IBM Cluster Systems Management for Linux®

Hardware Planning and Control Guide

Version 1.2

SA22-7856-03

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Note!
Before using this information and the product it supports, read the information in “Notices” on page 27.

Fourth Edition (July 2002)

This edition of the *IBM CSM for Linux: Hardware Planning and Control Guide* applies to IBM Cluster Systems Management (CSM) for Linux Version 1.2, program number 5765–E88, and to all subsequent releases of this product until otherwise indicated in new editions. This edition replaces SA22-7856-02. Significant changes or additions to the text and illustrations are indicated by a vertical line (|) to the left of the change.

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Contents

About this book

This book describes the hardware, network, software, and configuration requirements for using IBM Cluster Systems Management (CSM) for Linux hardware control functions. This book focuses on the architecture of CSM hardware and how to use CSM remote power and remote console software in a Linux cluster.

Who should use this book

This book is intended for system administrators who use IBM Cluster Systems Management (CSM) for Linux. The system administrator should have experience in UNIX® administration and networked systems.

Highlighting

The following highlighting conventions are used in this book:

Typographic	Usage
Bold	Identifies commands, subroutines, keywords, files, structures, directories, and other items whose names are predefined by the system. Also identifies graphical objects such as buttons, labels, and icons that the user selects
Italic	Identifies parameters whose actual names or values are to be supplied by the user.
`monospace`	Identifies examples of specific data values, examples of text similar to what you might see displayed, examples of portions of program code similar to what you might write as a programmer, messages from the system, or information you should actually type.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Related information

See the following references for information related to CSM hardware control for Linux:

Web Site	URL	Resources
IBM CSM for Linux Hardware Planning and Control Guide and Reference	http://www.ibm.com/servers/eserver/clusters/library/csmremot.html	• PDF version • Firmware updates
IBM @server Clusters library	http://www.ibm.com/servers/eserver/clusters/library/	• CSM Books • CSM FAQ
IBM Linux Clusters Hardware	http://www.ibm.com/servers/eserver/clusters/hardware/index.html	• IBM @server Cluster information • Linux Clusters white paper • Linux education • Linux services
IBM Universal Manageability (UM) Services	http://www.pc.ibm.com/us/pc/um/index.html	• Tools and Services • Acquisition, Migration and Installation, and Support

Web Site	URL	Resources
IBM Remote Supervisor Adapter (RSA)	http://www.pc.ibm.com/qtechinfo/MIGR-4UKSML.html	• RSA overview • RSA User's Guide • RSA Installation Guide
Equinox® Ethernet Serial Provider (ESP) Installation Guide	http://www.equinox.com/tech/hardware_man.html	• FAQ • Product installation
Conserver serial console application information	http://www.conserver.com/	• FAQ • Source code and documentation
Computone IntelliServer® RCM8 information	http://www.computone.com/Products/RCM/RCM4_8_index.html	• Specifications • FAQ • Documentation
Avocent™ CPS1600 information	http://www.avocent.com	• Specifications • FAQ • Product Manual
Linux Documentation Project	http://www.ibiblio.org/mdw/index.html	• Serial-HOWTO • Serial-Programming-HOWTO • Modem-HOWTO

Note: IBM provides linking information to third party Web sites as a convenience. These Web sites and the information available through these Web sites are not under IBM's control. If you have any questions or concerns regarding the information available through a third party Web site, please contact the third party directly.

How to obtain publications

The IBM Cluster Systems Management (CSM) for Linux publications are available as HTML and PDF files on the CD-ROM in the **/doc** directory or on the installed system in the **/opt/csm/doc** directory. The README is available on the CD-ROM in the root directory (/). The file names are as follows:

- *IBM CSM for Linux: Software Planning and Installation Guide* (am7lxins.pdf)
- *IBM CSM for Linux: Administration Guide* (am7lxadm.pdf)
- *IBM CSM for Linux: Hardware Planning and Control Guide* (am7lxhwc.pdf)

These IBM Cluster Systems Management (CSM) for Linux publications were also available at the time of this release at http://www.ibm.com/servers/eserver/clusters/library/.

The following references contain more information about Reliable Scalable Computing Technology (RSCT) for Linux:

- *IBM RSCT for Linux: Guide and Reference*, SA22–7892–00
- *IBM RSCT for Linux: Technical Reference*, SA22–7893–00
- *IBM RSCT for Linux: Messages*, SA22–7894–00
- *IBM RSCT for Linux: Group Services Programming Guide and Reference*, SA22–7888–00

How to contact IBM by e-mail

To contact IBM CSM development by e-mail, send your comments to cluster@us.ibm.com.

Chapter 1. CSM hardware control

IBM Cluster Systems Management (CSM) for Linux hardware control software provides remote power and remote console functions for CSM cluster nodes from a single point of control. CSM allows the system administrator to control cluster nodes remotely through access to the cluster management server. CSM for Linux is currently only available as preinstalled software on IBM xSeries™ 330 and 342 hardware.

CSM hardware control includes the remote power and remote console functions. The remote power **rpower** command is used to power on, power off, reboot, and query power status of cluster nodes. The remote console **rconsole** command is used to open a console to a cluster node from the management server. The **rpower** and **rconsole** commands must be run from the management server, and either command can be run to affect multiple nodes simultaneously. See the command man pages or the *IBM CSM for Linux: Administration Guide* for detailed command usage information.

CSM hardware control functions depend on the specific hardware, software, network, and configuration requirements described in this book. The requirements for remote power are separate and distinct from those for remote console. See "CSM hardware and network requirements" for a description of the remote power and remote console hardware and network requirements. See Chapter 2, "Remote power software and configuration" on page 9 and Chapter 3, "Remote console software and configuration" on page 17 for descriptions of the remote power and remote console software and configuration requirements.

Linux clusters without the hardware, software, network, or configuration required to use remote power and remote console functions can still have CSM installed on some or all cluster nodes. However, on such clusters the **rpower** and **rconsole** commands may be inoperable or provide only limited function.

CSM hardware and network requirements

CSM hardware control depends on the specific hardware and network requirements described in this book. A management server is the single point of control for a CSM cluster, and a system administrator runs most CSM commands from the management server using the command line. The management server can be connected to the cluster nodes and external networks using various configurations of IBM and non-IBM hardware and software that meet the CSM architecture requirements described in this book.

The **rpower** command communicates with a node's hardware control point to request node power status, reboot, and power on and off functions. Hardware control points should be on the management virtual LAN (VLAN) and connected to the hardware that ultimately controls the power functions. The IBM Remote Supervisor Adapter (RSA) is the type of management processor adapter (MPA) hardware control point that can currently be used with CSM.

The **rconsole** command communicates with console server hardware to open a console window for a node on the CSM management server. Console servers must be on the management VLAN and connected to node serial ports. This out of band network configuration allows a remote console to be opened from the management server even if the network is inaccessible. For example, if the cluster VLAN is offline, remote console can still access the target node to open a console window. Console server types that can currently be used with CSM are the Equinox ESP-8 and ESP-16 serial hubs, Equinox ELS-16 II terminal server, Computone IntelliServer RCM8, and Avocent CPS1600.

Figure 1 shows a network partitioned into three virtual LANs (VLAN); public, cluster, and management. The public VLAN connects the cluster nodes and management server to the site network. Applications are accessed and run on cluster nodes over the public VLAN. The public VLAN can be connected to nodes through a second Ethernet adapter in each node, or by routing to each node through the Ethernet switch. The cluster VLAN connects nodes to each other and to the management server. Installation and CSM administration tasks such as running **dsh** are done on the cluster VLAN. Host names and attribute values

for nodes on the cluster VLAN are stored in the CSM database. The **rpower** and **rconsole** commands are run on the management VLAN (Mgt VLAN), which connects the management server to the cluster hardware.

For optimal security, the management VLAN must be restricted to the remote hardware being controlled (hardware control points and remote terminal servers) and the management server. User access to the management server should be restricted to root and admin users only. Routing between the management VLAN and cluster or public VLANs could compromise security on the management VLAN.

The management server in Figure 1 connects to the management and cluster VLANs through Ethernet adapters. The terminal server, an Equinox Serial Provider (ESP) in this example, connects to the management VLAN through its Ethernet adapter, and to the cluster nodes through their serial (COM) ports. An ESP-16 can connect up to 16 nodes; other terminal servers may have different capacities. The nodes must be connected to the cluster VLAN through their first Ethernet adapters (eth0), and directly or indirectly to an IBM Remote Supervisor Adapter (RSA). The management VLAN connects to the RSA in select nodes; one RSA is required per 10 nodes. An RSA connects to its node internal service processor (ISP) port, and up to nine node ISP ports can be daisy-chained from the RSA ISP port. Configuration for a public VLAN is flexible and can be defined by the system administrator.

Note: For remote console to work correctly, CSM currently requires that COM port B is used for the serial connection on both the x330 and x342 cluster nodes. On x330 nodes, the cable must be switched from the default COM Port A to COM Port B before installing the node. On x342 nodes, the external serial cable must be connected to COM Port B.

