCM Horizontal Scalability is the ability to combine multiple NCM Cores with a single database so that they work as a single logical unit to improve the performance of the overall system. NCM Horizontal Scalability can be configured in different ways, depending on how you use your system and where bottlenecks are apt to occur.

The following figure shows a typical two-NCM Core Horizontal Scalability installation.



Keep in mind that some installations might have two separate network device collections that are inaccessible from the non-managing NCM Core. These installations still provide scaling benefits, however.

The communication between the NCM Cores is done using Java's Remote Method Invocation (RMI). RMI is used to ensure:

- Certain file system objects, such as software images and driver packages, are in sync.
- NCM tasks are scheduled and run on the correct NCM Core.

In addition to replication monitoring, NCM also monitors the following between each NCM Core:

- RMI connectivity between each NCM Core
- NCM server timestamp differences between each NCM Core
- Local NCM Core identification

These monitors generate events during error conditions. For more information, see NCM-Generated Events on page 21. The events can be emailed to the NCM administrator using an event rule in NCM. For information on configuring email notification, see the *User Guide for CiscoWorks Network Compliance Manager 1.8*.

In a scenario where the NCM Core is the bottleneck in terms of task throughput or overall performance, NCM Horizontal Scalability can ease the problem. For example, an NCM Core could become a bottleneck if:

- The NCM Core's memory or CPU usage is high due to running many concurrent tasks
- The NCM Core's memory or CPU usage is high due to many concurrent users on the system
- NCM is not able to run as many concurrent tasks as you would like due to memory restrictions

Using NCM Horizontal Scalability could place additional load on your database, as certain queries for the task scheduler could be duplicated across different NCM Cores.

Architecture

The NCM Horizontal Scalability architecture has multiple components:

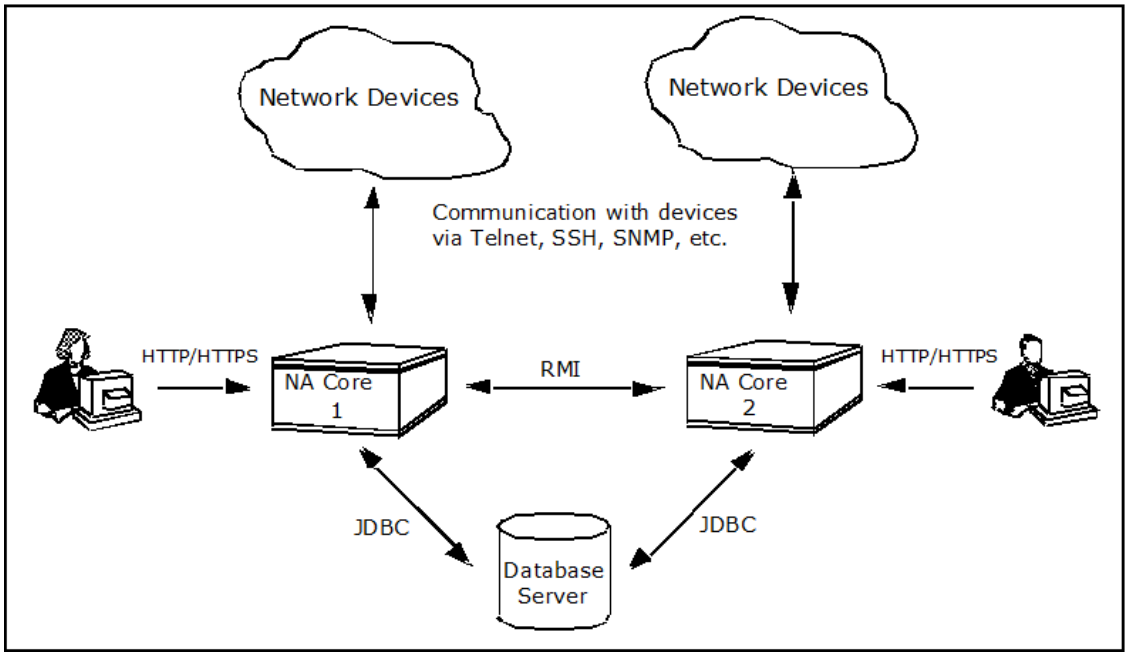
- An NCM Mesh scheduler that is optimized for group task throughput. The scheduler enables group tasks to be load-balanced across multiple cores. The scheduler is not currently optimized for task failover, however.
- A file system synchronizer. Certain file system items are kept synchronized across multiple NCM Cores. These items include NCM Core configuration files, device drivers, and software images.
- A monitoring subsystem that periodically checks the health of inter-NCM Core communication.

