

# OpenVMS Technical Journal

## Revision and Configuration Management (RCM) for OpenVMS

Pat Moran, HP Services

### Overview

This article describes the HP Services tool, Revision and Configuration Management (RCM), which collects detailed system configuration information from HP systems at customer sites. The data is stored on the RCM server at HP and is used to create configuration, change, comparison, and analysis reports that the customer and HP account team can access through the Electronic Site Management Guide (eSMG). Customers with valid service contracts access their own information using encrypted (https) connections.

RCM is available for OpenVMS VAX and Alpha systems from Version 6.2 through Version 7.3-2, as well as for HP Tru64 UNIX, Windows NT/2000 and HP-UX systems. This paper describes the RCM architecture and focuses on the design of the RCM OpenVMS collector. It describes the main features of the RCM reports, such as recommendations for critical patches as well as detailed information including the following:

- Disk and tape devices on the system
- Installed software and patches
- Firmware revision levels; hardware part numbers and revision levels
- SAN controller details and topology map
- Enterprise Virtual Array (EVA) configuration reports.

By collecting system configuration information on a regular schedule, RCM change reports make it possible for the customer and HP Service personnel to quickly diagnose problems that configuration changes might have introduced.

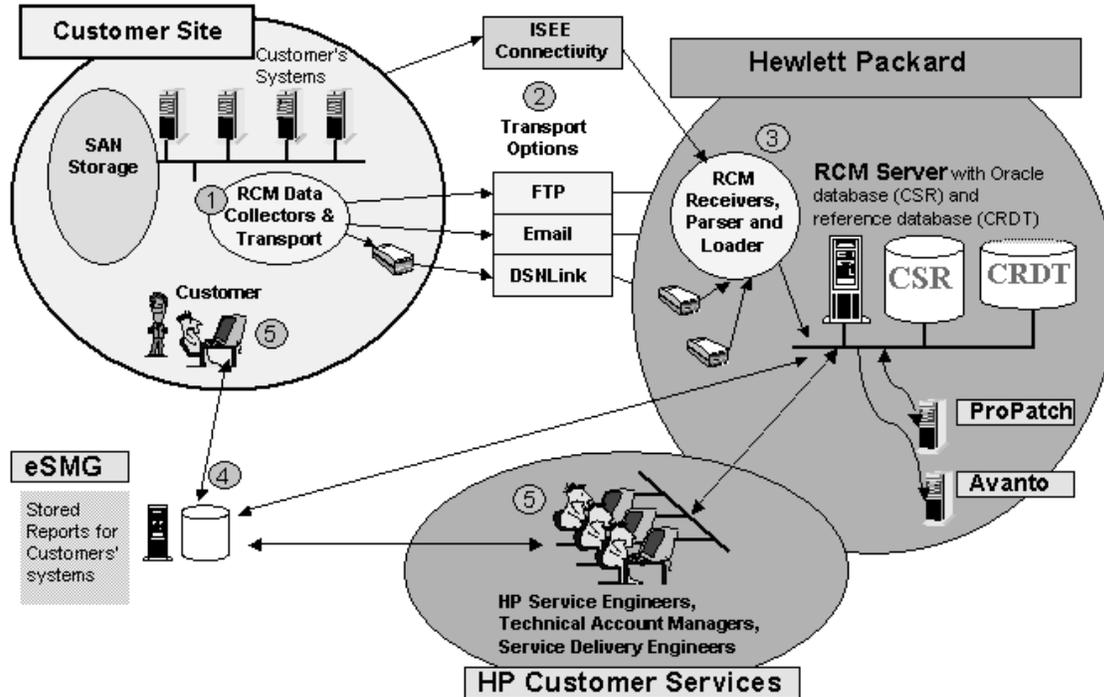
RCM, which was developed by the HP Mission Critical and Proactive Services group, has been deployed on thousands of OpenVMS systems worldwide and is a key part of the HP Services portfolio.

### RCM Architecture

Figure 1 illustrates the overall RCM architecture. Numbers correspond to numbers in the figure.

1. The RCM data collector is installed on a system at a customer site and gathers selected information from the system software.
2. The collected information is transported to the RCM Server at HP using DSNlink, Email or FTP. DSNLink is currently being retired as a transport mechanism; however, future releases of RCM will use the HP Instant Support Enterprise Edition (ISEE) to transport RCM data securely from the customer site to HP.
3. At the RCM server, the parser-loader software processes the collected information, verifying that the information conforms to the necessary standard (system type, revision, format, and so on) before loading it into the Configuration Snapshot Repository (CSR) database. This database is used as the source of information for various RCM reports. The Configuration Reference Database (CRDT), an additional database that is maintained on the RCM server, contains product reference information such as current hardware revisions.

4. The Electronic Site Management Guide (eSMG) serves as a repository for RCM reports, system healthcheck reports, availability statistics, contact information, and any additional site-related documents that the customer wants to store.
5. Customers and HP Technical Account Managers (TAMs) can access eSMG through a web-based user interface to request reports for specific customer systems. These reports can be used to track historical changes or to make comparisons with a reference system.



**Figure 1 RCM Architecture**

## RCM Security

The Electronic Site Management Guide incorporates security features to ensure that customer information stored in the eSMG remains confidential. Each customer's information is accessible only by authorized members of the HP Mission-Critical and HP support team in charge of that customer. Customer access to the eSMG is reserved to customers who have valid service contracts.

Authorized customers can access their data from the Internet through a secured port using an SSL 3.0 protocol and 128-bit key. All information sent and received over the Internet is encrypted. Customers access their personal information using a personal username and password that an HP representative provides. By default, Internet access to customer information is set to read-only mode.

Initially, only the Technical Account Manager assigned to a customer and the eSMG administrator have access to customer data. Granting access to the customer information to additional HP Services employees requires the approval of the TAM.

## Access IDs

All data stored in the RCM Server is secure. The RCM server and eSMG use access identifiers to identify data collections and to control access to these collections. An identifier is assigned to a system when the RCM collector is configured. As a result, every RCM data collection has an associated access identifier, which represents the system, or group of systems, from which data

was collected. All RCM reports associated with that access identifier are available in eSMG within one hour of the time data is sent from a customer's system.

## RCM Reports

The reports generated by RCM and available from eSMG are the following:

<b>Report Type</b>	<b>Description</b>
Configuration	Displays a detailed inventory of hardware and software components installed on a selected system.
Change	Shows configuration changes that might have occurred on a selected system by comparing data from two different collections from this system.
Comparison	Shows the differences between any two similar systems by comparing data collected from each system. This is useful, for example, to indicate changes between a test and a production system.
Patch	Recommends any patches that should be applied to the system.
Raw Data	The text file that the collector produces for each system. The RCM Server software parses it and loads it into the database.
SAN Configuration	Shows the topology of the SAN as well as configuration data of the devices in the SAN.
EVA	Shows details of the specified EVA devices including the controllers, LUNS, disks, and so on.
AVANTO	An HP availability modeling tool; RCM can generate an input file for the storage portion of a customer's system.

