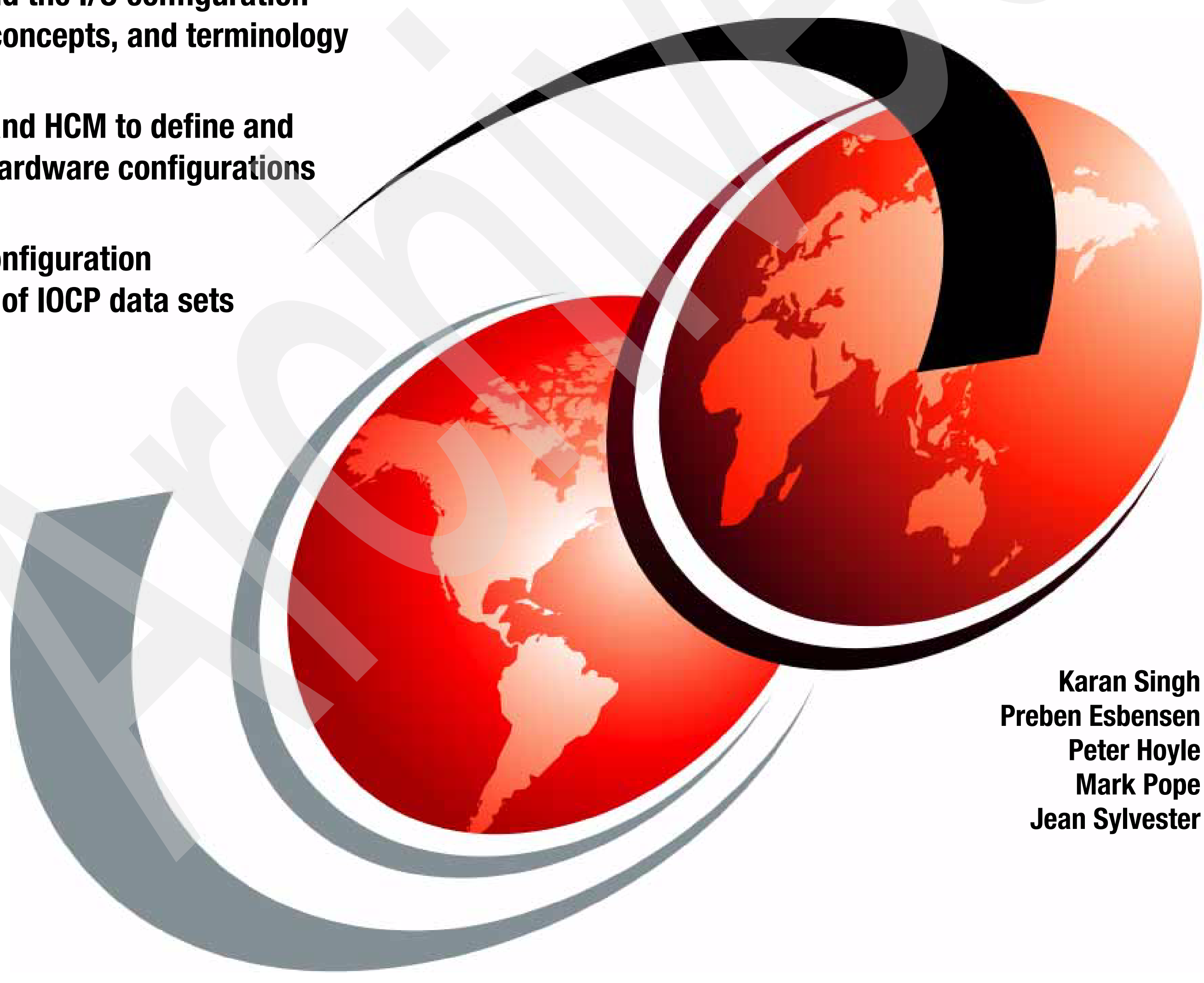
IBM

I/O Configuration Using z/OS HCD and HCM

Understand the I/O configuration process, concepts, and terminology

Use HCD and HCM to define and manage hardware configurations

Review configuration examples of IOCP data sets



Karan Singh
Preben Esbensen
Peter Hoyle
Mark Pope
Jean Sylvester

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

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Contents

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Preface

IBM® System z® servers offer a full range of connectivity options for attaching peripheral or internal devices for input and output to the server. At the other end of these connections are a variety of devices for data storage, printing, terminal I/O, and network routing.