Topologies

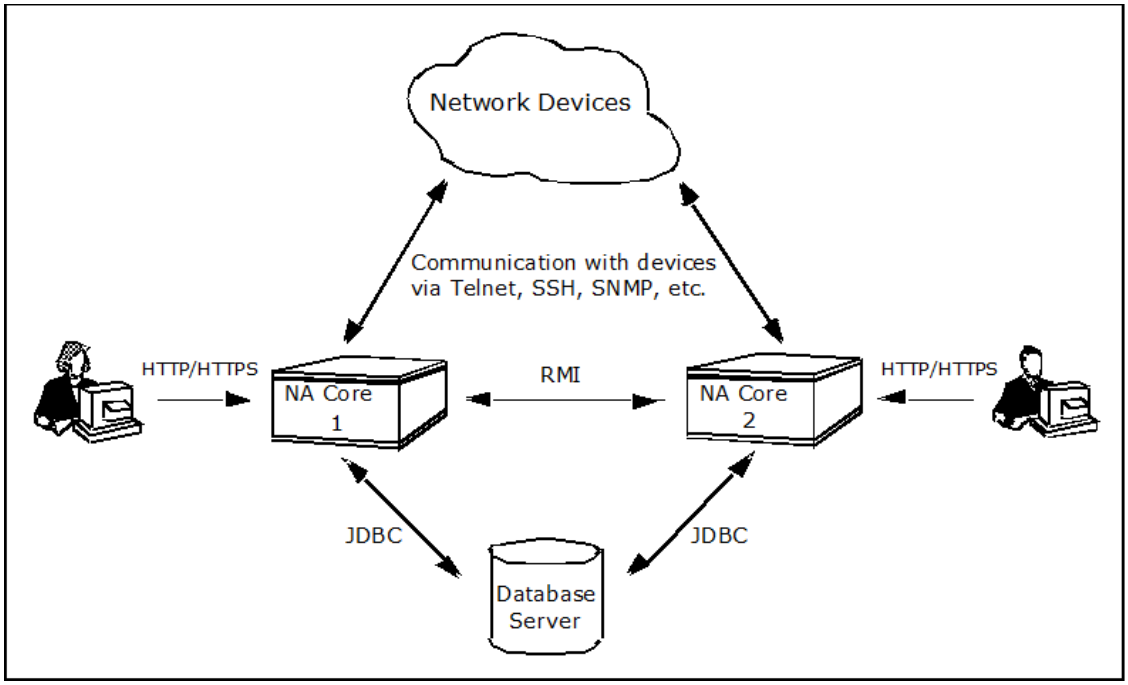
The NCM Mesh can be configured in multiple topologies, depending on your requirements. For information about configuring the NCM Mesh with these topologies, see Configuring Topology After Setup on page 17.

The following general topologies are supported:

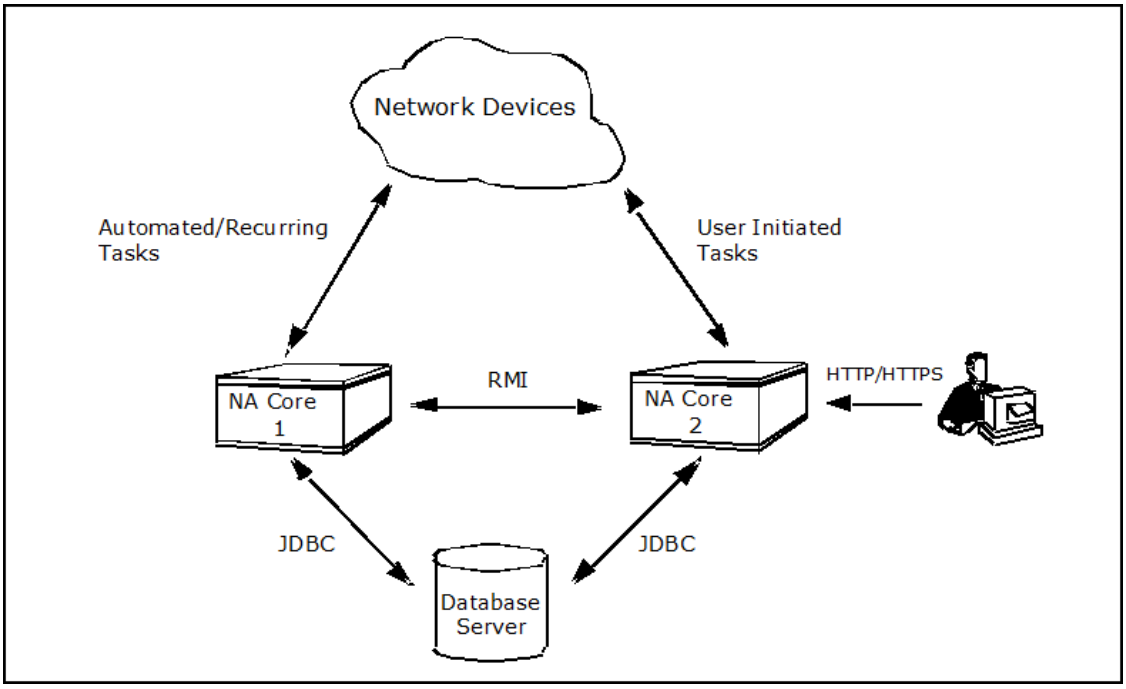
- **Topology 1:** Dedicating each server to a fixed set of devices. You should use this topology if you have business units that need their own servers for performance reasons. This topology allows for global reporting on all devices.