Further explanations and examples of these report types are in the last major section of this paper.

## Collector Installation

The RCM OpenVMS collector consists of a number of Digital Command Language (DCL) command procedures as well as several OpenVMS VAX and Alpha binary executables that parts of the collection require. One node initiates the collection process for all the selected nodes. This node manages the overall collection process and sends the collected data to the RCM server at HP.

The RCM OpenVMS data collector is available as a free download from the HP software depot site and is installed using the POLYCENTER Software Installation Utility. You use the DCL command `PRODUCT INSTALL RCM` to install the kit. By default, RCM will be installed on the system disk, but you can install it on another disk by specifying the `/DESTINATION=device_name:[directory_name]` qualifier.

To de-install RCM, you use the DCL command `PRODUCT REMOVE RCM`.

### **Cluster Installation**

You usually need to install RCM on only one node in a cluster, and it can collect data from all nodes. The only requirement is that each node must have read and write access to the disk on which RCM is installed.

### **Collector Configuration**

The RCM\_START.COM procedure initiates the collection process. Execute this procedure on one node in a cluster.

When you run RCM\_START for the first time, as part of the installation procedure, it prompts for configuration information that is written to a configuration file in the RCM\$DATA directory. By default, the configuration file is named <nodename>.CFG.

The RCM\_START procedure also asks you to select the nodes from which to collect data, and it tries to obtain the serial numbers of the selected systems. On VAX systems and some older Alpha models, it is not possible to obtain the serial number from the operating system; therefore, RCM prompts for the serial number. Because RCM and ESMG use the serial number as part of the identifying information, it is important to enter the number correctly. On newer Alpha systems, the serial number is obtained from the system using the output from the SHOW CPU/FULL command, which is included in the RCM\_START procedure.

The RCM configuration file specifies all aspects of the RCM collection including the following:

- Selected nodes and serial numbers
- Collection frequency
- Date and time of next collection
- Transport option
- SAN switch data collection
- EVA data collection
- Run RCM on reboot
- Number of data collections to archive on the system

You can edit the configuration file using an editor or the built-in editing feature of RCM\_START.

Example 1 shows a sample RCM configuration file.

```

; RCM V5.0-601 Configuration file ALPHA.CFG
; created by RCM_START.COM on node ALPHA1 at 20-APR-2004 16:51:00.09
;
[COMPANY NAME]                xxxxxxxxxxxx
[CONTACT NAME]                xxxx  xxxxx
[CONTACT TELEPHONE]          xxx-xxx-xxxx
[CONTACT EMAIL]              xxx.xxxxx@xxxxxxxx.com
[ACCOUNT MANAGER]            xxxxx  xxxxxx
[ACCOUNT MANAGER EMAIL]      xxxxx.xxxxx@hp.com
[CUSTOMER ACCESS ID]         DEMO
[TRANSPORT OPTION]           DSN
[COLLECTION FREQUENCY]       WEEKLY
[NEXT COLLECTION TIME]       2-MAY-2004 13:53:25.15
[MAX ARCHIVES]               10
[ARCHIVE DIRECTORY]          RCM$ROOT:[RCM_ARCHIVE]
[COLLECTION DIRECTORY]       RCM$ROOT:[DATA]
[FTP AREA]                   rcm.support.compaq.com/to_rcm/
[FTP PROCEDURE]
[EMAIL ADDRESS]              xxx.xxxx@hp.com
[LOCAL SITE]                 Y
[LOCAL TRANSPORT OPTION]     FTP
[LOCAL EMAIL ADDRESS]
[LOCAL HOSTNAME]             xxxxx.xxx.xxxxxx.com
[LOCAL LOGIN]                anonymous
[LOCAL UPLOADDIR]            /pub/vms
[LOCAL FTP PROCEDURE]
[SUPPRESS IP ADDRESSES]     N
[RUN ON REBOOT]              N
[FCT BINARY IMAGE]          N
[DATA FOR ANALYSIS]         F
[SAN SWITCH DATA COLLECTION] Y
[SAN SWITCH SNMPWALK_TIMEOUT] 15
[EVA DATA COLLECTION]      Y
[NODES]                      ALPHA1 , ALPHA2 , ALPHA3 , ALPHA4 , ALPHA5 , ALPHA6
[ALPHA1 SYSTEM SERIAL NUMBER] AY22001634
[ALPHA2 SYSTEM SERIAL NUMBER] AY33407373
[ALPHA3 SYSTEM SERIAL NUMBER] AY42602765
[ALPHA4 SYSTEM SERIAL NUMBER] AY22602766
[ALPHA5 SYSTEM SERIAL NUMBER] AY23407373
[ALPHA6 SYSTEM SERIAL NUMBER] AY12001637

```

### Example 1 RCM Configuration File

The RCM\_START procedure starts a detached process, which runs the RCM\_COLLECT.COM procedure, on each selected node in the cluster. The process name of each detached process is "RCM\_COLLECT". The data for each system is written to a text file in the RCM\$DATA directory with a naming convention of RCMO-<nodename>yyyymmdd-hhmmss.TXT.

The RCM\_COLLECT process on the node that initiated the RCM collection is responsible for managing the overall collection. When all the other collection processes have completed, the initial node's collect process adds each system's RCM data files to a ZIP archive, which is then transported to HP using the selected transport option.

If email is selected as the transport option, the ZIP file is first converted to a text file using the uencode utility included in the RCM Kit; it is then emailed to HP using VMSMAIL. If no transport

option is selected, the user should send the data to the RCM server in HP using the most convenient option, such as sending the ZIP file as an attachment to an email or using ftp to send the data. The size of an RCM collection ZIP file depends on many factors, such as the number of nodes and devices and whether SAN and EVA collection is enabled. The size of the archive is usually less than 1MB.

The RCM collected data can also be sent to another system at the customer site, using either FTP or email, by setting the LOCAL SITE option to Y and entering the transport details. You can use this method to centralize all site RCM data in one location. You might need to use this method if you have a system without a connection to the internet in order to move data to a gateway node for later transport to HP.

## Scheduling Collections of Data

The required collection schedule for RCM data is a configuration option. The default setting is to collect RCM data once a month but you can choose daily, weekly, or quarterly collections instead. If you do not need a regular schedule, you can configure RCM to collect information only on demand. After you set up a schedule, a detached process is started, and the process hibernates until the next scheduled time. During the collection process, the date for the next collection is updated, and another detached process is started.

RCM adds an entry to the SYSMAN startup database so that when a system reboots, the collection schedule is preserved. To see the RCM entry, enter the following command:

```
$ MCR SYSMAN STARTUP SHOW FILE RCM/FULL
```

This command shows the entry RCM\$STARTUP\_ *nodename*.COM enabled on the node with RCM installed. The RCM\$STARTUP\_ *nodename*.COM procedure in SYS\$STARTUP defines the required RCM logicals and resets the collection schedule when the system reboots. Note that only the system on which RCM was installed runs the RCM procedure at startup.