This combination of connectivity and hardware offer System z customers solutions to meet most connectivity requirements. However, to make use of these features, the System z server must be properly configured.

This IBM Redbooks® publication takes a high-level look at the tools and processes involved in configuring a System z server. We provide an introduction to the System z channel subsystem and the terminology frequently used in the hardware definition process.

We examine the features and functions of tools used in the hardware definition process, such as HCD, CHPID Mapping Tool, and HCM. We discuss the input and output of these tools (IODF, IOCP, IOCDS) and their relationship to one another.

We also provide a high-level overview of the hardware configuration process (the flow of generating a valid I/O configuration). We provide configuration examples using both HCD and HCM.

The book also discusses available new functions and guidelines for the effective use of HCD and HCM.

This document is intended for system programmers and administrators who are responsible for defining and activating hardware changes to z/OS® and System z servers, and for the IBM representatives who need this information. General knowledge of z/OS and IOCP is assumed.

The team who wrote this book

This book was produced by a team of specialists from around the world working at the International Technical Support Organization (ITSO), Poughkeepsie Center.

Karan Singh is a Project Leader for the ITSO, Poughkeepsie Center.

Preben Esbensen is an IBM Certified Consulting IT Specialist in the Integrated Technology Delivery organization in Denmark. Preben has worked as a z/OS Systems Programmer for more than 20 years and has been responsible for maintaining I/O configurations for 12 years. Preben’s other areas of expertise include disaster recovery, GDPS®, parallel sysplex, zSeries® solution design, and more. Preben also teaches at IBM and at conferences. He has been part of many hardware projects including data center migrations, infrastructure, standardization, and hardware consolidation projects. He joined IBM in 2004.

Peter Hoyle is a zSeries Configurator for IBM in Sydney, Australia. He has more than 30 years of experience in the IT industry, including 17 years in zSeries mainframe server configuration management and design. He has worked at IBM for 11 years. His areas of expertise include HCM and HCD, configuration implementation solutions, and documentation. He has contributed extensively to IBM System z9® 109 Configuration Setup and IBM System z10™ Enterprise Class Configuration Setup documentation.

Mark Pope works for IBM as a Hardware Support Specialist within the MTS High Availability Domain in the U.K. He joined IBM in 1976 and was a Large Systems CE until 1991 when he joined the Support Centre. His responsibilities are providing hardware support to CEs and customers on System z and High Availability Storage Products within the U.K.

Jean Sylvester joined IBM in 2002 in IOS/HCD/HCM Level 2 Support. She currently works on the zSeries microcode patch team in Poughkeepsie, NY, USA. She holds a Masters degree in Computer Science from Marist College, in Poughkeepsie. This is her first IBM Redbooks publication.

Figure 1   Jean Sylvester, Peter Hoyle, Karan Singh, Preben Esbensen, Mark Pope

Thanks to the following people for their contributions to this project:

Richard Conway, Robert Haimowitz
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Part 1

Concepts

In this part, we introduce the input and output configuration process for System z servers. We also discuss hardware and software concepts that are relevant to the configuration process.

1 Introduction

This chapter discusses the purpose and uses of the input/output (I/O) configuration, and the software and hardware components relevant to the I/O configuration process:

- I/O configuration and its flow
- Hardware Configuration Definition (HCD)
- Hardware Configuration Management (HCM)
- I/O configuration and POR, IPL, and dynamic reconfiguration
- Hardware Management Console (HMC) and Support Element (SE)

1.1 I/O configuration

The I/O configuration is the definition of the hardware and software of the computer system, including how the system is all connected.

1.1.1 Who performs the I/O configuration

Traditionally, I/O configuration has been performed by system programmers. Often this performance is determined by the size and organization of the installation. A large installation might have dedicated teams to handle I/O configuration; a smaller installation might have overlapping duties of a single role (for example, the system programmer role might handle hardware configuration and storage, and so on). In summary, the I/O configuration is usually done by the following roles:

- System programmers
- Hardware planners

1.1.2 I/O configuration flow

Figure 1-1 on page 4 shows the I/O configuration flow.