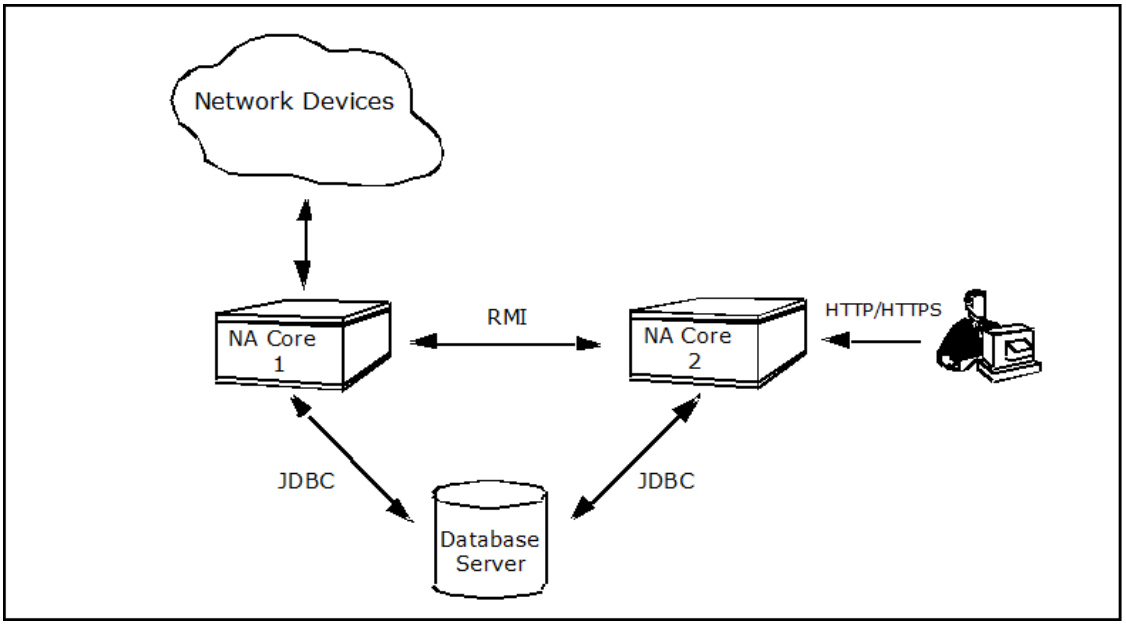
- **Topology 2:** Load-balancing all device group tasks across all servers. This topology is useful if you want to maximize task throughput across your entire NCM Mesh. You should use this topology if you have performance requirements on task throughput, but do not need to limit access to certain devices for different servers.



- **Topology 3:** Using one server to run automated regularly-scheduled group tasks, while another server is dedicated to running all user-initiated device tasks. This configuration is useful if you want to have user-initiated tasks avoid a scheduler bottleneck due to large automated tasks that are running. You should use this topology if it is critical that user-initiated tasks run as soon as possible.



- **Topology 4:** Using one server for all user-interaction, while another server is used for all device tasks. This is useful if NCM users experience UI performance limitations due to device tasks loads on a specific NCM Core. You should use this topology if users run multiple search and reporting operations that impact overall system performance.



Horizontal Scalability in conjunction with Multimaster Distributed Systems is not a supported configuration due to the replication load that Horizontal Scalability generates. For more information, see the *NCM Support Matrix*.

Configuration with NCM Satellites

When configuring NCM Satellites with Horizontal Scalability, each Satellite Remote Agent is associated with an NCM Core. The NCM Core associated with a Satellite receives snapshot requests when Syslog messages indicate a Snapshot is required.