The following diagram (Figure 1) shows the hardware and networking configuration required for using CSM hardware control with IBM xSeries 330 nodes. Figure 3 shows the required configuration for IBM xSeries 342 nodes. See “CSM hardware node attributes” on page 7 for example node attribute definitions corresponding to Figure 1.

Notes:

1. There are two MP ports on x330 nodes. The daisy chain connection is set up so that the MP Port A (on clsn01) is connected to the MPA PCI (on mgtn03) through an external dongle and the MP Port B (on clsn01) is connected to Port A (on clsn02), and so on. This leaves Port B on the last node (clsn10) open.
2. ESP console servers are physically numbered 1-16, but the corresponding ttys created by ESP software are logically numbered 0-f.

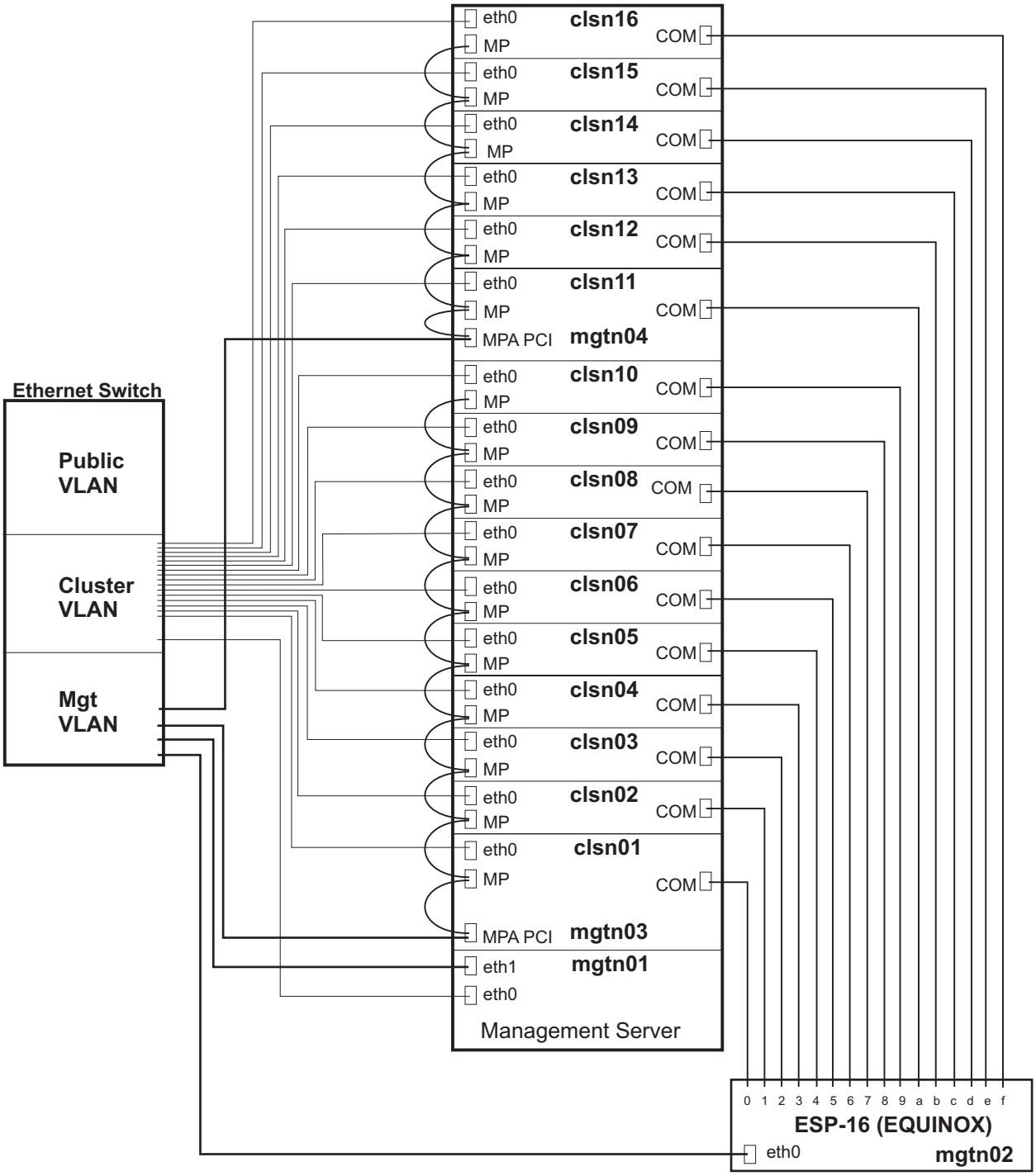

Figure 1. CSM hardware control hardware and networking configuration for IBM xSeries 330 nodes

The following diagram (Figure 2) shows the relationship between the CSM node database attributes and the internal hardware names used in Figure 1. For remote power and remote console to work as expected, this matching of database attribute names to the internal hardware values must be correct for all management processors (MPs), management processor adapters (MPAs), and console serial providers in the CSM cluster.

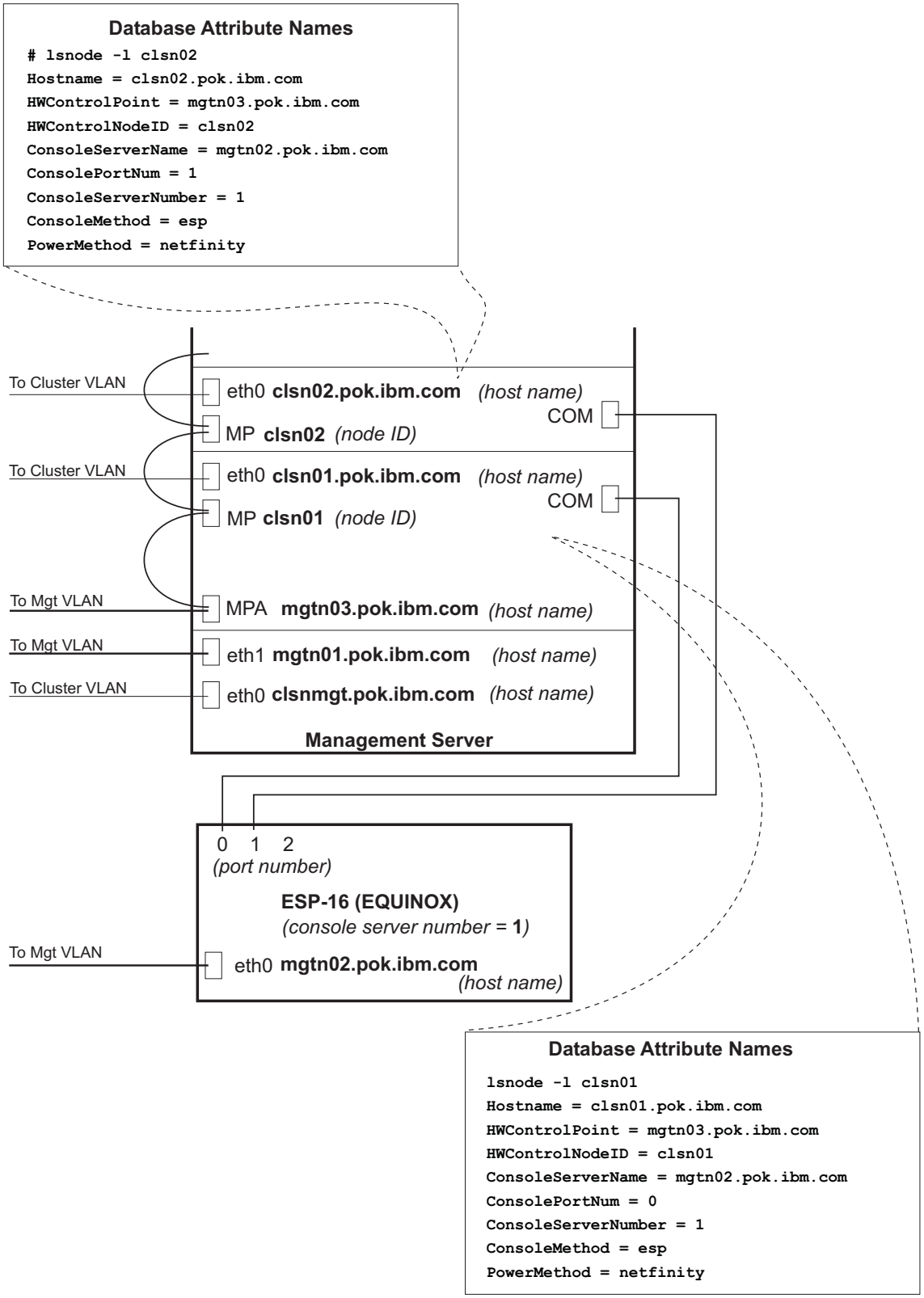

Figure 2. CSM hardware control database attributes for IBM xSeries 330 nodes

The following diagram (Figure 3) shows the hardware and networking configuration required for using CSM hardware control with IBM xSeries 342 nodes. An xSeries 342 node can be connected to the management VLAN using an MP or an MPA. Each MPA can have its own connection to the management VLAN (mgtn03 – mgtn12), or up to nine MPAs can be daisy-chained from one MPA that is connected to the management VLAN (mgtn13). See Figure 4 for a more detailed view of three nodes from Figure 3.