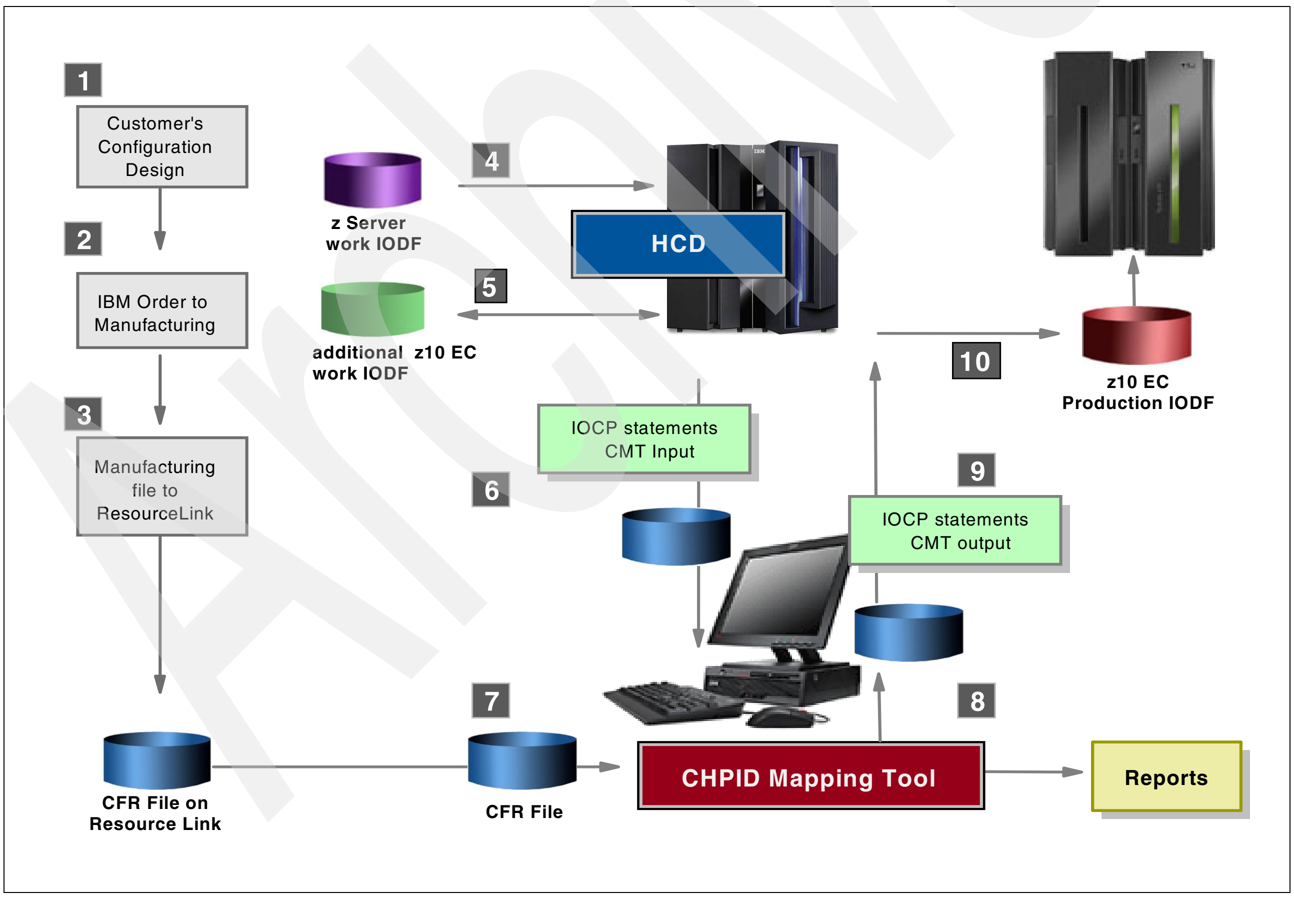


Figure 1-1 I/O configuration flow

The figure shows the following steps:

1. The client determines which configuration will meet the needs of the site. The IBM Technical Support team can help with the configuration design.
2. The IBM order for the configuration is created and passed to the manufacturing process.
3. The manufacturing process creates a configuration file that is stored on the IBM Resource Link™ Web site. This configuration file describes the hardware that is being ordered and is available for download by the client installation team.
4. If this is an upgrade or add-on, the existing I/O configuration is used as a starting point in the Hardware Configuration Definition (HCD). The client production input/output definition file (IODF) is used as input to HCD to create a work IODF that becomes the base to the new or upgrade configuration.
5. When the new or upgrade configuration has been added and any obsolete hardware has been deleted, a validated version of the configuration is saved to the new processor in a validated work IODF.
6. From the validated work IODF, a file containing the new input/output configuration program (IOCP) statements is created. This IOCP statement file is transferred to the workstation used for the CHPID Mapping Tool (CMT) by HCD. The HCM may also be used here to transfer the IOCP statements (often referred to as a *deck*) to and from the CMT.
7. The configuration file that is created by the IBM manufacturing process in step 3 is downloaded from Resource Link Web site to the CMT workstation.
8. The CHPID Mapping Tool uses the input data from these two files to map logical channels to physical channels on the new hardware.

   The following situations might arise that require certain decisions to be made:

   – Resolving situations where limitations on the purchased hardware can cause a single point of failure (SPOF). As a result, purchasing additional hardware in order to resolve these SPOF situations might be necessary.
   – Prioritizing certain hardware items over others.

   After processing by the CHPID Mapping Tool, the IOCP statements will contain the physical channel (PCHID) assignments to logical channels (CHPIDs), based on the actual hardware configuration that was purchased.

   The CMT also creates a variety of configuration reports to be used by the IBM support representative and the installation team.
9. The file containing the updated IOCP statements and that was created by the CMT (now including the PCHID assignments) is transferred to the host system through HCD.
10. Using HCD and the validated work IODF file, created in step 5, and the IOCP statements updated by the CHPID Mapping Tool, apply the PCHID assignments done by the CMT to the configuration data in the work IODF.

    After the physical channel (PCHID) data has been migrated into the work IODF, a new production IODF is created. During validation, when building a production IODF, HCD invokes the IOCP program to perform checking of the channel packaging rules. Note that the correct version of the IOCP program must be accessible because it is where the final IOCP statements are generated. These IOCP statements are stored in an I/O configuration data set (IOCDS) on the Support Element (SE) for use by the I/O subsystem after you perform a power-on reset (POR) by selecting **Power-on Reset** from the SE Console or the Hardware Management Console (HMC).

1.2 Hardware Configuration Definition (HCD) and benefits

HCD is part of z/OS and provides an interactive interface that allows you to define the hardware configuration for a processor, a processor's channel subsystem, and the operating system running on the processor.

The I/O configuration you define with HCD may contain multiple hardware and software configurations. HCD stores all this information and more, centrally, in the input/output definition file (IODF). When you activate an IODF, HCD defines the I/O configuration to the channel subsystem and the operating system. See Figure 1-2.