When using Topology 1, the NCM Core associated with a Satellite should be the same NCM Core associated with the Partition for the Realm of the Satellite. For example,

- Partition Bellevue is associated with the Bellevue Realm and NCM Core A.
- Satellite Gateway Bellevue1 is installed in the Bellevue Realm.
- The Remote Agent deployed to Gateway Bellevue1 should also be NCM Core A.

When using Topology 2 and 3, the NCM Cores associated with the Satellites should be distributed evenly between the NCM Cores.

Load-Balancing

NCM Horizontal Scalability enables multiple NCM Cores to communicate with a single database. This configuration uses several methods to boost NCM performance:

- You can configure the NCM Cores to execute tasks in a round-robin fashion across the NCM Cores. NCM tasks are not bound to the NCM Core that owns the device. Note that the round-robin algorithm is used only for group tasks, and occurs at group sub-task creation time.
- You can configure one or more NCM Cores to run all tasks that were locally created on it.
- NCM can be configured to only look at in-memory running tasks when searching for duplicate tasks scheduled to run at the same time on the same device.

Load-balancing assumes that the database is not the limiting factor for performance. If the database performance is the bottleneck, NCM Horizontal Scalability will not help. In fact, it could exacerbate the problem. Be sure to check the CPU and memory usage on all of your servers. If your NCM Core is using a lot of CPU and memory, the NCM Core is the bottleneck. Otherwise, the bottleneck could by the database.

Known Issues and Limitations

The network connectivity between different NCM Cores and Database servers must be adequate for the NCM Horizontal Scalability to function properly. In networking terms, the latency must be low.

If there is a firewall in the network configuration, make sure all the appropriate TCP ports are opened for traffic to tunnel through the firewalls. For example, ports 1099 must be open between the NCM Cores. For detailed information on port usage, see "Protocols, Databases, and Ports" in the *Installation and Upgrade Guide for CiscoWorks Network Compliance Manager 1.8*.

If you want to round-robin device tasks, all NCM Cores must have network connectivity to all devices. Using the round-robin algorithm requires that each server access the database to determine the full list of running tasks in the NCM Mesh. This can incur additional performance demands on the database. In addition, the maximum concurrent tasks settings should be the same on all NCM Cores in the NCM Mesh.

In the event of an NCM Core failure while running tasks, some tasks that were scheduled to run on the failed NCM Core can remain in the running task state. You can delete these tasks and resubmit them to run again on a running NCM Core.

2 Configuring Horizontal Scalability

Configuring NCM Horizontal Scalability on Two NCM Cores

The following steps describe how to configure two NCM Cores communicating with one database. This configuration can be started using an existing NCM Core or on two new NCM Cores.

SQL scripts are provided in the appropriate bundle described below. The SQL scripts should be run on your database using the appropriate tool, for example SQLPlus for Oracle or SQLServer Management Studio for SQL Server. Running Scripts on Oracle on page 15 includes information for running scripts on Oracle. Running Scripts on SQL Server on page 15 includes information on running scripts on SQL Server.

1. Verify that the following prerequisites have been met:
   - The two application servers that will run NCM have working hostnames. Note the following:
     - Each application server should have a high-speed connection to the database server.
     - For application server hardware and operating system requirements, see the *NCM Support Matrix*.
   - It is recommended that the host names of the database server and both application servers are in the `hosts` file on each application server. This file is located as follows:
     - *Windows*: `<Drive>:\Windows\System32\drivers\etc\hosts`
     - *UNIX*®: `/etc/hosts`
   - The database server and all application servers are set to use the same time and timezone. It is recommended to synchronize the servers with an external time service.
2. *Optional.* If you do not have an existing SQL Server or Oracle NCM database server installed, perform a clean NCM install (NCM1) for either the SQL Server or Oracle database server. To review the NCM installation steps, see the *Installation and Upgrade Guide for CiscoWorks Network Compliance Manager 1.8* in the `docs` folder of the installation DVD.
3. Record the IP addresses and the database instance name and credentials for the NCM Cores and Database server.
4. Locate the `OracleHorizontalScalabilityBundle.zip` file or the `SQLServerHorizontalScalabilityBundle.zip` file in the `oracle_horizontal_scalability` folder or the `sql_server_horizontal_scalability` folder on the NCM Multimaster and Horizontal Scalability DVD. Be sure to use the scripts for the appropriate database type.
5. Stop the NCM Cores/daemons (NCM1).

6 Extract either the `OracleInitialSetup.sql` file or `SQLServerInitialSetup.sql` file from the appropriate replication script bundle. You will need to edit the file to replace certain variables. The variables to be replaced are located in the script between comment lines `BEGIN VARIABLE REPLACEMENT SECTION` and `END VARIABLE REPLACEMENT SECTION`. Be sure to completely replace the variables, including replacing the angle brackets (<>), as follows:

`<REPLACEME_DATABASE_NAME>` Use the SQL Server database name or Oracle SID.