## Monitoring and Stopping an RCM Collection

The duration of an RCM collection depends on the system type and configuration; however, it usually takes less than fifteen minutes. You can monitor the progress of a collection by executing the RCM\$DIR:RCM\_STATUS.COM procedure. This procedure shows the current status of the collection on each system and the scheduled date and time of the next collection.

You can use the RCM\$DIR:RCM\_STOP procedure at any time to stop the collection process and to cancel future collections. Running RCM\_START again resets the scheduled collections.

## Data That Is Collected

The RCM\_COLLECT process runs on each selected system and collects detailed system information. Even for customers without a service contract, the raw data file is a useful source of information for the system manager.

The collected data file is written as a series of tag-delimited sections as follows:

```
--- START RCM <section name> ---  
--- END RCM <section name> ---
```

Some examples of sections of the raw data file are shown in Example 2.

```
--- START RCM OPERATING SYSTEM ---  
  
Operating System = VMS V7.3-1  
  
Console Version = V6.6-1111  
  
Palcode Version = 1.98-2  
  
--- END RCM OPERATING SYSTEM ---  
  
--- START RCM NODE ---  
  
Node Host Name = ALPHA1  
Node System Type = AlphaServer GS160 6/1224  
Node Domain Name =  
--- END RCM NODE ---
```

## Example 2 Raw Data Sections

The following sections describe the types of data that RCM collects.

### Configuration Tree Data (FRU)

A configuration tree is a memory structure containing system hardware resource configuration and associated Field Replaceable Unit (FRU) information on AlphaServer systems. The configuration tree, which is built by the console firmware, is a permanent data structure in system memory; it is also written to the binary error log. RCM uses two separate products, DECEvent and WEBES, to read the FRU data:

- DECEvent

On AlphaServer systems with FRU Version 4.0 (models 1200, 4X00, 8X00, GS60, GS140), DECEvent is required to translate the FRU table. DECEvent is a hardware fault-management diagnostic tool that reads hardware configuration information from an error log. RCM uses the OpenVMS Analyze/System command CLUE FRU to generate a file with a dummy binary error log record for DECEvent to analyze. Note that no Product Authorization Kit (PAK) is required for the error log translation feature of DECEvent.

- WEBES

The HP Service Tool WEBES is required on systems with FRU Version 5.0 to enable RCM to collect additional hardware and firmware information from the configuration tree. Some of the AlphaServer systems supporting FRU Version 5.0 are models DS10, DS10L, DS20, DS20E, DS25, ES40, ES45, GS80, GS160, GS320, and GS1280. RCM determines if a system is a FRU Version 5.0 system by checking the value that F\$GETSYI("SYSTYPE") returns. Alpha systems with a system type higher than 33 are FRU Version 5.0 systems. Note that the "Desta Director" process is not required to be running on RCM Version 4.2.

The collected configuration tree data is written to the RCM data file as a series of name=value pairs as shown in the short extract in Example 3.

```
--- START RCM CT5 ---
CT5START
NODE NODE_ROOT FRU Version 5.2
NodeHandle=0x0
Child=0x240
Child=0x2c0
Child=0x10c0
FRAME GCT_Node_HD GCT_Node_HD
N_Type=1
N_Sbtyp=0
N_Size=x0240
Hd_extension=x00000000
Owner_Handle=x00000000
Current_Owner_Handle=x00000000
Node_ID=x0000000000000000
Node_Flags=x0000000000000000
Direct_Ancestor_Handle=x00000000
Affinity_Handle=x00000000
Parent_Handle=x00000000
Next_Sibling_Handle=x00000000
Previous_Sibling_Handle=x00000000
Child_Handle=x00000240
.
. (thousands of lines omitted!)
.
--- END RCM CT5 ---
```

### **Example 3 Portion of Configuration Tree Data**

#### **Clue Configuration Data**

The collector uses the Analyze/System SDA command CLUE CONFIG to obtain detailed system, memory, and device configuration information.

#### **Clue SCSI Data**

RCM uses the Analyze/System SDA command CLUE SCSI/SUMMARY to collect SCSI configuration data, including all ports, targets, and connections with attached devices. Device types and hardware revision information are included.

#### **Installed Software Product Information**

RCM uses the DCL command PRODUCT SHOW PRODUCT/FULL to find which products and patches have been installed using the DCL command PRODUCT INSTALL. RCM also searches the VMSINSTALL.HISTORY file to find any products installed using the older installation tool VMSINSTALL.

#### **License Information**

RCM uses the OpenVMS DCL command SHOW LICENSE/UNIT\_REQUIREMENT to collect details of licenses loaded on the system.

## Device Information

To collect detailed information about all disk and tape devices attached to the system, RCM uses the DCL command SHOW DEVICE/FULL and the lexical F\$GETDVI with various item codes.

## Network Configuration Information

Detailed network configuration information is usually collected by displaying hardware and IP addresses. Customers who do not want to display this information can skip this section by setting the [SUPPRESS IP ADDRESSES] option in the configuration file to Y.

## Hard and Soft Partition Information

RCM can collect details of the hard and soft partitions for AlphaServers systems. Hard partitioning is a physical separation of computing resources by hardware-enforced access barriers. No resource sharing exists between hard partitions. Soft partitioning is a separation of computing resources by software-controlled access barriers. Read and write access across a soft partition boundary is controlled by the operating system. OpenVMS Galaxy is an implementation of soft partitioning.

Hard and soft partition information, which RCM and ESMG require to properly identify a system, is found in configuration tree data. If a system does not support partitions, the hard and soft partition values are set to -1. Example 4 shows the hard and soft partition information in the raw data file for a typical system:

```

--- START RCM PARTITION IDS ---

hard: 0
soft: 1,ALPHA2

--- END RCM PARTITION IDS ---
    
```

### Example 4 Collected Hard/Soft Partition IDs

Example 5 shows a section of an RCM configuration report with platform partition information.

Hard Partition Id	Soft Partition Id	Instance Name	Instance OS	Date of Last Collection
0	0	ALPHA1	VMS V7.3-1	2004-04-27 02:52:32
0	1	ALPHA2	VMS V7.3-1	2004-04-27 02:58:31
0	2	ALPHA3	VMS V7.3-1	2004-04-27 03:01:26

### Example 5 Platform Partition Table from an RCM Report

## GALAXY and RAD Data

For systems with OpenVMS Galaxy software, additional information is collected using the following F\$GETSYI Galaxy item codes:

```

galaxy_platform, galaxy_member, galaxy_id, community_id,
partition_id
    
```

RCM uses the Analyze/System SDA command SHOW GALAXY to capture the state of all the instances in the Galaxy configuration and collects Resource Affinity (RAD) data using the following F\$GETSYI item codes:

```
rad_max_rads, rad_cpus, rad_memsize and rad_shmemsize
```

The output from the following command, which shows how much memory is mapped in each RAD, is also collected:

```
$ MCR SYS$TEST:RADCHECK.EXE -allprocs
```

## ProPatch Data

RCM collects input data for the separate tool ProPatch and writes it to a .LIF file. The RCM server automatically submits the LIF file to the ProPatch server, which returns a report that recommends installing specific patches. This functionality is derived from the former Digital Equipment Corporation tools DASC and LIFE.