Note: ESP console servers are physically numbered 1-16, but the corresponding ttys created by ESP software are logically numbered 0-f.

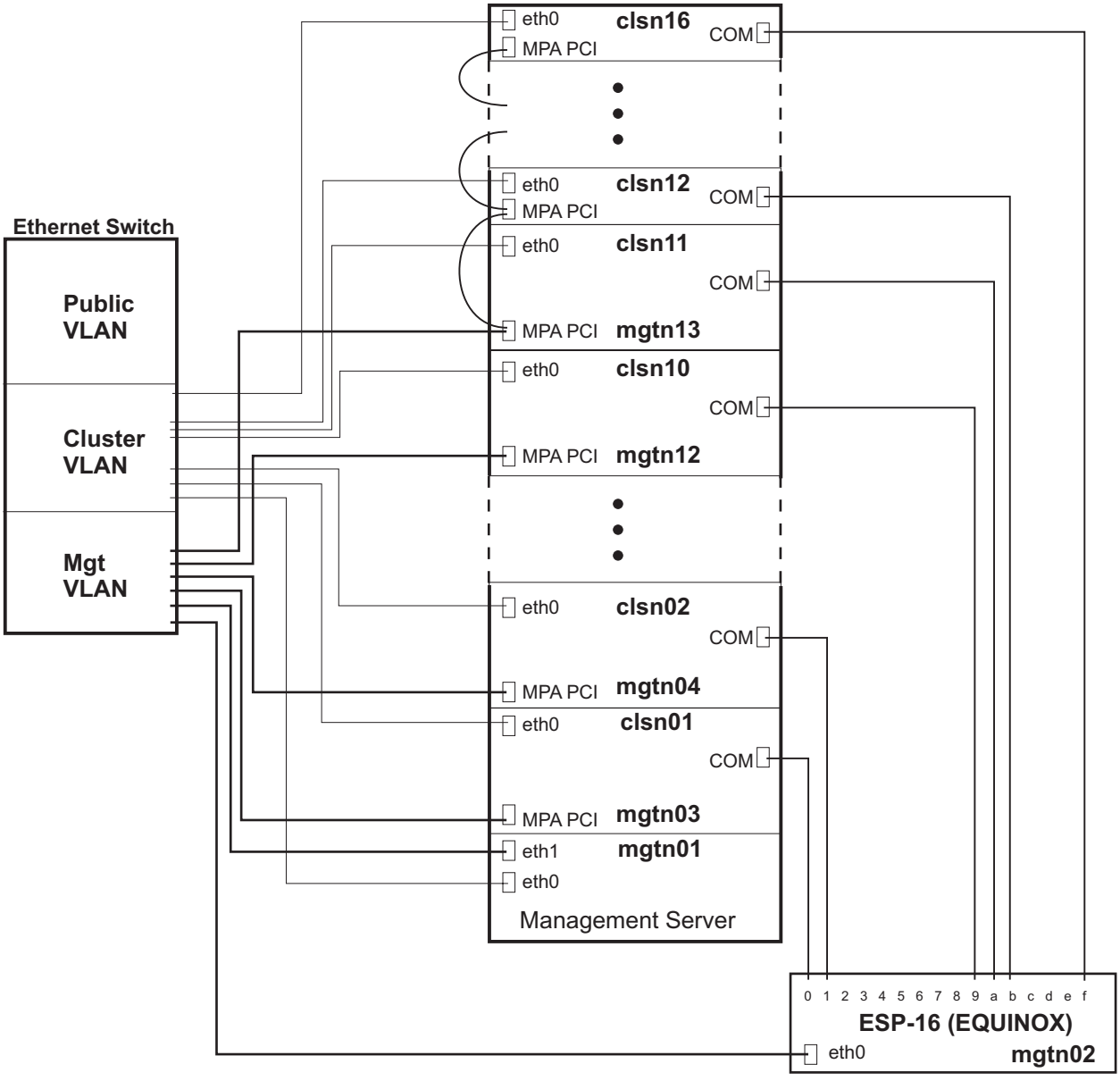

Figure 3. CSM hardware control hardware and networking configuration for IBM xSeries 342 nodes

The following diagram (Figure 4) is a detailed view of three nodes from Figure 3. The diagram shows the relationship between the CSM node database attributes and the internal hardware names used in Figure 3. For remote power and remote console to work as expected, this matching of database attribute names to the internal hardware values must be correct for all management processors (MPs), management processor adapters (MPAs), and console serial providers in the cluster.

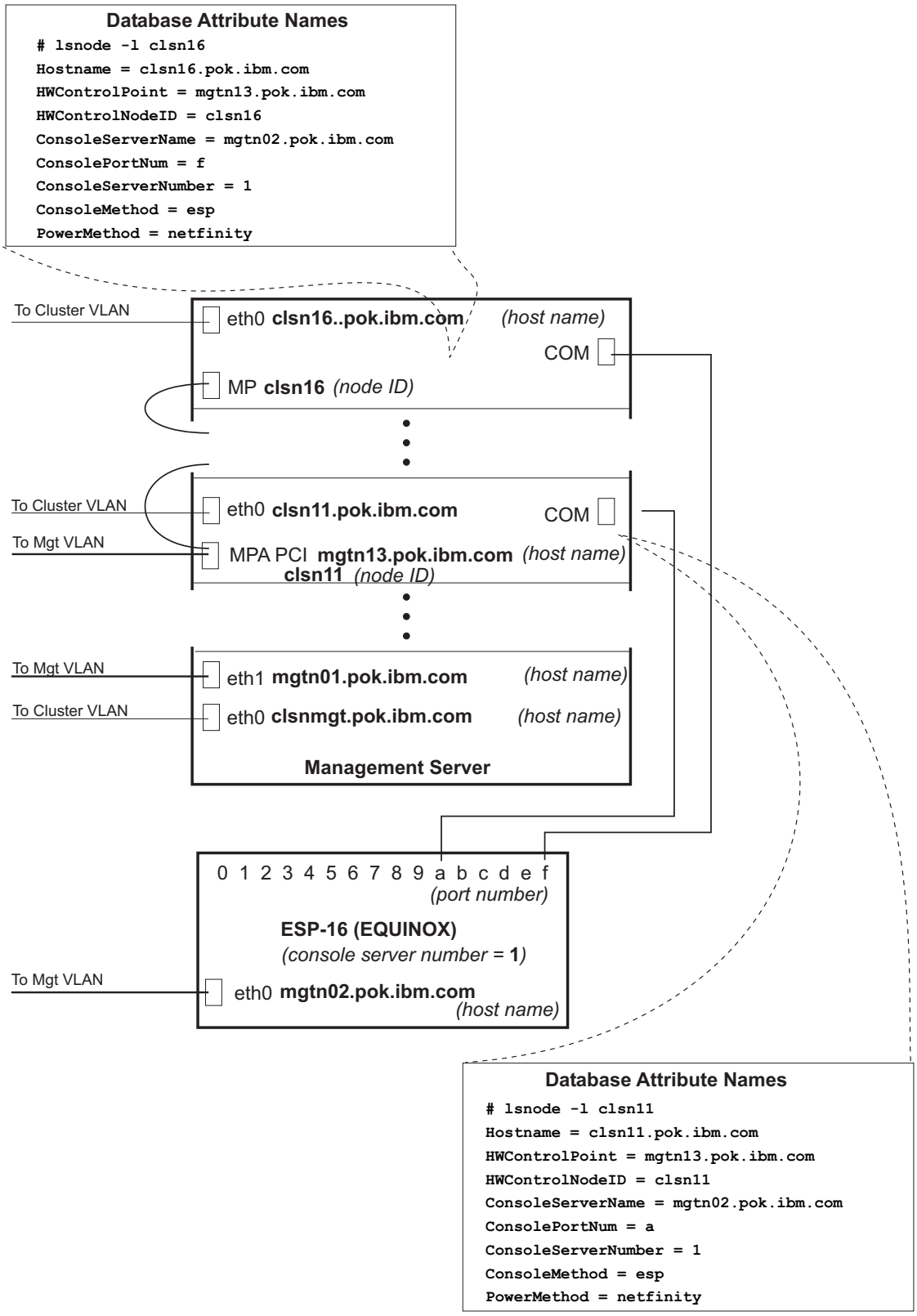

Figure 4. CSM hardware control database attributes for IBM xSeries 342 nodes

Hardware and networking requirements

CSM for Linux is an integral part of the IBM @server Cluster 1300 platform for deploying applications on Linux clusters. CSM also runs on IBM @server xSeries models 330 and 342. For CSM hardware control to function properly, the following hardware and hardware specifications are required:

- One IBM RSA PCI adapter per 24 nodes.
- One or more of the following terminal servers:
  - Avocent CPS1600
  - Computone IntelliServer RCM8, RCM24, or RCM48
  - Equinox ESP-8 or ESP-16
  - Equinox ELS-16 II.
- One Ethernet adapter per virtual LAN (VLAN).
- A minimum of one Ethernet adapter on each node.
- TCP/IP and one PXE-enabled network adapter per cluster.
- Appropriate cabling.
- A minimum of 128MB of memory and 120MB of disk space on the management server to install CSM.
- 1.5GB of disk space on the management server for each fully installed version of Red Hat® Linux.
- A minimum of 128MB of memory and 20MB of disk space on each managed node to install and run CSM.
- Additional disk space on each node is required for the Linux operating system and RPMs.