`<REPLACEME_DATABASE_SERVER_NAME_OR_IP>` Use the DNS hostname or static IP address of your database server.

`<REPLACEME_CORE_SERVER_NAME_OR_IP_1>` Use the DNS hostname or static IP address of the first NCM Core.

`<REPLACEME_CORE_SERVER_NAME_OR_IP_2>` Use the DNS hostname or static IP address of the second NCM Core.

The CoreRMIPort in the script could be different from 1099 if your installation has been customized. The default DatabasePort is 1521 for Oracle and 1433 for SQL Server. If you are using a port other than the standard one for the database, you will need to modify the script accordingly.

If you have previously configured a second Horizontal Scalability Core and then removed it, you will need to comment out the following line by putting two hyphens (--) at the beginning of the line:

```
-- INSERT INTO RN_KEY_INCREMENTOR SELECT Name,Value,2 FROM
RN_KEY_INCREMENTOR WHERE CoreID = 1;
```

Keep in mind that the `RN_KEY_INCREMENTOR` table will already be updated for the second Horizontal Scalability Core from before.

7 Run the appropriate setup script, for example `SQLServerInitialSetup.sql` or `OracleInitialSetup.sql`, that you edited in step 6. (See Running Scripts on Oracle on page 15 or Running Scripts on SQL Server on page 15 for information.)

8 On the second NCM Core, install NCM (NCM2). When prompted, choose **Use Existing Database**. The database name/SID is the same one you used in step 6.

9 Stop the second NCM Core Management Engine (NCM2). For information on how to stop the NCM Management Engine, see the *User Guide for CiscoWorks Network Compliance Manager 1.8*.

10 On all of the NCM Cores, edit and copy the `distributed.rcx` file from the appropriate `HorizontalScalabilityBundle.zip` to `C:\NCM\jre\` (Windows) or equivalent Unix directory, for example `/opt/NAfiles/jre/`.

Make sure the following options are set accordingly for Oracle.

```
<options>
…
   <option name="distributed/enabled">true</option>
   <option name="distributed/replication_enabled">false</option>
   <option name="distributed/type">Oracle</option>
   <option name="distributed/cache_delay">30</option> <!-- in seconds -->
   <option name="distributed/bind_tasks_to_core">true</option>
…
</options>
```

The following options are for SQL Server:

```
<options>
…
   <option name="distributed/enabled">true</option>
   <option name="distributed/replication_enabled">false</option>
   <option name="distributed/type">SQLServer</option>
   <option name="distributed/cache_delay">120</option> <!-- in seconds-->
   <option name="distributed/bind_tasks_to_core">true</option>
…
</options>
```

`<option name="distributed/bind_tasks_to_core">false</option>` enables the round-robin algorithm. If you are configuring your NCM Mesh topology for round-robin, this should be set to false.

11 Restart all the NCM Cores/daemons.

12 Verify your installation is working correctly. See Verifying Installation and Setup on page 17).

Scripts

Running Scripts on Oracle

To run your edited setup scripts on Oracle using SQLPlus, do the following:

1 Execute the following command from the appropriate shell prompt:

sqlplus <*USER*>**/**<*PASSWORD*>**@**<*DATABASE_SID*>

2 At the "SQL>" prompt, either paste the script you have edited or use `@`<*ScriptName*>`.sql` to run the script. Substitute the appropriate script you want to run for <*ScriptName*>.

The <*USER*>, <*PASSWORD*>, and <*DATABASE_SID*> are the appropriate user, password, and database SID that the NCM Core uses to access the database.

Running Scripts on SQL Server

You can run your edited setup script using either SQLServer Management Studio or the `sqlcmd` command line utility.

To run your script using the sqlcmd command line utility, use the following command:

sqlcmd -S <*SERVER_NAME*> **-U** <*USER*> **-P** <*PASSWORD*> **-d** <*DATABASE_NAME*> **-i** <*SCRIPT_NAME*>**.sql**

Where the variables should be substituted as follows:

<*SERVER_NAME*> The name of your database server.

<*USER*> The user that the NCM Core uses to access the database.

<*PASSWORD*> The user's password.

<*DATABASE_NAME*> The database name NCM uses.

<SCRIPT_NAME> The name of the script you want to run.