The LIF file consists of a listing of all the executable images in several system directories such as SYS\$SYSTEM, SYS\$LOADABLE\_IMAGES and SYS\$SHARE. Each entry in the LIF file shows the image name, link time, and version identification. This information is extracted from the image header.

The ProPatch server uses the image link times to determine if any patches are required. See Example 6 and Example 7 for portions of a typical .LIF file and the corresponding ProPatch report, which recommends installing a critical patch based on the link time of a system executable file. In this example, ProPatch recommends installing the critical patch VMS731\_XFC-V0200 because it has detected that the system has an old version of SYS\$SHARE:ALPHA\_XF\$SDA.EXE.

```
--- START CustomerInfo START ---
HP
ALPHA1
ALP
12-APR-2004
RCM V5.0-601
--- END CustomerInfo END ---
~Hardware
~Software
OpenVMS Alpha|001|V7.3-1|$3$DKB1:
SYS$SYSTEM:RRV.EXE|04-OCT-2003 08:47:55.97|050989GKF|$3$DKB1:
SYS$SYSTEM:ACC.EXE|18-JUL-2002 19:52:58.23|X-16|$3$DKB1:
...
SYS$SHARE:ADARTL.EXE|18-JUL-2002 19:50:57.52|V7.3-2|$3$DKB1:
SYS$SHARE:ALPHA_XFC$SDA.EXE|07-MAR-2003 11:33:37.85|V1.0|$3$DKB1:
SYS$SHARE:AS$SDA.EXE|18-DEC-2002 01:05:23.32|V02.00|$3$DKB1:
```

### Example 6 Section of a .LIF File

```
Image on your system:
  VMS version: OPENVMS ALPHA V7.3-1
  image name:  $3$DKB1:SYS$SHARE:ALPHA_XFC$SDA.EXE
  image file id: V1.0
  link date/time: 07-MAR-2003 11:33:37.85

  Service action: VMS731_XFC-V0200
  Patch reference name: DEC-AXPVMS-VMS731_XFC-V0200--4.PCSI  --CRITICAL--

XFC fixes.
```

### Example 7 Portion of a ProPatch Report

### Storage Controller Information

RCM collects information from storage controllers using the HP StorageWorks Command Scriptor utility, which is bundled with the RCM collector. This is a command-line tool that can safely interrogate a storage controller. Earlier versions of RCM used HSZTERM, which is no longer supported.

The Command Scriptor command line (CLI) command '-j subsysdata' is used to find available HSJ devices and the '-f subsysdata' command is used to obtain a list of available HSZ and HSG storage controllers.

The following command script CLI commands are used for HSJ devices:

```
SHOW THIS_CONTROLLER FULL
SHOW OTHER_CONTROLLER FULL
SHOW STORAGESETS FULL
SHOW FAILEDSET FULL
SHOW SPARESETS FULL
SHOW UNITS FULL
SHOW DEVICES FULL
```

For HSG and HSZ devices, enter these commands:

```
SHOW THIS_CONTROLLER FULL
SHOW ASSOCIATIONS FULL
SHOW CONCATSETS FULL
SHOW CONNECTIONS FULL
SHOW REMOTE_COPY FULL
SHOW STORAGESETS FULL
SHOW UNITS FULL
SHOW DEVICES FULL
SHOW OTHER_CONTROLLER FULL
SHOW EMU
```

If the Command Console LUN (CCL) is enabled at the console, a CCL device is used to access a HSG80 controller. Otherwise, one of the attached devices is used to access the controller. The CCL devices have device names such as \$1\$GGAnnnn.

The firmware revision of the storage controllers is in the output of the SHOW THIS\_CONTROLLER command as shown Example 8.

```
--- START RCM HSG ---  
  
SANworks Command Scriptor V1.0B Build 076  
SHOW THIS_CONTROLLER FULL  
Controller:  
    HSG80 ZG11305292 Software V87F-1, Hardware E12  
    NODE-_ID           = 5000-1FE1-0011-8F20  
    ALLOCATION_CLASS    = 0  
    SCSI_VERSION       = SCSI-3  
    Configured for MULTIBUS_FAILOVER with ZG11305742  
    In dual-redundant configuration
```

### Example 8 SHOW THIS\_CONTROLLER Output

To obtain the firmware revision of Fibre Channel Adapters (for example, KGPSA), use the following Analyze/System command:

```
SDA> FC SHOW DEVICE FGxx:
```

Example 9 shows typical output of this command in the raw data file.

```
--- START RCM SDA FC SHOW DEV FG ---  
  
FGAO: operational firmware revision DS3.81A4  
port_name(adapter_id) = 1000-0000-C92B-0098, node_name(host_id) = 2000-0000-C92B-0098  
FGB0: operational firmware revision DS3.81A4  
Port_name(adapter_id) = 1000-0000-C92A-FF07, node_name(host_id) = 2000-0000-C92A-FF07  
  
--- END RCM SDA FC SHOW DEV FG ---
```

### Example 9 KGPSA Firmware Revision

#### SAN Switch Data Collection

You can configure RCM to collect configuration information from HP-supported switches that are used in Storage Area Networks. To collect this data, RCM requires the IP address of each SAN switch as well as its SNMP community string. The RCM collector issues a passive request for data to each designated SAN switch using the SNMP protocol.

This option is available only on systems running the HP TCPIP product because the OpenVMS RCM collector uses the TCPIP utility SYS\$SYSTEM:TCPIP\$SNMP\_REQUEST.EXE to collect the SAN Management Information Base (MIB) data shown in Example 10.

SAN configuration reports are generated from the collected MIB data and are made available to customers in the eSMG. Excerpts from sample reports are in the last sections of this paper.

```

--- START RCM SAN SWITCH OUTPUT ---

START SAN SWITCH 192.168.12.10
1.3.6.1.2.1.1.1.0 = Fibre Channel Switch.
1.3.6.1.2.1.1.2.0 = 1.3.6.1.4.1.1588.2.1.1.12
1.3.6.1.2.1.1.3.0 = 1126391968 = 130 d 8:51:59
1.3.6.1.2.1.1.4.0 = Field Support.
1.3.6.1.2.1.1.5.0 = SAN01
1.3.6.1.2.1.1.6.0 = End User Premise
1.3.6.1.2.1.1.7.0 = 79
1.3.6.1.2.1.2.1.0 = 3
1.3.6.1.2.1.2.2.1.1.1 = 1
1.3.6.1.2.1.2.2.1.1.2 = 2
1.3.6.1.2.1.2.2.1.1.3 = 3
1.3.6.1.2.1.2.2.1.2.1 = lo
1.3.6.1.2.1.2.2.1.2.2 = eth0
1.3.6.1.2.1.2.2.1.2.3 = fc0
1.3.6.1.2.1.2.2.1.3.1 = 24
1.3.6.1.2.1.2.2.1.3.2 = 6
1.3.6.1.2.1.2.2.1.3.3 = 56
1.3.6.1.2.1.2.2.1.4.1 = 16436
1.3.6.1.2.1.2.2.1.4.2 = 1500
1.3.6.1.2.1.2.2.1.4.3 = 2024
1.3.6.1.2.1.2.2.1.5.1 = 0
. . .