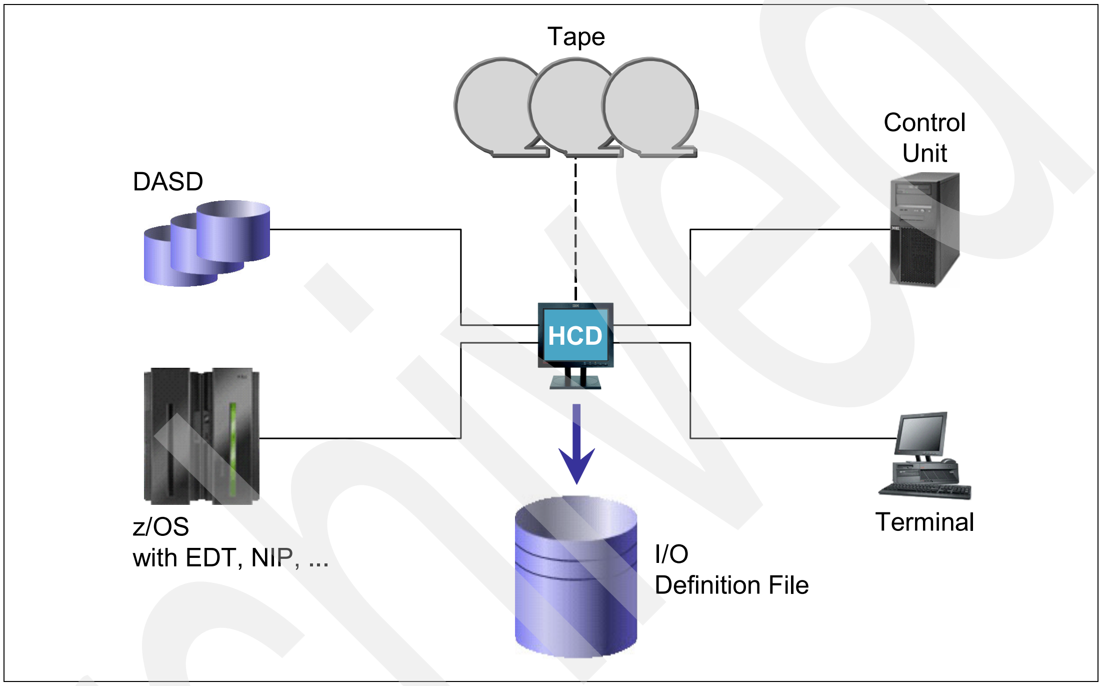


Figure 1-2 Configuration definition using HCD

HCD is a *single point of control*, which means both hardware and software configuration data is stored in one place, the IODF.

Definitions are checked for validity by HCD as they are entered to reduce the chance of unplanned system outages because of inconsistent definitions thereby ensuring increased system availability.

You can change hardware and software definitions (add devices, change devices, channel paths, and control units) dynamically without performing a POR of the System z server or an initial program load (IPL) of an operating system.

Besides defining the I/O configurations, HCD is also used to maintain the I/O configuration files (such as change, copy, delete, import, and export functions), to verify and activate the I/O configuration at a parallel sysplex level, to query hardware supported by the z/OS system, to update the IOCDS, and to maintain director (switch) information.

HCD includes a number of reporting functions to view and print I/O configuration data in print files or data sets. Compare functions are also available to compare to other I/O configuration files and the current hardware and software setup.

Extensive online help and prompting facilities are offered with HCD. Help is available for panels within HCD, commands, displayed data, actions, and input fields.

In addition to the interactive interface offered with HCD, several batch utilities can be used to help with certain operations:

- Migrate your existing configuration data.
- Maintain the IODF.
- Generate an exported IODF.
- Print configuration reports.
- Use configuration packages as a subset of Master IODF.

With HCD you can define both z/OS and z/VM® configuration types from z/OS and exchange IODFs between z/OS HCD and z/VM HCD.

HCD provides search and update capabilities for IODF data through an LDAP interface.

1.3 Hardware Configuration Manager (HCM) and benefits

The z/OS and z/VM HCM is a PC-based client/server interface to HCD that combines the logical and physical aspects of hardware configuration management.

You can manage the logical connections with HCM and manage the physical aspects of the configuration. You can effectively manage the flexibility offered by the IBM FICON® infrastructure (cabinet, cabling).

All updates to your configuration are done through HCM's intuitive graphical user interface. An important point (because of the client/server relationship with HCD) is that all changes of the logical I/O configuration are written into the IODF and fully validated and checked for accuracy and completeness by HCD, thus avoiding unplanned system outages because of incorrect definitions.

For z/OS only, HCM allows the display of operational data such as system status information and operates on the switch through an interface to the I/O operations function of IBM Tivoli® System Automation for z/OS.

HCM is the graphical user interface to HCD. It does not replace HCD, but is used in conjunction with HCD and its selected IODF.

HCD runs on the host; HCM runs on a workstation. The host requires an internal model of its connections to devices, but it is far more convenient and efficient for you to maintain (and modify) that model in a visual form. HCM maintains the configuration data as a diagram, in a configuration file, in sync with the IODF. The IODF contains only logical definitions; the configuration file contains a subset of the logical data from the IODF, plus physical information added using HCM. Together, the IODF and the configuration file data form a single data source or repository, providing you with a complete view of both the logical and physical aspects of the hardware configuration.

Finding and fixing configuration problems is made much easier because physical and logical information cannot diverge.

With HCM's intuitive graphical user interface, you can navigate around the configuration diagram and dialogs to edit information, and perform the following tasks:

- Create or delete objects, including only physical objects such as cabinets, patchports, crossbar switches or converters.
- Modify any object by double-clicking it in the configuration diagram and adjusting its information in the resulting dialog.