For specific hardware control point and console server product details, see the documentation shipped with the hardware, or the product Web site URLs listed in “Related information” on page v.

IBM supports a CSM cluster with up to 256 nodes. IBM suggests a networking configuration where each console server is connected to the management VLAN through its Ethernet port, and to 16 or fewer nodes through the nodes’ serial or COM ports. IBM suggests that each IBM RSA PCI be connected to the management VLAN through its Ethernet port. However, to conserve IP addresses one IBM RSA PCI could be connected to the management VLAN with up to nine management processors daisy-chained from it to the management VLAN. For optimal security, CSM cluster hardware control functions must be restricted to users with root access by isolating the management server network.

CSM hardware node attributes

CSM hardware planning is facilitated by filling out a table describing all cluster hardware node attribute values; see Table 1 on page 8 for one example. The cluster used in this hardware node attributes example includes 20 nodes; attribute values for the first 16 nodes correspond to the hardware and network configuration shown in Figure 1 on page 3. See Chapter 2, “Remote power software and configuration” on page 9 and Chapter 3, “Remote console software and configuration” on page 17 for detailed descriptions of the attributes described in Table 1 on page 8. See the *IBM CSM for Linux: Software Planning and Installation Guide* for a blank node attributes planning worksheet.

Note: IBM suggests changing the default hardware user IDs and passwords that are shipped with the preinstalled CSM cluster nodes. The hardware control node IDs should each be set to a unique value, such as the short host name of the node. Use the IBM Universal Manageability Services tool (see “Related information” on page v for the URL) to change hardware control node IDs and passwords to unique values for all nodes. Then use the **systemid** command to record the changed ID and password information in the CSM database.

Table 1. Hardware node attributes example

Hostname	*HWControlPoint*	*Power Method*	*HWControl NodeID*	*ConsoleServerName*	*Console Server Number*	*Console Method*	*Console PortNum*
clsn01.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn01	mgtn02.pok.ibm.com	1	esp	0
clsn02.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn02	mgtn02.pok.ibm.com	1	esp	1
clsn03.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn03	mgtn02.pok.ibm.com	1	esp	2
clsn04.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn04	mgtn02.pok.ibm.com	1	esp	3
clsn05.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn05	mgtn02.pok.ibm.com	1	esp	4
clsn06.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn06	mgtn02.pok.ibm.com	1	esp	5
clsn07.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn07	mgtn02.pok.ibm.com	1	esp	6
clsn08.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn08	mgtn02.pok.ibm.com	1	esp	7
clsn09.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn09	mgtn02.pok.ibm.com	1	esp	8
clsn10.pok.ibm.com	mgtn03.pok.ibm.com	netfinity	clsn10	mgtn02.pok.ibm.com	1	esp	9
clsn11.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn11	mgtn02.pok.ibm.com	1	esp	a
clsn12.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn12	mgtn02.pok.ibm.com	1	esp	b
clsn13.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn13	mgtn02.pok.ibm.com	1	esp	c
clsn14.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn14	mgtn02.pok.ibm.com	1	esp	d
clsn15.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn15	mgtn02.pok.ibm.com	1	esp	e
clsn16.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn16	mgtn02.pok.ibm.com	1	esp	f
clsn17.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn17	mgtn06.pok.ibm.com	n/a	cps	1
clsn18.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn18	mgtn06.pok.ibm.com	n/a	cps	2
clsn19.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn19	mgtn06.pok.ibm.com	n/a	cps	3
clsn20.pok.ibm.com	mgtn04.pok.ibm.com	netfinity	clsn20	mgtn06.pok.ibm.com	n/a	cps	4

Chapter 2. Remote power software and configuration

Once CSM cluster hardware and networking is configured as required, CSM software must be installed and configured to enable remote power functions. The CSM **installms** command installs the required **csm.server** package, including the **/opt/csm/bin/rpower** remote power command, on the management server. For detailed CSM installation instructions, see the *IBM CSM for Linux: Software Planning and Installation Guide*. For detailed command usage information, see the **installms**, **definenode**, and **rpower** man pages or the *IBM CSM for Linux: Administration Guide*.

Remote power software

The CSM management server communicates with hardware control points through the IBM Distributed Management Server (DMS) resource manager (IBM.DMSRM). The DMS resource manager supports IBM hardware control libraries and customized programs or scripts. IBM hardware control libraries manage the IBM RSA hardware control point. Customized programs or scripts are required to manage other hardware control points. Each library (or script) is responsible for communicating to the hardware control point and making the request for the hardware action. The library or script returns the action request results to the DMS resource manager, which returns the information to the user.

Remote power configuration

To configure remote power, the default hardware control point user IDs and passwords must be changed using the utility disks and documentation provided with the hardware. For MPs and MPAs the default user ID shipped with the system is ″USERID″ and the default password is ″PASSW0RD″ (P-A-S-S-W-zero-R-D). When a user runs the **rpower** command, the user ID and password information is automatically retrieved and decrypted. The **rpower** command is run from the management server only to restrict remote power to users with root access.

The MP and MPA user IDs and passwords stored for nodes on the management server must match the nodes' physical user IDs and passwords in the hardware. The **systemid** command must be run once for each MP and MPA to encrypt password information on the management server. Password files generated by the **systemid** command have the following properties:

```
Directory location: /etc/opt/csm/system_config

File permissions (owner/group and permissions):  root/root read-only.
For example, -r------- 1  root root 20 May 3 12:31 9.111.111.11

Naming convention: IP Address of host (if resolvable). For example, 9.111.111.11;
otherwise, the node ID specified (for example, node01).
```

The following examples show how to create system IDs on the management server (all examples will prompt for a valid password):

1. To create a system ID for *HWControlPoint* clsn05.pok.ibm.com, enter:

   ```
   systemid clsn05.pok.ibm.com USERID
   ```

2. To create a system ID for a node with node ID clsn07, enter:

   ```
   systemid clsn07 USERID
   ```

3. To verify that the system IDs have been created, enter:

   ```
   systemid
   ```

   Output should be similar to:

   ```
   9.001.001.01        USERID
   clsn06.pok.ibm.com  USERID
   ```

The remote power *PowerMethod* library type provided with CSM for Linux is *netfinity*. The *HWControlNodeID* attribute must contain the value shown in Table 2 based on the *PowerMethod* library type used:

Table 2. Hardware control attribute values

HWControlPoint **attribute**	*HWControlNodeID* **attribute**	*PowerMethod* **library**
host name of the IBM xSeries RSA PCI MPA	text ID associated with MP or MPA	*netfinity*

The following example shows how to change a management processor (MP) hardware text ID, user ID, and password using a Web browser session. For detailed information on the Cluster 1300 see the IBM Linux clusters hardware Web site listed in "Related information" on page v. To change the text ID, user ID, and password of an MP in a cluster node:

1. Use a Web browser to open a session to the RSA controller's IP address. You will be prompted for a user ID and password. Use the default user name and password to log in:

   ```
   User Name: USERID
   Password: PASSW0RD (P-A-S-S-W-zero-R-D)
   ```

2. Click the **Continue** button.
3. Click the **Access Remote ASM** button. You should see the nodes controlled by this MPA.
4. Choose a node from the ASM **Name** list and click **login** to establish a session on the target node. Use the default user name and password to log in:

   ```
   User Name: USERID
   Password: PASSW0RD (P-A-S-S-W-zero-R-D)
   ```

5. You should see a status window for the node. Click **ASM Control => System Settings**. Change the text ID for the node in the **Name** window and click **Save**.
6. Click **ASM Control => Login Profiles**. Click on a profile with a USERID login ID, change the login ID, and reset the password. Click **Save**. Repeat this step to change additional profiles.
7. Click **Log Off Remote ASM** to return to the **Remote ASM Access** window.

To change log in information for an IBM RSA management processor adapter (MPA), perform the above steps but skip steps 3 and 4.

Remote power attributes

CSM remote power functions require attributes to be defined in the CSM database for the specific hardware control points used in the cluster. When new nodes are defined in a cluster using the **definenode** command, the required *PowerMethod*, *HWControlPoint*, and *HWControlNodeID* attributes are created in the CSM database. See the *IBM CSM for Linux: Software Planning and Installation Guide* or the man page for **definenode** command examples.