```

## Example 10 SAN Switch MIB Data

### EVA Data

RCM V5.0 can collect configuration information from HSV110-based Enterprise Virtual Array Storage Systems. To enable EVA data collection, the RCM configuration file must have the EVA DATA COLLECTION option set to Y.

RCM uses the Storage System Scripting Utility (SSSU) to communicate with a Command View EVA (also called the Storage Element Manager), running on the SAN Appliance Manager. This communication is necessary to find out what EVA storage systems, or cells, the appliance manager is responsible for and also to collect revision and configuration information for a particular cell. Each cell represents, at a logical level, all the components that make up the EVA storage system, including cabinets, power supplies, disks, and controllers.

To communicate with the Element Manager, the RCM collector requires the IP addresses and valid access details for each SAN Appliance Manager. This information is stored in the file RCM\$DATA:EVA.INI using the format shown in Example 11.

Supported versions of the Element Manager are Version 2 and Version 3. SSSU Version 2 is required for Element Manager Version 2; SSSU Version 3 is required for Element Manager Version 3. Both versions of the OpenVMS Alpha SSSU utility are included in the RCM collector kit. It is important to know the versions of Element Manager running on each appliance manager so that you use the correct version of SSSU.

```
# The following section is used to list the required information for SAN
# Appliance Managers which are running Element Manager V2.
#
#[SSSU v2]
#<IP address>:<username>:<password>
#<IP address>:<username>:<password>
# The following section is used to list the required information for SAN
# Appliance Managers which are running Element Manager V3.
#
[SSSU v3]
192.168.0.10:administrator:password
```

### **Example 11 EVE.INI with Details of a V3 Element Manager**

#### **SYSGEN Parameter Information**

To collect OpenVMS System Generation Utility (SYSGEN) parameters, RCM uses the SYSGEN commands SHOW/ALL and SHOW/SPECIAL. The contents of the file SYS\$SYSTEM:MODPARAMS.DAT are also included in the RCM collected data.

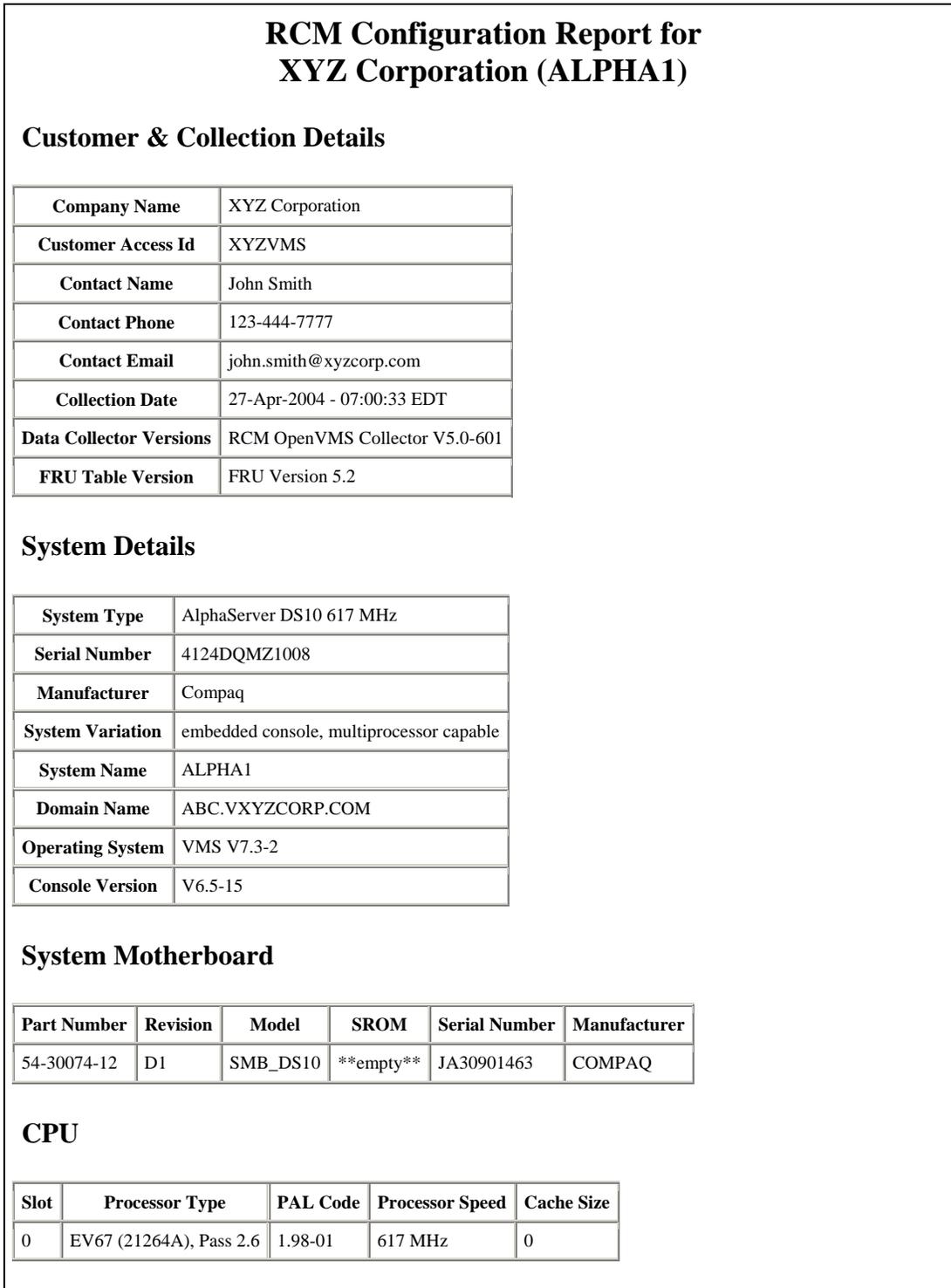
The RCM Configuration Report does not show all the SYSGEN parameters; however, the Change Report shows any differences in the SYSGEN parameters between any two collections. This can be useful in diagnosing problems that might be due to changed SYSGEN parameters. To see all the parameters, you can view the raw data.