Adding Additional NCM Cores

To add a third, or more NCM Cores to an existing NCM Mesh, do the following:

1. Record the IP addresses and the database instance name and credentials for the NCM Core you are adding.
2. Locate the *User Guide for CiscoWorks Network Compliance Manager 1.8* in the `docs` folder of the installation DVD to review the NCM installation steps.
3. Locate the `OracleHorizontalScalabilityBundle.zip` file or the `SQLServerHorizontalScalabilityBundle.zip` file in the `oracle_horizontal_scalability` folder or the `sql_server_horizontal_scalability` folder on the NCM Multimaster and Horizontal Scalability DVD. Be sure to use the scripts for the appropriate database type.
4. Stop the NCM Core Management Engines on all the other servers.
5. Extract either the `OracleAddServer.sql` file or `SQLServerAddServer.sql` file from the appropriate replication script bundle. You will need to edit the file to replace certain variables. The variables to be replaced are located in the script between comment lines BEGIN VARIABLE REPLACEMENT SECTION and END VARIABLE REPLACEMENT SECTION. Completely replace the variables, including replacing the angle brackets (<>), as follows:

   `<REPLACEME_DATABASE_NAME>` Use the SQL Server database name or Oracle SID.

   `<REPLACEME_DATABASE_SERVER_NAME_OR_IP>` Use the DNS hostname or static IP address of your database server.

   `<REPLACEME_ADDED_CORE_SERVER_NAME_OR_IP>` Use the DNS hostname or static IP address of the NCM Core you are adding.

   The CoreRMIPort in the script could be different from 1099 if your installation has been customized. The default DatabasePort is 1521 for Oracle and 1433 for SQL Server. If you are using a port other than the standard one for the database, you will need to modify the script accordingly.

6. Run the appropriate add server script, for example `OracleAddServer.sql` or `SQLServerAddServer.sql` that you edited in step 5. (See Running Scripts on Oracle on page 15 or Running Scripts on SQL Server on page 15 for information.)
7. On the new NCM Core, install NCM (NCM_n). When prompted, choose **Use Existing Database**. The database name/SID is the same one you used in step 5 (i.e. dbname1).
8. Stop the new NCM Core Management Engine (NCM_n).
9. On the new NCM Core, edit and copy the `distributed.rcx` file from the appropriate `HorizontalScalabilityBundle.zip` to `C:\NCM\jre\` (Windows) or equivalent Unix directory, for example `/opt/NAfiles/jre/`.

   Make sure the following options are set accordingly for Oracle.

```
<options>
…
   <option name="distributed/enabled">true</option>
   <option name="distributed/replication_enabled">false</option>
   <option name="distributed/type">Oracle</option>
```

```
   <option name="distributed/cache_delay">30</option> <!-- in seconds -->
   <option name="distributed/bind_tasks_to_core">true</option>
…
</options>
```

The following options are for SQL Server:

```
 <options>
…
   <option name="distributed/enabled">true</option>
   <option name="distributed/replication_enabled">false</option>
   <option name="distributed/type">SQLServer</option>
   <option name="distributed/cache_delay">120</option> <!-- in seconds-->
   <option name="distributed/bind_tasks_to_core">true</option>
…
</options>
```

`<option name="distributed/bind_tasks_to_core">false</option>` enables the round-robin algorithm. If you are configuring your NCM Mesh topology for round-robin, this should be set to false.

10 Restart all the NCM Cores/daemons.

Verifying Installation and Setup

To verify installation and setup, do the following:

1 Verify that the RN_CORE table database contains the appropriate list of servers in the NCM Mesh. To check the RN_CORE table, using the query tool appropriate for your database, enter:

`SELECT * FROM RN_CORE;`

You can also view the Edit Core page in NCM to review each NCM Core's settings. See Edit Core Page on page 23 for information.

2 Edit an object on one NCM server (for example, a Comments field for a device).

3 Verify that the updated comment exists on the second NCM server.

4 Check the status of the Distributed Monitor in the NCM UI to ensure that no problems are being reported. It could take up to five minutes for this monitor to initially run.

Configuring Topology After Setup

The following general topologies are supported:

- **Topology 1:** Dedicating each server to a fixed set of devices.
- **Topology 2:** Load-balancing all device group tasks across all servers.
- **Topology 3:** Using one server to run automated regularly-scheduled group tasks, while another server is dedicated to running all user-initiated device tasks.
- **Topology 4:** Using one server for all user-interaction, while another server is used for all device tasks.

See Table 1.