PowerMethod The *PowerMethod* attribute specifies the type of hardware control points used in the cluster. The *PowerMethod* attribute value specifies which power method library the **rpower** command will use to control power functions on that node.

HWControlPoint
The *HWControlPoint* attribute specifies the short host name, long host name, or IP address of the Ethernet connection for the MPA. For IBM xSeries systems the MPA or hardware control point is the Ethernet connection to the IBM RSA PCI. The attribute value is passed from the **rpower** command to the corresponding *PowerMethod* library to contact the target node.

HWControlNodeID
The *HWControlNodeID* attribute specifies the IBM xSeries MP or MPA hardware text ID of the target node for the **rpower** hardware control action. The node's *HWControlNodeID* attribute value is passed through the *netfinity* library.

Setting a node's *HWControlNodeID* attribute to the short host name of the node can simplify the node definition process. The following **definenode** command example defines the node short host names as the *HWControlNodeID* attribute values. If the *HWControlNodeID* attribute values were not set to the node short host names, then the **nodedef** file would be used to specify each attribute value. If a node's *HWControlNodeID* is the short host name, then the following command can be run once to define all nodes attached to the hardware control point:

```
definenode -n clsn01.pok.ibm.com -c 20 -H mgtn03.pok.ibm.com:10,- mgtn04.pok.ibm.com:10 \
-C mgtn02.pok.ibm.com:1:0:16 mgtn05.pok.ibm.com:2:0:16 PowerMethod=netfinity ConsoleMethod=esp.
```

All *HWControlNodeID* node attribute values attached to a hardware control point must be unique. For xSeries 330 and 342 nodes, the *HWControlNodeID* value must match the text ID set in the hardware. If *HWControlNodeID* values are changed to the short host names of the nodes, then the **systemid** command must be subsequently run to correctly set the new user ID and password information in the CSM database.

Using remote power with other hardware

If a hardware control point other than those listed in Table 2 on page 10 is used, then additional software and configuration is required to enable remote power functions. Each hardware control point must have an associated Perl or shell command for communicating with the management server. The *PowerMethod* attribute for a node must be set accordingly by the **definenode** command when the node is defined. A corresponding *PowerMethod*_**power** command must also be provided. For example, if the *PowerMethod* attribute on a node is set to *vendor1*, then **rpower** will attempt to access a **vendor1_power** command to carry out remote power requests. Each node's *HWControlPoint* attribute must be set to the value expected by the *PowerMethod*_**power** command using the **definenode** command. For command usage examples see the **definenode** man page and the *IBM CSM for Linux: Software Planning and Installation Guide*.

To use remote power with other hardware control points, the following steps are required. In this example, *vendor1* is used as the *PowerMethod* node attribute value:

1. Connect the hardware control points to the management server and nodes on the management VLAN.
2. Specify a value for the *PowerMethod* node attribute: for example, *vendor1*.
3. Use the **definenode** or **chnode** command to set the *PowerMethod* value for each node to *vendor1*.
4. Write a Perl or shell command named **vendor1_power**, and save the command in the **/opt/csm/bin** directory on the management server. The **vendor1_power** command will be run by the **rpower** command for nodes with *PowerMethod* attribute values set to *vendor1*. The **vendor1_power** command will carry out the requested power operation on one node, and must support some or all of the actions that **rpower** supports: **on**, **off**, **reboot**, **query**, **resetsp_host**, and **resetsp_hcp**. Actions not supported by **vendor1_power** should result in an error message written to standard error and a negative value return code. A successful call to **vendor1_power** should result in a return code of 0. The **vendor1_power** Perl or shell command should have root:system ownership and permissions of 5-0-0.

   Note: The Perl or shell command provides the same function that a power method library does for IBM hardware. A power method library is not required for non-IBM hardware.
5. The **vendor1_power** command will be passed the following parameters in the order shown:
   a. *option_string* (**-v** only)
   b. *Hostname* value
   c. *HWControlPoint* value
   d. *HWControlNodeID* value
   e. action (**on**, **off**, **reboot**, **query**, **resetsp_host**, or **resetsp_hcp**).

Testing remote power hardware control

To ensure the cluster is configured correctly, all CSM remote power hardware control functions should be tested before using them in a production environment. The **rpower** command should be run with the **query**, **power on**, **power off**, **reboot**, **resetsp_host**, and **resetsp_hcp** options to verify that all nodes are configured correctly and are responding accordingly. See the **rpower** man page or the *IBM CSM for Linux: Administration Guide* for examples.

Node power status is determined by polling. The *PowerStatus* attribute value is the status returned from polling MPs and MPAs: **on**, **off**, or **unknown**. The polling interval is set to 300 seconds by default, but can be changed if required using the **chrsrc** command.

The following examples provide some methods for testing remote power configuration:

1. To view current attribute values for nodes in a cluster, enter the following command on the management server:

   ```
   lsnode -l
   ```

   Output for each node in the cluster is similar to:

   ```
   ManagementServer = csmlinux.pok.ibm.com
   Mode = PreManaged
   Name = clsn02.pok.ibm.com
   NodeNameList = {csmlinux.pok.ibm.com}
   PowerMethod = esp
   PowerStatus = on
   Status = on
   UniversalId = 0
   UpdatenodeFailed = 0
   ------------------
   Hostname = clsn03.pok.ibm.com
   AllowManageRequest = 0 (no)
   CSMVersion =
   ConfigChanged = 0 (no)
   ConsoleMethod = esp
   ConsolePortNum =
   ConsoleServerName = clsn03.ppd.pok.ibm.com
   ConsoleServerNumber =
   HWControlNodeId = clsn03_NODEID
   HWControlPoint = clsn03.ppd.pok.ibm.com
   HWModel =
   HWSerialNum =
   HWType =
   InstallAdapterDuplex =
   InstallAdapterMacaddr = 00:00:00:00:00:00
   InstallAdapterSpeed =
   InstallAdapterType =
   InstallCSMVersion = 1.2.0
   InstallDisk =
   InstallDiskType =
   InstallDistributionName = RedHat
   InstallDistributionVersion = 7.2
   InstallKernelVersion =
   InstallMethod = kickstart
   InstallOSName = Linux
   InstallPkgArchitecture = i386
   LParID =
   LastCFMUpdateTime =
   ManagementServer = csmlinux.pok.ibm.com
   Mode = PreManaged
   Name = clsn03.pok.ibm.com
   NodeNameList = {csmlinux.pok.ibm.com}
   PowerMethod = esp
   ```

```
PowerStatus = on
Status = on
UniversalId = 0
UpdatenodeFailed = 0
```

2. To power on multiple cluster nodes simultaneously, enter:

```
rpower -n clsn01,clsn07,clsn13,clsn20 on
```

3. To change the power status polling interval to the minimum allowed value of 30 seconds, enter:

```
chrsrc -s 'Name=="clsn07.pok.ibm.com"' IBM.HwCtrlPoint PollingInterval=30
```

Remote power diagnostics

The following examples show problems and solutions for specific instances of using remote power:

1.

Problem: Connectivity to the target hardware control point cannot be established.

Description: Attempts to use trace routes or ping to the target hardware control point are unsuccessful. Connectivity from the management server to the target hardware control point cannot be established.

Action: Contact your network administrator and check the hardware connectivity documentation to diagnose and solve the network connectivity problem.

2.

Problem: Cannot log in to the target hardware control point.

Description: Connection to the targeted hardware control point cannot be established. Attempts to log in to the targeted hardware control point were unsuccessful or returned an error.

Action: Confirm that the **filename** user ID and password file for hardware control points exists in the **pathdirname** directory. Confirm that the user ID and password for the user are entered and encrypted correctly.

3.

Problem: Java interface error for method <action>: communication session is not valid.

Description: The hardware control library successfully logged in to the service processor specified by the node *HWControlPoint* attribute, but could not log in to the node's service processor.

Action: Confirm the user ID and password for the hardware control node ID for the node and rerun the **systemid** command with the correct user ID and password.

4.

Problem: Java interface error for method <action>: node not found.

Description: The hardware control point specified by the node *HWControlPoint* attribute is not configured to control this node.

Action: Check the CSM configuration to ensure the specified node *HWControlPoint* and *HWControlNodeID* attributes are correct for the node. If correct, ensure that the hardware control point service processor is configured correctly to control the node.

5.

Problem: Java interface error for method <connect>: service processor host name is not valid.

Description: The service processor specified by the node's *HWControlPoint* attribute is not valid for the node's *PowerMethod* attribute specified.

Action: Verify that the node *HWControlPoint* and *PowerMethod* attributes are valid for the node using the **lsnode -F** *<Hostname>* command. If they are not correct, change

them using the **chnode** *<Hostname>* **HWControlPoint=***<HWControlPoint>* **PowerMethod=***<PowerMethod>* command.

6.

Problem: Java interface error for method <connect>: SPException.

Description: The hardware control library was unable to log in to the service processor specified by the node *HWControlPoint* attribute.