#### **Reports**

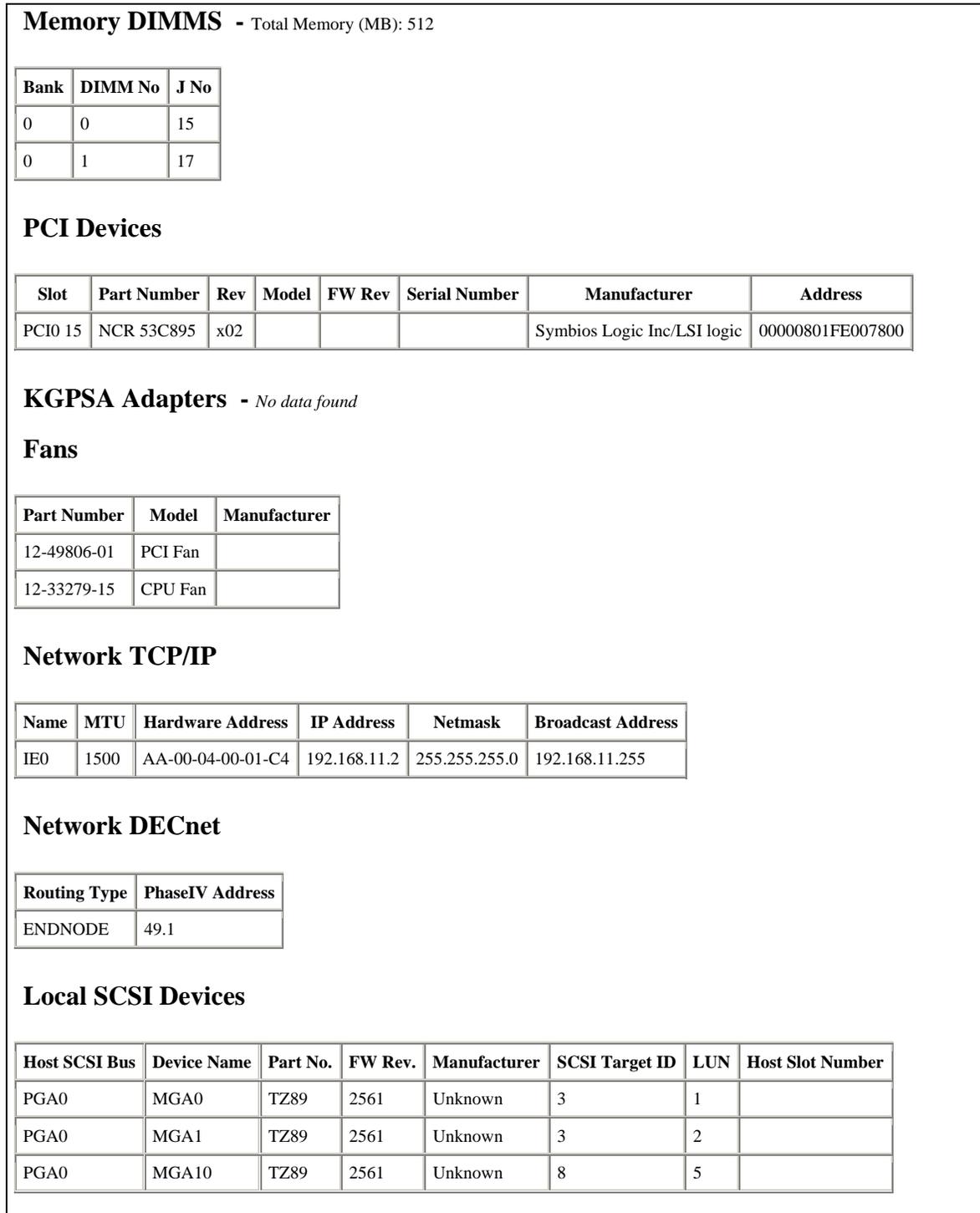
The following sections contain examples and descriptions of sample RCM reports.

#### **Configuration Report**

The following figures show excerpts from a sample RCM Configuration Report (many sections have been omitted from these examples). The data for the various tables is collected from many parts of the raw data. Hardware part numbers and revision information are derived from configuration tree data.



**Figure 2 Sections of an RCM Configuration Report**



**Figure 3 Additional Sample Tables from Configuration Reports**

Figure 4 gives some examples of HSJ and HSG Storage controller information from a configuration report. Several columns and rows have been removed for readability.

<b>HSD/HSJ Controllers</b>								
Part Number	Rev.	FW. Rev.	Serial No.	Disk Allocation Class	CI/DSSI Node No.	Cache Size	Cache Status	Auto Spare
HSJ50-AX - IN1J00	B05	V57J-6	ZG90300591	1	0	128	GOOD	Off

<b>HSG Controllers</b>									
Part No.	Rev.	FW Rev.	Serial No.	Failover Mode	SCSI Bus	Port 1 Topology	Cache Size	Cache Status	Redundant With
HSG80	E12	V87F-1	ZG05016850	MultiBus	PGA0	FABRIC (fabric up)	256	GOOD	ZG05103673
HSG80	E12	V87F-1	ZG05103673	MultiBus	PGA0	FABRIC (fabric up)	256	GOOD	ZG05016850

<b>HSG Disk Configuration ZG05016850</b>	
Controller	HSG80
Serial No.	ZG05016850
Redundant with	ZG05103673
Host SCSI Bus	PGA0
Host Slot	Unavailable

Host LUN	Console Device Name	Unit No.	Connections	Write-back Cache	Max. Trans. Size	Storageset Name	Name	Type	Model	FW Rev.
						R7	DISK10800	raidset	BF01863644	3B05
							DISK60800	raidset	BF01863644	3B05
						SPARESET	DISK11300	spareset	BF01863644	3B05
							DISK21300	spareset	BF01863644	3B05
\$1SDGA402	dga402	D8	ALL	On	32(READ) / 32(WRITE)	R1	DISK10000	raidset	BF01863644	3B05
							DISK20000	raidset	BF01863644	3B05
\$1SDGA404	dga404	D9	ALL	On	32(READ) / 32(WRITE)	R2	DISK10100	raidset	BF01863644	3B05
							DISK20100	raidset	BF01863644	3B05
							DISK30100	raidset	BF01863644	3B05
							DISK40100	raidset	BF01863644	3B05