After you have created or modified objects, you can perform the following tasks:

- Physically connect and logically define the objects. HCM *intelligently* adjust the positions of objects in the diagram to clearly display all connections.
- Generate reports and wall charts to help you analyze, plan, and implement changes to your configuration.
- Tailor your view of the diagram to display only the objects of interest.
- Zoom in to focus on one area of the diagram, or crop, reorder, show, or hide selected objects. HCM can highlight all connections to selected objects.

The data you define with HCM is used to activate your system. You can use the same data to automatically generate reports and diagrams, eliminating inconsistencies and ensuring accurate documentation of system definitions. By skipping the tedious process of manual data entry, you make fewer errors and save significant amounts of time.

HCM addresses the needs of several user groups involved in configuration management. HCM can be used by the following groups:

- System programmers can more easily create and edit configuration definitions that have been previously maintained in HCD.
- Hardware support groups can add physical data to the configuration; for example, cabinets and patchports which are not dealt within the IODF.
- System planners can generate reports and diagrams to develop future or alternate configurations for planning purposes.
- Operators can conveniently retrieve information about the active status or about objects in the configuration of a system, and they can perform operation tasks on the switch. Operators also have immediate access to an overview of the configuration, helping them to analyze and solve problems, even if HCM is running in stand-alone mode.

1.4 I/O configuration: POR, IPL, dynamic reconfiguration

HCD must have a running z/OS system before it can be used to define the I/O configuration. If there is no running z/OS system, two possibilities are available:

- Use POR or dynamically activate an old IODF on the z/OS system.
- Use a customized offering driver starter IODF to IPL the z/OS system for the first time.

Then, HCD can be used on that system to define the complete I/O configuration.

HCD uses the z/OS unit information modules (UIMs) that contain device-dependent information, such as parameters and device features. The UIMs must be installed in `SYS1.NUCLEUS` location on the z/OS system before HCD is used to define the configuration. The UIMs are used at IPL time to build the unit control blocks (UCBs), which are used by the z/OS operating systems that are running in defined logical partitions (LPAR).

HCD stores the hardware configuration data and operating system data that was defined in the IODF. One IODF can contain definitions for several processors and several z/OS or z/VM operating systems. It also contains all the information that is used to create IOCDSs and the information necessary to build the UCBs and Eligible Device Tables (EDTs).

1.4.1 Power-on reset (POR)

The IODF is used as input when HCD initiates the function to build the IOCDS. The IOCDS with the channel subsystem definitions of a processor resides on the Support Element (SE) hard disk. When you perform a POR, the IOCDS is loaded into the hardware system area (HSA). The I/O subsystem uses the data in the HSA to control I/O requests.

A power-on reset initializes a system by the following functions:

- Initializing all processors
- Initializing the channel subsystem (allocating storage)
- Loading the hardware system area (HSA) with Licensed Internal Code
- Establishing the logically partitioned (LPAR) mode
- Defining the I/O configuration to the channel subsystem

1.4.2 Initial program load (IPL)

The same IODF used for POR is used by z/OS to read the configuration information directly from the IODF during IPL, which is the process that loads the system programs (operating system for the system or each LPAR from the auxiliary storage, checks the system hardware, and prepares the system for user operations.

1.4.3 Dynamic reconfiguration

Dynamic reconfiguration management is the ability to select a new I/O configuration during normal processing and without the need to perform a POR of the hardware or an IPL of the z/OS operating system.

The ability of HCD to provide equivalent hardware and software I/O definitions and to detect when they are not in sync is essential for dynamic I/O reconfiguration management. HCD compares both the old and the new configuration and informs the hardware and software about the differences. You may add, delete, and modify definitions for channel paths, control units and I/O devices without having to perform a POR or an IPL.

As a system programmer (or other authorized person), you can use the HCD option “Activate or verify configuration dynamically” or the ACTIVATE operator command (**`ACTIVATE IODF=xx`**) to make changes to a running configuration. On the HCD panel, a programmer (or authorized person) specifies the name and volume serial number, if applicable, for the production IODF.

The production IODF is expected to be in proper syntax for a production IODF name. If your name does not comply with the prescribed syntax of a production IODF name (see Chapter 6.2, “IODF naming standards” on page 79), that IODF cannot be used for IPL nor dynamic activate.