Table 1 Topology Configurations

Option	Topology 1 Value	Topology 2 Value	Topology 3 Value	Topology 4 Value
"distributed/bind_tasks_to_core" (in `distributed.rcx`)	true	false	true	true
Allow local task running: **Admin Settings > Server > Performance Tuning** **Note:** In a Distributed System, this option notifies the entire NCM Mesh that there can be one or more NCM Cores in the NCM Mesh that locally run all tasks scheduled on those NCM Cores. This is an NCM Mesh-wide global option. If you need to change this option, you must restart all of the NCM Management Engines after making the change.	Unchecked (false)	Unchecked (false)	Checked (true)	Checked (true)
Run tasks locally: **Admin Settings > Server > Performance Tuning** **Note:** In a Distributed System, this option notifies the NCM Core to locally run all tasks created on it. This option will only take effect if the NCM Mesh-wide option is set and is NCM Core-specific.	Unchecked	Unchecked	• Checked (on the server where tasks should run locally) • Unchecked (on the other servers)	Unchecked

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 Partition 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 Partitions. 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. (See the *User Guide for CiscoWorks Network Compliance Manager 1.8* for information.)

Uninstall Procedures

If you want to remove NCM Horizontal Scalability from two NCM Cores and return to a single NCM Core configuration, do the following:

If you are using more than two NCM Cores, the following steps need to be applied to each of the NCM Cores you are removing.

1. Stop and disable as appropriate the NCM Cores/daemons on the NCM Core that is being removed.
2. On the database server, run the following script as appropriate for your database type:

   Oracle Script

   ```
   UPDATE RN_SITE SET OwningCoreID = 1 WHERE OwningCoreID = <coreID>;
   UPDATE RN_SITE SET ManagingCoreID = 1 WHERE ManagingCoreID = <coreID>;
   UPDATE RN_SCHEDULE_TASK SET CoreID = 1 WHERE CoreID = <coreID>;
   DELETE FROM RN_CORE WHERE CoreID = <coreID>;
   COMMIT;
   ```

   SQL Server Script

   ```
   UPDATE RN_SITE SET OwningCoreID = 1 WHERE OwningCoreID = <coreID>;
   UPDATE RN_SITE SET ManagingCoreID = 1 WHERE ManagingCoreID = <coreID>;
   UPDATE RN_SCHEDULE_TASK SET CoreID = 1 WHERE CoreID = <coreID>;
   DELETE FROM RN_CORE WHERE CoreID = <coreID>;
   ```

   Change `<coreID>` as appropriate. The script assumes you do not want to remove NCM Core 1.

3. Remove the `distributed.rcx` file from NCM Core 1 (assuming you want to leave only NCM Core 1).
4. Restart NCM on NCM Core 1.

Upgrading Horizontal Scalability

To upgrade NCM in a Horizontal Scalability environment from version 1.4x, 1.5x, 1.6x, or 1.7x to version 1.8, follow these steps:

1. Upgrade each NCM application server as described in the "Upgrading to NCM 1.8 from a Different System" chapter or the "Upgrading to NCM 1.8 on the Same System" chapter of the *Installation and Upgrade Guide for CiscoWorks Network Compliance Manager 1.8*, as appropriate.

   Run the upgrade procedures in parallel. That is, complete step 1 on each NCM application server before initiating step 2 on any NCM application server, and so forth. Follow the referenced procedure through the step to run the NCM 1.8 Service Pack Installer.

   Note the following:

   - To prevent database access, on each NCM application server, after the NCM 1.8 Service Pack Installer runs, stop all NCM services.
     - *Windows*: Open the **Services** control panel. In the list of services, right-click each of the following services, and then click **Stop**:

TrueControl ManagementEngine

TrueControl FTP Server

TrueControl SWIM Server

TrueControl Syslog Server

TrueControl TFTP Server

— *UNIX*: Run the following command:

```
/etc/init.d/truecontrol stop
```

- If you need to upgrade the database product on the NCM database server to a newer version, do so only one time, not for each application server.
- If you are moving NCM to different application servers, copy the NCM-specific files (the NCM directory and, on UNIX, the startup files) from one existing NCM application server to only one new NCM application server.

  For example, consider a two-core Horizontal Scalability environment. The existing NCM application servers are Server X1 and Server X2. The new NCM application servers and Server Y1 and Server Y2. Do the following:

  — Copy the NCM directory from Server X1 to Server Y1.

  Retain the permissions on the files.

  On UNIX systems, also copy the `/etc/truecontrol` and `/etc/init.d/truecontrol` files from Server X1 to Server Y1.

  — Copy the NCM directory from Server X2 to Server Y2.

  Retain the permissions on the files.

  On UNIX systems, also copy the `/etc/truecontrol` and `/etc/init.d/truecontrol` files from Server X2 to Server Y2.