**Figure 4 HSx Storage Controller Tables from Configuration Reports**

## ProPatch Report

Figure 5 shows a partial ProPatch Report.

```
This Proactive Patch report is being provided to XYZ Corporation
as part of your Business Critical Support Services. The purpose of
this report is to assist in managing your system by identifying
patches and allowing you to proactively decide the applicability
to your environment and business needs.

Data within this report was collected from the system disk of
ALPHA node ALPHA11 and will pertain to all nodes within the cluster
that share the same system disk. If the cluster has multiple
system disks then a separate Proactive Patch report will need
to be generated for each system disk.

NOTES:

1. Some patches in this report are identified as being --CRITICAL--.
   This indicates that the problem(s) addressed by the patch have the potential
   to cause system outages (i.e. hang or crash).

2. Some patches require the prior installation of other patches. For
   patches that have this prerequisite, please read the patch release
   notes for additional information.

3. If you plan to install multiple patches simultaneously it is recommended you
   install them in a test environment to test with your applications before
   implementing in a production environment.

=====
=====

LIFE Analysis Report
  For: ALPHA1
  Date: Tue Apr 27 05:43:26 2004
  Report Type: BRIEF
  Rules Database Version Number: MBM-MAR-2004
  ProPatch executable Version Number: V4.30
=====
=====

Image on your system:
  VMS version: OPENVMS ALPHA V7.3-2
  image name: ALPHA$DKA0:SYS$SHARE:DECW$DRM_PRIV.EXE
  image file id: DW V7.3-2031001
  link date/time: 01-OCT-2003 21:37:43.86

  Service action: VMS732_GRAPHICS-V0200
  Patch reference name: DEC-AXPVMS-VMS732_GRAPHICS-V0200--4.PCSI

Graphics fixes.

=====

Image on your system:
  VMS version: OPENVMS ALPHA V7.3-2
  image name: ALPHA$DKA0:SYS$SYSTEM:DCL.EXE
  image file id: X-36
  link date/time: 09-OCT-2003 15:46:09.42

  Service action: VMS732_DCL-V0100
  Patch reference name: DEC-AXPVMS-VMS732_DCL-V0100--4.PCSI          --CRITICAL--

DCL fixes.

=====
```

**Figure 5 Sample ProPatch Report**

## Change Report

Figure 6 shows part of a Change Report illustrating SYSGEN parameter changes.

<b>RCM Configuration Change Report for XYZ Corporation (ALPHA1)</b>		
<b>Summary</b>		
	<b>Earlier</b>	<b>Later</b>
<b>Company Name</b>	XYZ Corporation	XYZ Corporation
<b>System Name</b>	ALPHA1	ALPHA1
<b>Collection Date</b>	01-Jan-2004 - 03:20:00	04-Feb-2004 - 10:13:12
<b>System Type</b>	hp AlphaServer GS1280 7/1150	hp AlphaServer GS1280 7/1150
<b>Operating System</b>	VMS V7.3-1	VMS V7.3-1
<b>Console Version</b>	V6.5-19	V6.5-19
<b>Table of Contents</b>		
<b>Section (Link)</b>	<b>Changed?</b>	
Warnings	N	
Summary	Y	
Customer&Collection Details	Y	
System Details	N	
Sysgen Parameters	Y	
<b>Sysgen Parameters Changes</b>		
<b>Earlier</b>		
<b>Parameter</b>	<b>Value</b>	
EXPECTED_VOTES	4	
GBLPAGES	101481875	
GH_EXEC_DATA	360	
LOCKIDTBL	1622224	
RESHASHTBL	2097152	
<b>Later</b>		
<b>Parameter</b>	<b>Value</b>	
EXPECTED_VOTES	6	
GBLPAGES	101482106	
GH_EXEC_DATA	384	
LOCKIDTBL	1330589	
RESHASHTBL	1048576	

**Figure 6 Portion of a Change Report**

## SAN Reports

A typical SAN report contains the following information:

- Configuration information for individual fabric servers
- Configuration information for fabric storage
- Configuration information for SAN switches, inter-switch links, and switch ports
- SAN topology maps

Some examples from a typical SAN report are shown in the following figures:

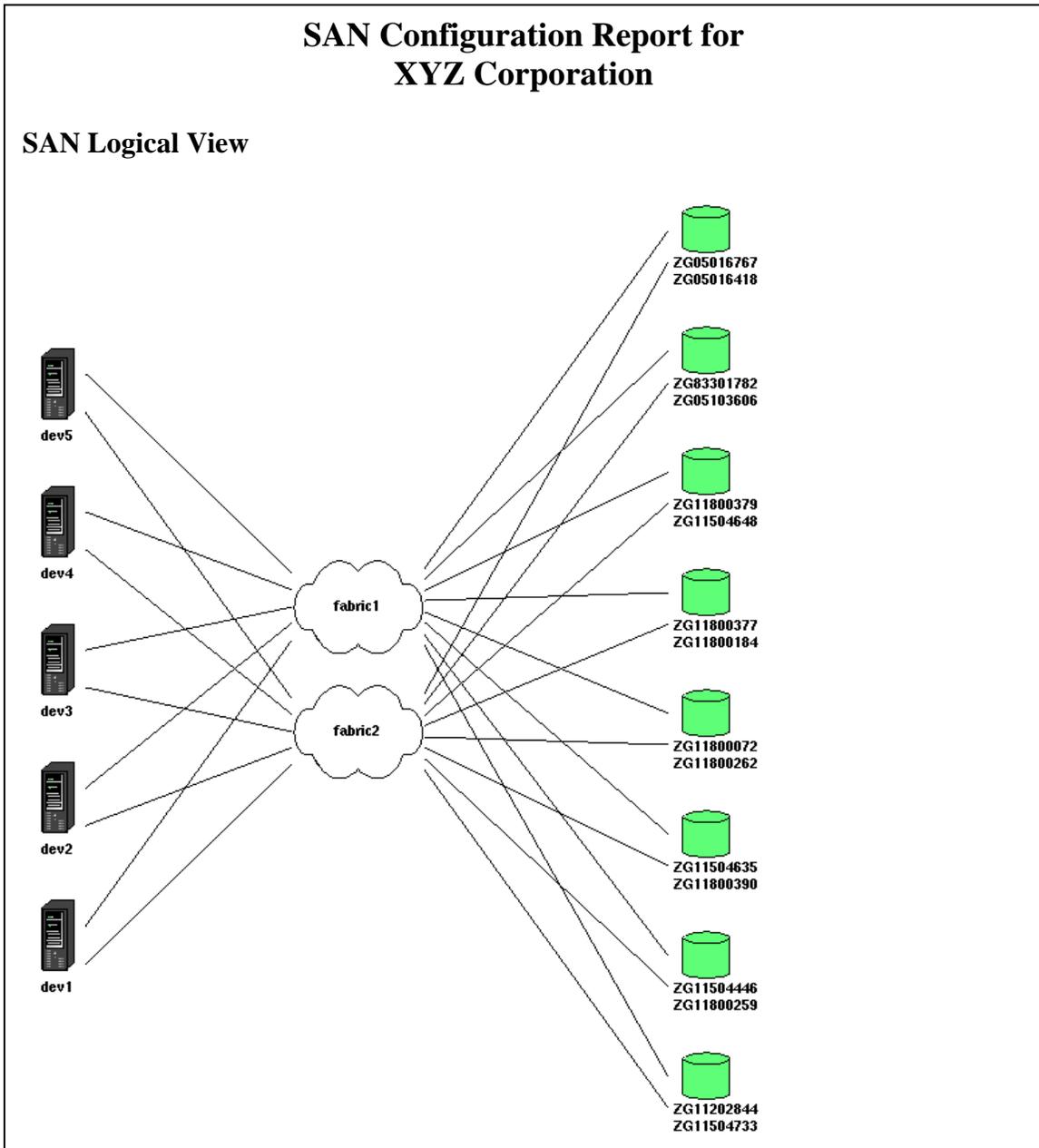


Figure 7 Part of a SAN Report

**SAN Summary**

Fabric	Device Type	Device Name	Device OS/Firmware
1	Server	dev1	VMS V7.3-1
		dev2	VMS V7.3-1
		dev3	VMS V7.3-1
		dev4	VMS V7.3-2
		dev5	VMS V7.3-1
	Storage	ZG05016767 / ZG05016418	V87F-4 / V87F-4
		ZG11202844 / ZG11504733	V87F-4 / V87F-4
		ZG11504446 / ZG11800259	V87F-4 / V87F-4
		ZG11504635 / ZG11800390	V87F-4 / V87F-4
		ZG11800072 / ZG11800262	V87F-4 / V87F-4