Action: Confirm the user ID and password for the hardware control point and run the **systemid** command again with the correct user ID and password.

7.

Problem: Could not perform action because one or more *HWControlPoint*, *HWControlNodeId*, and *PowerMethod* attributes are not set.

Description: For the command to work properly the *HWControlPoint*, *HWControlNodeId* and *PowerMethod* attributes must be defined.

Action: Verify that the *HWControlPoint*, *HWControlNodeId*, and *PowerMethod* attributes are defined using the **/opt/csm/bin/lsnode -F** *<hostname>* command. If these attributes are not set, then set them to their correct values using the **/opt/csm/bin/chnode** command and rerun the **rpower** command.

8.

Problem: Could not load hardware control library.

Description: CSM hardware control requires the *PowerMethod* attribute be set ″netfinity″ for an IBM xSeries controlled node. The hardware control library corresponding to this attribute must also reside in **/opt/csm/lib**. For example, if the power method is *netfinity* then the hardware control library must be **/opt/csm/lib/libnetfinity_power.so**.

Action: Verify that the *PowerMethod* attribute is set correctly using the **chnode -F <Hostname>** command. For an IBM xSeries node, the power method value must be ″netfinity″. If it is not correct then set the value using the **chnode <Hostname>PowerMethod=netfinity** command. If the power method is set correctly, then verify that the **/opt/csm/lib/libnetfinity_power.so** library exists. If it does not, then reinstall the **csm.server** package.

9.

Problem: The hardware control point address specified is not valid.

Description: The hardware control library could not resolve the host name or IP address of the service processor specified by the *HWControlPoint* attribute.

Action: Verify that the *HWControlPoint* attribute is valid for the node and that the management server can reach the node.

10.

Problem: The *Hostname* attribute value specified for the node is not valid.

Description: The specified host name is not a defined node resource.

Action: Verify that the node specified by the *Hostname* attribute is a node resource using the **lsnode** *<Hostname>* command. If it is not valid then choose a valid node returned by the **lsnode** command or add the host name as a node resource.

11.

Problem: Cannot run the command because the IBM.DMSRM resource manager is not available.

Description: The **rpower** command could not make a connection to the IBM.DMSRMd daemon.

This daemon contains the IBM.NodeHWCtrl and IBM.HwCtrlPoint resource classes. The **rpower** command runs actions on these resource classes which in turn calls the appropriate hardware control library.

Action: Ensure that the IBM.DMSRM daemon is running on the management server using the **lssrc -s IBM.DMSRM** command. If the output status field is ″inoperative″ then start the daemon using the **startsrc -s IBM.DMSRM** command.

12.

Problem: Could not find hardware control point for the node.

Description: There is no corresponding hardware control point resource for the *HWControlPoint* attribute. This is an internal error that should not occur.

Action: Stop the IBM.DMSRMd daemon using the **stopsrc -s IBM.DMSRM** command. Remove the hardware control point resources from the registry table using the **/usr/sbin/rsct/bin/rmsrtbl/IBM/HwCtrlPoint/Resources** command. Restart the IBM.DMSRMd daemon using the **startsrc -s IBM.DMSRM** command. Rerun the command. If this problem persists contact your IBM service representative.

Web and telnet access

Management processor adapters (MPAs) and management processors (MPs) can be controlled through a telnet session or Web browser. To access an MPA or MP using a telnet or Web connection, the http server must be installed and running, and the telnet session or Web browser must be targeted to the host name or IP address of the hardware control point. The physical login process for telnet and Web connections is the same as that shown in Figure 1 on page 3. User IDs and passwords are required, and appropriate security measures should be implemented to restrict remote power control to users on the management VLAN, as described in “CSM hardware and network requirements” on page 1. Telnet and Web access provide alternative interfaces for tasks such as debugging.

Remote power logging

Log files are generated by specifying the **-v** flag on hardware control commands such as **rpower**. For example, the command:

```
rpower -v
```

could produce log files similar to the following examples:

An example trace file:

```
--------  Wed May 15 06:43:36 EDT 2002
06:43:36
CLASSPATH=/opt/csm/codebase:/opt/csm/codebase/asmlibrary.jar:/opt/csm/codebase/sniacimom.jar:  \
      /opt/csm/codebase/xerces.jar
06:43:36  LIBPATH=/opt/csm/lib
06:43:36  hardware control point -> clsn01.pok.ibm.com (9.111.111.111)
06:43:36  using default userid/password
06:43:36  connect(9.111.111.111,USERID,********)
06:43:36  >>>>> connect : 274 ms
06:43:36  connect() returns 0
06:43:36  invoke_method (query,clsn01.pok.ibm.com,clsn09)
06:43:36  using default userid/password
06:43:36  searching for clsn09
06:43:36  8 nodes found:
06:43:36   clsn01
06:43:36   clsn02
06:43:36   clsn03
06:43:36   clsn04
06:43:36   clsn05
06:43:36   cl2n06-> found on 485 bus
06:43:37  >>>>> connect485 : 1030 ms
```

```
06:43:37  send_command (query,clsn01.pok.ibm.com,clsn09)
06:43:37  c5n64 state = 4
06:43:38  >>>>> query : 474 ms
06:43:38  query() returns 0
```

An example error file:

```
[9.111.111.11]: com.ibm.sysmgt.lib.exception.DestinationInvalidException
 at com.ibm.sysmgt.lib.comm.IP.DCSocketBase.openDestinationHelper(DCSocketBase.java:178)
 at com.ibm.sysmgt.lib.comm.IP.DCSocketBase.logon(DCSocketBase.java:335)
 at com.ibm.csm.hcnetfinity.Netfinity.connect(Netfinity.java:1443)
```

Command usage with output to stdout:

```
rpower -v -n clsn05.pok.ibm.com query
clsn05.pok.ibm.com on

resource class: IBM.NodeHwCtrl
response for: query
        mc_errnum = 0x00000000
        mc_ffdc_id =
        mc_error_msg =
        SD value is :
                Element 0: type=8, value=clsn05.pok.ibm.com
                Element 1: type=3, value=0
                Element 2: type=8, value=on
```

Chapter 3. Remote console software and configuration

Once cluster hardware and networking is configured as required, CSM software must be installed and configured to enable remote console functions. The **installms** command installs the required **csm.server** package, including the **/opt/csm/bin/rconsole** remote console command, on the management server. For detailed CSM installation instructions, see the *IBM CSM for Linux: Software Planning and Installation Guide*. For detailed command usage information, see the **installms**, **rconsole**, and **definenode** man pages or the *IBM CSM for Linux: Administration Guide*.

Remote console software

The CSM management server communicates with the specific console server types described in this book through the provided console server commands. The management server can communicate with other console server types through customized programs and scripts. Each program or script must communicate to the console server, make the request for the console functions, and return the action request results to the user.

Remote console configuration

IBM supports CSM remote console software environments for the following third-party console server types:

- Avocent CPS1600
- Computone IntelliServer RCM8, RCM24, and RCM48
- Conserver
- Equinox ELS-16 II
- Equinox ESP-8 and ESP-16

The **rconsole** *ConsoleMethod* attribute specifies the software environment used for remote console: *cps*, *computone*, *conserver*, *els*, or *esp*. Each *ConsoleMethod* type also has a corresponding *ConsoleMethod*_**console** command that the **rconsole** command communicates with to control remote console functions. The following table describes the console server types that can be used with CSM, and their associated console method attribute and command.

Table 3. Console server attributes

Console server type	*ConsoleMethod* **value**	*ConsoleServerNum* **value**	*ConsolePortNum* **value**
Equinox ELS-16 II	*els*	not applicable	1-16
Equinox ESP-8; ESP-16	*esp*	1 or more (returned by **espcfg**)	0-7; 0-f
other	*conserver*	not applicable	not applicable
Computone IntelliServer RCM8, RCM24, and RCM48	*computone*	not applicable	1-8; 1-24; 1-48
Avocent CPS1600	*cps*	not applicable	1-16

For more information about these console servers, see the product Web site URLs in “Related information” on page v.

Remote console depends on file changes being made on each node to direct the console to the node’s serial port. These changes, shown in the two examples below, are made automatically when the **csm.client** package is installed on a node. Remote console is activated when the following lines of code in bold text have been added to the **lilo.conf**, **grub.conf**, and **inittab** files during **csm.client** installation:

1. **/etc/lilo.conf** file:

```
boot=/dev/sda
map=/boot/map
install=/boot/boot.b
prompt
timeout=50
message=/boot/message
linear
default=linux
serial = 1,9600n8
append = "console=tty1 console=ttyS1,9600"

image=/boot/vmlinuz-2.4.2-2smp
        label=linux
        initrd=/boot/initrd-2.4.2-2smp.img
        read-only
        root=/dev/sda8

image=/boot/vmlinuz-2.4.2-2
        label=linux-up
        initrd=/boot/initrd-2.4.2-2.img
        read-only
        root=/dev/sda8
```

2. **/etc/grub.conf** file:

```
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition.  This means that
#          all kernel and initrd paths are relative to /boot/, eg.
#          root (hd0,0)
#          kernel /vmlinuz-version ro root=/dev/sda5
#          initrd /initrd-version.img
#boot=/dev/sda
default=0
serial = 1,9600n8
append = "console=tty1 console=ttyS1,9600"
timeout=10
splashimage=(hd0,0)/grub/splash.xpm.gz
title Red Hat Linux (2.4.7-10smp)
        root (hd0,0)
        kernel /vmlinuz-2.4.7-10smp ro root=/dev/sda5
        initrd /initrd-2.4.7-10smp.img
title Red Hat Linux-up (2.4.7-10)
        root (hd0,0)
        kernel /vmlinuz-2.4.7-10 ro root=/dev/sda5
        initrd /initrd-2.4.7-10.img
```

3. **/etc/inittab** file:

```
s1:345:respawn:/sbin/agetty 9600 ttyS1 xterm
```

See the *IBM CSM for Linux: Software Planning and Installation Guide* for software installation details.