2 On each NCM application server, restart all NCM services.

- *Windows*: Open the **Services** control panel. In the list of services, right-click each of the following services, and then click **Restart**:

  — **TrueControl ManagementEngine**

  — **TrueControl FTP Server**

  — **TrueControl SWIM Server**

  — **TrueControl Syslog Server**

  — **TrueControl TFTP Server**

- *UNIX*: Run the following command:

```
/etc/init.d/truecontrol restart
```

3 Complete the upgrade procedure from the step to run the Data Pruning task.

3 System Administration

Managing Your Horizontal Scalability NCM Mesh

In addition to replication monitoring, NCM also monitors the following for each of the NCM Cores:

- RMI connectivity between each NCM Core
- NCM server timestamp differences between each NCM Core
- Local NCM Core identification

These monitors will generate events during error conditions. The events can be emailed to the NCM administrator using a standard event rule in NCM.

NCM-Generated Events

By default, NCM generates system events. Event rules can alert you to certain error conditions requiring attention. You should examine the default “Distributed System” event rule to ensure all of the events are included in the event rule and that the event rule is configured to send the email notification to the appropriate administrator.

An RMI error that prevents NCM console logon or inhibits use of the NCM console can mean that NCM is unable to identify the localhost.

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.

To correct the problem, update the localhost section of the `hosts` file on each NCM application server as follows:

This solution is for static IP environments only.

1. In a text editor such as WordPad or vi, open the following file:
   - *Windows*: `<Drive>:\Windows\System32\drivers\etc\hosts`
   - *UNIX*: `/etc/hosts`
2. Set the localhost line to read:

   ```
   127.0.0.1 localhost
   ```
3. For each NCM application server, add a line in the following format:

   <xx.xx.xx.xx> <NCM.example.com> <NCM>
   - Replace *<xx.xx.xx.xx>* with the IP address of the NCM application server.
   - Replace *<NCM.example.com>* with the fully-qualified domain name of the NCM application server.
   - Replace *<NCM>* with the short hostname of the NCM application server.
4. Repeat step 3 until the `hosts` file includes all NCM application servers in the distributed system environment.
5. To use the updated hosts information, restart the NCM application server.

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. The following options are included under the **Admin > Distributed** option:

- Monitor Results
- Site Reassignment
- Core List
- Renew Configuration Options

Distributed Monitor Results Page

The Distributed Monitor Results page displays the overall health of the Distributed System. By default, the Distributed monitor runs every five minutes.

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.

NCM monitors 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.

- Local NCM Core Definition - The local NCM Core must be able to determine which entry in the RN_CORE table it is. If the “The local core for this system is undefined” error message is displayed, the CoreHostname property needs to be updated for the NCM Core. This can be done using the Edit Core page. See Edit Core Page on page 23 for information.

This condition could be displayed in the error logs with the following text: “Fatal error - could not assign local core.”

The CoreHostname value can be either the DNS, etc/hosts value, or an IP address. If you are using an NCM server with multiple IP addresses, you might need to tell NCM which IP address to use. This is done by adding the following setting to the `distributed.rcx` file:

```
<option name="distributed/NCM_server_local_ip">A.B.C.D</option>
```

The value A.B.C.D should be replaced with the appropriate NAT IP address for the NCM server and should match the RN_CORE table's CoreHostname value for that NCM Core.

For detailed information on the Distributed Monitor Results page, see the *Configuration Guide for High Availability Distributed System on Oracle, Software version 1.8* or the *Configuration Guide for High Availability Distributed System on Microsoft SQL Server*.

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. You can select NCM Cores from the drop-down menu. For detailed information on the Site Reassignment page, see the *Configuration Guide for High Availability Distributed System on Oracle, Software version 1.8* or the *Configuration Guide for High Availability Distributed System on Microsoft SQL Server*.

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. For detailed information on the List Cores page, see the *Configuration Guide for High Availability Distributed System on Oracle, Software version 1.8* or the *Configuration Guide for High Availability Distributed System on Microsoft SQL Server*.

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.
3. Complete the following fields and click the Save Core button.

For detailed information on the Edit Core page, see the *Configuration Guide for High Availability Distributed System on Oracle, Software version 1.8* or the *Configuration Guide for High Availability Distributed System on Microsoft SQL Server*.

Renew Configuration Options Page

The Renew Configuration Options page enables you to reset the configuration options when the configuration options on an 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. Click the Renew Config Options button to ensure that all options on the NCM Cores are in sync with the rest of the NCM Mesh.

For detailed information on the Renew Configuration Options page, see the *Configuration Guide for High Availability Distributed System on Oracle, Software version 1.8* or the *Configuration Guide for High Availability Distributed System on Microsoft SQL Server*.