**Fabric Servers**

Host	HBA	WWN	Firmware
dev3	FGB0	2000-0000-c92c-1b81	CS3.91A1
dev5	FGB0	2000-0000-c92c-219d	CS3.91A1
dev1	FGB0	2000-0000-c92c-2bbd	CS3.91A1
dev4	FGB0	2000-0000-c931-837d	CS3.91A1
dev2	FGB0	2000-0000-c931-837c	CS3.91A1

**Fabric Storage**

Name	Serial Number	Port	WWN	Firmware
ZG05016767 / ZG05016418	ZG05016767	P1	5000-1fe1-000f-3f50	V87F-4
ZG11202844 / ZG11504733	ZG11504733	P2	5000-1fe1-0010-d560	V87F-4
ZG11504446 / ZG11800259	ZG11504446	P2	5000-1fe1-0010-d590	V87F-4
ZG11504635 / ZG11800390	ZG11504635	P2	5000-1fe1-0010-d600	V87F-4
ZG11800072 / ZG11800262	ZG11800072	P2	5000-1fe1-0010-cdb0	V87F-4

**Switch Information**

Domain	Name	IP	Role	WWN	State	Fabric OS	Power Supply 1	Power Supply 2
1	DSAN02	192.168.12.13	principal	1000-0060-6990-57e8	online	v4.1.2b	nominal	nominal

**Figure 8 Additional Details from a SAN Report**

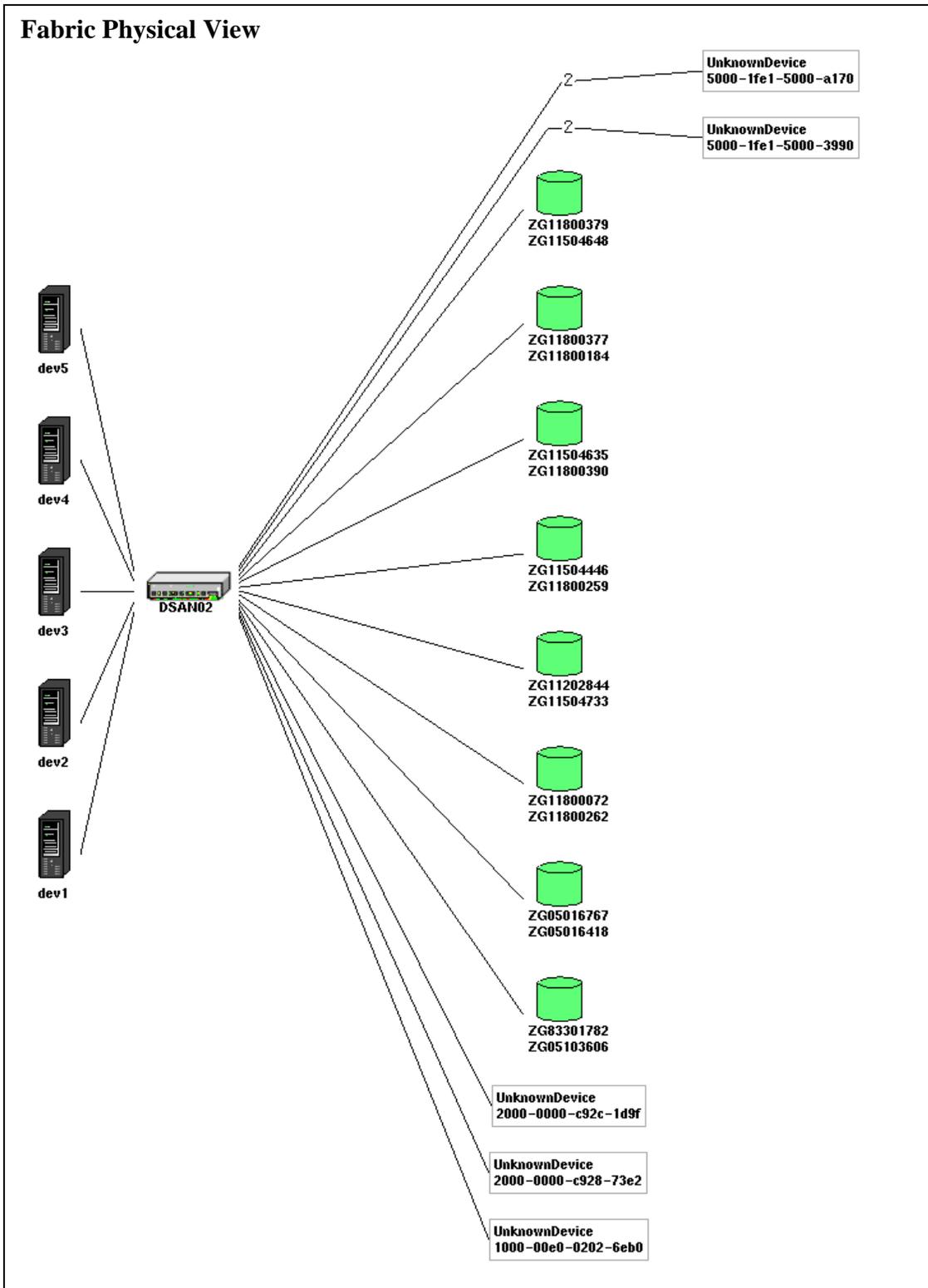


Figure 9 Physical FABRIC Diagram from a SAN Report

## Summary

RCM is an extremely useful tool for mission-critical customers and HP technical account managers in managing OpenVMS systems. The automated collection process ensures that the configuration information in eSMG is always up-to-date. RCM helps diagnose problems that can arise due to configuration changes, and it maintains a historical record of all changes to a system.

## For More Information

The RCM OpenVMS collector kits and documentation, as well as the HP-UX, Tru64 Unix, and Windows collector kits, can be freely downloaded from the HP Software Depot at:

<http://www.software.hp.com/portal/swdepot/displayProductInfo.do?productNumber=RCMBASE01>

VAX and Alpha RCM kits are separate. Each kit is a self-extracting OpenVMS executable file that unpacks into a PCSI kit. You can also unpack the kits using the OpenVMS UNZIP utility.

Information about Electronic Site Management Guide is available from:

<http://www.hp.com/go/esmg>

WEBES and DECEvent kits are available at:

<http://h18000.www1.hp.com/support/svctools/>