Remote console hardware configuration

Attention!

The hardware configuration tips in this section are provided as a convenience only. These tips are not a replacement for reading and using the installation and configuration documentation provided with the specified remote console hardware.

ELS configuration

1. Connect a serial terminal or terminal emulator to port 1 of the ELS console device. Set the terminal to 9600 bps; 8-bit data; No Parity; 1 stop bit. Press the return key to get an ELS login prompt.

2. Login as root. IBM suggests changing the default user IDs and passwords shipped with external devices since failure to do so could compromise cluster security.
3. At the ″Local″ prompt enter privileged mode by typing ″set priv″. When prompted for a password, enter ″system″.
4. Reset the current ELS configuration by entering ″init database″.
5. Enter the following required information:

```
change server ip <desired IP address of ELS>
change server subnet mask <desired mask>
change node gw ip <default gateway IP address> gateway en
```

   For example:

```
change server ip 123.45.67.89
change server subnet 255.255.255.0
change node gw ip 123.45.67.1 gateway en
```

6. Disconnect the serial terminal and connect the ELS to the network. Telnet to the ELS and press return to get a ″#″ prompt. Type ″access″ to get a ″Local″ prompt, then enter the ″set priv″ command and password as described in step 3.
7. The ELS ports must be set to Reverse Telnet mode to work properly with CSM remote console. Set the ELS ports to Reverse Telnet by entering the following:

```
define port 1-16 access remote
define port 1-16 flow control xon
define port 1-16 speed 9600 lo port 1-16
```

8. Enter ″exit″ to quit.

ESP configuration

The ESP console device requires the installation of software and drivers that are shipped with the device. Once these are installed the device can be configured using the **espcfg** command. Refer to the ESP device installation instructions for details.

CPS configuration

The CPS 1610 console device requires a firmware level of 1.5 or higher to work properly with CSM remote console.

1. Connect a serial terminal or terminal emulator to port 1 of the CPS console device. Set the terminal to 9600 bps; 8-bit data; No Parity; 1 stop bit. Press return until prompted for a user name.
2. Enter ″Admin″ as the user name and press return. Press return again at the password prompt; there is no initial password for the Admin user. IBM suggests changing the default user IDs and passwords shipped with external devices since failure to do so could compromise cluster security.
3. For initial configuration, the CPS will prompt for an IP address, subnet mask, and Admin password. Enter this information, pressing return after each item.
4. After all the required information is entered, the configuration will be saved. Complete the network configuration by entering the following command:

```
SERVER SET IP=<CPS IP Address> MASK=<subnet mask> GATEWAY=<Default gateway IP address>
```

5. For CSM remote console to work properly with the CPS console device, user authentication must be disabled for the device by entering the following:

```
SERVER SECURITY AUTHENTICATION=NONE
```

6. Quit by entering ″quit″. Disconnect the terminal and connect the CPS to the network.

A CPS device does not require explicit configuration to set the ports to Reverse Telnet mode. However, by default the CPS serial Command Line Interface (CLI) is enabled on CPS port 1. Any CPS ports that have the CLI enabled cannot be used for Reverse Telnet, and therefore will not work with CSM remote console.

If the default CLI setting is not changed, CPS port 1 will not be available for remote console access. See the CPS documentation for information on the CLI settings.

Computone configuration

The Computone console device requires a firmware level of 1.6.002 or higher to work with CSM remote console.

1. Connect a serial terminal or terminal emulator to the console port of the Computone console device. Set the terminal to 9600 bps; 8-bit data; No Parity; 1 stop bit. Press return until prompted for a user name.
2. Enter ″root″ as the user name and ″root″ as the password. IBM suggests changing the default user IDs and passwords shipped with external devices since failure to do so could compromise cluster security.
3. At the prompt, enter ″config″ to enter the configuration utility. The prompt should change to ″config #″.
4. Enter the console device's IP address and subnet mask as follows:

   ```
   set ether address <Computone IP Address>/<# of bits in mask>
   ```

   The device's IP address and subnet mask are entered in a single string. The subnet mask is entered as the number of bits that are set in the mask, and is appended to the IP address by a forward slash (/). Each of the four parts of the subnet mask is composed of eight bits, for a possible maximum of 32 bits set. For example, if the subnet mask is 255.255.255.0, the number of bits set is 8 + 8 + 8 + 0 = 24 bits. If the mask is 255.255.255.192, the number of bits set is 8 + 8 + 8 + 2 = 26 bits. If the device IP address is 123.45.67.89, and the subnet mask is 255.255.255.192, then you would enter the following command:

   ```
   set ether address 123.45.67.89/26
   ```

5. Enter the default gateway information as follows:

   ```
   set gateway 0 destination 0.0.0.0 gateway <Default Gateway IP address>/<# of bits in mask>
   ```

   The gateway address requires the subnet mask also, and is entered as it was for the device IP address in step 4. If the gateway address is 123.45.67.1, and the subnet mask is 255.255.25.192, enter the command:

   ```
   set gateway 0 destination 0.0.0.0 gateway 123.45.67.1/26
   ```

6. Configure the serial ports for Reverse Telnet as follows:

   ```
   set port 1 type "reverse tcp"
   ```

   Repeat this step for ports 2 - 8. Note that Computone refers to Reverse Telnet as ″Reverse TCP″.
7. Enable the telnet interface as follows:

   ```
   set apps telnetd enabled
   ```

8. Enter ″exit″ to return to the system prompt. Enter ″save″ to save the settings. Enter ″exit″ once more to terminate the session.
9. Disconnect the terminal and attach the Computone device to the network.

Conserver configuration

Conserver is an open source package that adds features to console management. Details are available at the Conserver Web site (see “Related information” on page v). To use Conserver with CSM remote console, the Conserver source code must be downloaded and compiled. The resulting Conserver daemon must be run on the management server, and the Conserver configuration file **conserver.cf** must be modified to include entries for each of the consoles that will be managed by Conserver. The node names for these entries must match the *Hostname* attribute in the CSM database, and the *ConsoleMethod* attribute for each node must be set to ″conserver″.

Remote console attributes

CSM remote console uses a *ConsoleMethod*_**console** command which specifies the type of console servers used in the cluster. When new nodes are defined in the cluster using the **definenode** command, a *ConsoleMethod* attribute is set for each new node in the CSM database. The *ConsoleMethod* attribute dictates which *ConsoleMethod*_**console** command **rconsole** will use for each node.

The *ConsoleServerName* attribute value specifies the short host name, long host name, or IP address of the console server used for the node.

The *ConsoleServerNumber* attribute (applicable to Equinox ESPs only) is the number assigned by the Equinox configuration tool when the ESP console is defined. The attribute value is passed from the **rconsole** command to the **esp_console** command corresponding to the target node. The attribute value must be the sequence number assigned to the Equinox ESP providing remote console for the target node. The **espcfg** command displays the current sequence number value.

The console port number *ConsolePortNum* attribute is passed from the **rconsole** command to the *ConsoleMethod*_**console** command to contact the target node. The console port number is the physical port that the node's serial port is connected to in the console server hardware. See Table 3 on page 17 for the console server types that can be used with CSM and the *ConsoleMethod* attribute and *ConsoleMethod*_**console** command required for each type.

Using remote console with other hardware

If console server types other than those listed in Table 3 on page 17 are used, then additional software and configuration is required to enable remote console functions. The *ConsoleMethod*, *ConsoleServerName*, *ConsoleServerNumber*, and *ConsolePortNum* attributes for each node must be set to the values expected by the corresponding *ConsoleMethod*_**console** command. For example, if the *ConsoleMethod* attribute for a console server is set to *termservX*, then **rconsole** would attempt to run **/opt/csm/bin/termservX_console** to carry out remote console requests.

To use other console servers with CSM the following steps are required. In this example, *termservX* is used as the *ConsoleMethod* node attribute value. The **termservX_console** command is used by the **rconsole** command to connect to the target node. The console method must print the *ConsoleMethod*_**console** command required to connect to the target node through the console server.

1. Connect the console servers to the management server and nodes on the management VLAN.
2. Specify a value for the *ConsoleMethod* node attribute: for example, *termservX*.
3. Use the **definenode** or **chnode** command to set the *ConsoleMethod* value for each node to *termservX*.
4. Write a Perl or shell command named **termservX_console** and save the command in the **/opt/csm/bin** directory on the management server. The **termservX_console** command must construct the command line required to access the target node's console through the termserver_X hardware and write the command output to stdout. The **termservX_console** Perl or shell command should have root:system ownership and permissions of 5-0-0.
5. The **rconsole** command invokes a **termservX_console** command, which will be passed the following parameters in the order shown:
   a. *ConsoleServerName* value
   b. *Hostname* value
   c. *ConsoleServerNumber* value
   d. *ConsolePortNum* value.

Testing remote console hardware control

To ensure that the cluster is configured correctly, all remote console hardware control functions should be tested before using them in a production environment. Run the **rconsole** command to verify that all nodes are configured correctly and are responding accordingly. See the **rconsole** man page or the *IBM CSM for Linux: Administration Guide* for detailed examples.

1. To view current attribute values for nodes in a cluster, enter the following command on the management server:

   ```
   lsnode -l
   ```

   Output for each node in the cluster is similar to:

   ```
   ManagementServer = csmlinux.pok.ibm.com
   Mode = PreManaged
   Name = clsn02.pok.ibm.com
   NodeNameList = {csmlinux.pok.ibm.com}
   PowerMethod = netfinity
   PowerStatus = on
   Status = on
   UniversalId = 0
   UpdatenodeFailed = 0
   ------------------
   Hostname = clsn03.pok.ibm.com
   AllowManageRequest = 0 (no)
   CSMVersion =
   ConfigChanged = 0 (no)
   ConsoleMethod = esp
   ConsolePortNum =a
   ConsoleServerName = clsn03.pok.ibm.com
   ConsoleServerNumber =1
   HWControlNodeId = ppsclnt3_NODEID
   HWControlPoint = clsn03.pok.ibm.com
   HWModel =
   HWSerialNum =
   HWType =
   InstallAdapterDuplex =
   InstallAdapterMacaddr = 00:00:00:00:00:00
   InstallAdapterSpeed =
   InstallAdapterType =
   InstallCSMVersion = 1.2.0
   InstallDisk =
   InstallDiskType =
   InstallDistributionName = RedHat
   InstallDistributionVersion = 7.2
   InstallKernelVersion =
   InstallMethod = kickstart
   InstallOSName = Linux
   InstallPkgArchitecture = i386
   LParID =
   LastCFMUpdateTime =
   ManagementServer = csmlinux.pok.ibm.com
   Mode = PreManaged
   Name = ppsclnt3.pok.ibm.com
   NodeNameList = {csmlinux.pok.ibm.com}
   PowerMethod = netfinity
   PowerStatus = 128 on
   Status = 127 on
   UniversalId = 0
   UpdatenodeFailed = 0
   ```

2. Before running the **rconsole** command for an Equinox console server, check that the following attributes are set correctly. For example, enter:

   ```
   lsnode -l clsn03
   ```

   Output should include:

```
ConsoleServerName = clsn03.pok.ibm.com
ConsoleMethod = esp
ConsoleServerNumber = 1
ConsolePortNum = a
```

3. To open console windows for multiple nodes using the short host name, long host name, or IP address, enter:

   ```
   rconsole -n clsn03,clsn09,clsn15,clsn19
   ```

4. To open a console session to each of the nodes defined in the CSM cluster, enter:

   ```
   rconsole -a
   ```

5. To open windows for each host defined in the given node groups, enter:

   ```
   rconsole -N nodegrp1, nodegrp2
   ```

6. To start a console session to the specified host in the current window, enter:

   ```
   rconsole -t -n clsn03
   ```

Remote console diagnostics

The following examples show problems and solutions for specific instances of using remote console:

1.

   Problem: Connection refused.

   Description: The remote console device is not accepting connections.

   Action: This indicates a potential network problem or a problem with the console device. Ping the IP address of the console device. If the ping is successful, try to telnet directly into the device. If a direct telnet is refused, check that the console device's IP address is not active elsewhere on the network. Reset the console device and check its TCP/IP settings. If the direct telnet succeeds, verify that the IP address of the console device matches the value entered in the CSM database.

2.

   Problem: A remote console window opens, but then immediately closes and no messages are displayed.

   Description: An error occurred during connection to the remote console session. The error could have been written to the remote console window, but the window was immediately closed when the session ended prematurely.

   Action: Rerun the **rconsole** command with the **-t** flag. This forces **rconsole** to open the console session in the current window, and should allow the error to be viewed.

3.

   Problem: A remote console window opens, but no console prompt is displayed.

   Description: The remote console device cannot establish a connection through the node's serial port.

   Action: Verify that the target node is powered on. Check the connection between the target's serial port and the console device. Verify that the *ConsolePortNum* attribute value configured in the CSM database for this node matches the actual port the target is plugged into. If the target node is accessible, run the **ps -ef** command to list the processes running, and look for a ″getty″ entry for the serial port the console device is connected to. Verify that the **/etc/inittab** file contains an entry to start the getty session on this port at system boot. Verify that the boot loader entries for remote console in the **lilo.conf** or **grub.conf** file are correct.

4.

   Problem: Incorrect argument on **-n** or **-N** flag.

Description: The argument supplied with the **-n** or **-N** flag is not valid.

Action: Verify the list of node names or node groups supplied does not start or end with a comma.

5.

Problem: Missing option.

Description: An option switch was encountered with no option, such as **rconsole - node1**, instead of **rconsole -n node1**.

Action: Verify that all option flags are complete.

6.

Problem: The CSM command could not resolve one or more of the specified node groups.

Description: A node group specified with the **-N** flag could not be resolved.

Action: Verify the node group name was entered correctly, or use the **nglist** command to verify that the node group exists.

7.

Problem: Too many arguments specified.

Description: Flags were specified on the command line that are not valid for the specified command.

Action: Verify the command syntax and ensure that only valid flags are specified.

8.

Problem: The **rconsole** node list environment variable RCONSOLE_LIST is not set.

Description: If a node list or node group list is not specified on the command line, **rconsole** checks the RCONSOLE_LIST environment variable for the name of the file that contains a list of nodes.

Action: Either enter a node list with the **-n** option, a node group with the **-N** option, or create a file with the list of nodes to use and set the RCONSOLE_LIST environment variable to the name of this file.

9.

Problem: The **rconsole** window font size is too small.

Description: Using the **rconsole -a** command on a system with more than four nodes caused the default console font size to be set too small.

Action: Set the RCONSOLE_FONT environment variable to a fixed or desired value. The exact syntax depends on your shell. For example, enter:

```
export RCONSOLE_FONT=fixed
```

10.

Problem: Could not open node list file.

Description: The node list file was specified in RCONSOLE_LIST but could not be opened.

Action: Verify that the filename in RCONSOLE_LIST is correct and has read permissions set.

11.

Problem: The CSM **lsnode** command is not installed.

Description: The **lsnode** command is not available. The **rconsole** command uses **lsnode** to acquire node attribute information, and cannot proceed if the command is not available.

Action: **lsnode** is a program in the **csm.server** package. Contact your system administrator to verify CSM installation.

12.

Problem: CSM **lsnode** command error.

Description: The **lsnode** command was run to acquire node attribute information, but did not complete successfully.

Action: Determine and resolve the problem with **lsnode**. Run **lsnode** from the command line without arguments to check the error results.

13.

Problem: Could not resolve a host name.

Description: One or more of the host names specified could not be resolved.

Action: Verify the host names are specified correctly and can be resolved on the network by the **-n** flag, the **-N** flag, or by the file specified by the RCONSOLE_LIST environment variable.

14.

Problem: A *ConsoleMethod* attribute is missing in the CSM database.

Description: The specified node does not have an entry in the CSM database for the *ConsoleMethod* attribute.

Action: Use the **lsnode** command with the **-l** flag to verify the entry for *ConsoleMethod* for this node. If necessary, use the **chnode** command to add the *ConsoleMethod* attribute value to the CSM database.

15.

Problem: A console command does not exist.

Description: The **rconsole** command requires a console command corresponding to the name of the *ConsoleMethod* in the CSM database. This console command does not exist in the **/opt/csm/bin** directory.

Action: Verify that the console command exists in the **/opt/csm/bin** directory.

16.

Problem: Running a command resulted in a non-zero return code. The command continued.

Description: The **rconsole** command invokes a console command for each node. A console command did not complete successfully for one of the nodes. Processing will continue for any other nodes that were specified.

Action: Determine the error being returned by the console command and contact IBM support.

17.

Problem: The remote console **xinit** command did not complete successfully.

Description: The **rconsole** command attempts to open a console by opening a new xterm session. The xterm session could not be started.

Action: Resolve the problems with **xinit** based on any additional error messages that were provided.

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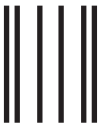

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