Also, to perform a dynamic activate operation, the high-level qualifier (HLQ) of the production IODF must be the same as the one from the IODF that was used for the previous IPL or dynamic activate, and the IPL of the OS configuration must be in the same production IODF as the processor configuration that was selected for the POR.

When activating a configuration dynamically, HCD compares the currently active IODF with the IODF that is to be activated and then processes the differences. You may want to view information about the IODF that was used for the last IPL or previous dynamic activation. First, specify to test an activation before you dynamically activate a configuration. Depending on changes that you made, before activating the new configuration, you have to configure offline the affected channel paths or vary offline the affected devices. For more information, see the *z/OS V1R10.0 HCD Planning*, GA22-7525. It offers the following information:

- Provides help for avoiding disruptions to I/O operations during dynamic changes.
- Has a detailed description of how to dynamically activate a configuration.
- Lists prerequisites for dynamic activation.
- Explains when hardware and software changes or software-only changes are allowed.
- Describes the actions necessary to change your I/O configuration dynamically.

Additionally, you can use dynamic reconfiguration to move PAV alias devices to subchannel set 1 (SS1).

1.5 Hardware Management Console and Support Element

The Hardware Management Console (HMC) is a hardware management instrument for System z. It provides the ability to configure and manage server, partition, I/O channels, and other resources of multiple System z servers. It also provides system resource views and system administration tasks that include real-time monitoring, backup, and recovery. These management functions are provided for multiple servers through the Support Element (SE) through HMC communication.

The SE is a dedicated workstation that is directly attached to the server itself. The SE provides a console for monitoring and operating the system and is supplied with each server (plus an alternate SE). By means of this communication path through the SE, the HMC can perform numerous operations and tasks to assist in maintenance and operation of the central processor complex (CPC), logical partitions (LPARs), I/O and other physical and logical entities of the system.

Note the following information:

- One HMC can control up to 100 Support Element units.
- One Support Element can be controlled by 32 HMCs.

2

System z concepts

This chapter describes the System z components that are used by the Hardware Configuration Definition (HCD) or Hardware Configuration Manager (HCM) to create an I/O configuration and their relevance to the I/O configuration process. The components are as follows:

- System z10 dedicated hardware storage area (HSA)
- System z channel subsystem (CSS)
- Hardware Management Console (HMC) and Support Element (SE)
- IOCDS, IOCP, IODF, and stand-alone IOCP
- Intelligent Resource Director (IRD), Workload Manager (WLM), and Dynamic Channel Path Management (DCM)
- IBM Sysplex Timer® external time reference (ETR) and Server Time Protocol (STP)

The concepts described are either directly related to the hardware itself or are implemented through HCD or HCM.

This chapter also contains the following information:

- Common terminology in use (IOCP, IODF, and so on)
- Hardware concepts such as the hardware system area (HSA), channel subsystems within a z10 Server, HMC, SE, and STP
- Two of the functions of the Intelligent Resource Director (IRD), Workload Manager (WLM), and Dynamic Channel Path Management (DCM) as they relate to HCD

2.1 System z10 dedicated hardware storage area (HSA)

The HSA is a non-addressable storage area that contains server Licensed Internal Code and configuration-dependent control blocks and is established at power-on reset (POR) time using configuration information from the IOCDS.

The HSA has a fixed size of 16 GB and is not part of the purchased memory that you order and install.

The fixed size of the HSA eliminates planning for future expansion of the HSA because HCD and IOCP always reserves the following items:

- Four channel subsystems (CSSs)
- Fifteen logical partitions in each CSS for a total of 60 logical partitions
- Subchannel set 0 with 63.75K devices in each CSS
- Subchannel set 1 with 64K devices in each CSS

The HSA has sufficient reserved space, allowing for dynamic I/O reconfiguration changes to the maximum capability of the processor.

Most of this capability is achieved by enabling a maximum configurable system. Also, HCD automatically adds in IOCDS statements to maximize the channel subsystem too.

2.2 System z channel subsystem (CSS)

With the CSS, communication from server memory to peripherals is through channel connections. The channels in the CSS permit transfer of data between main storage and I/O devices or other servers under the control of a channel program. The CSS allows channel I/O operations to continue independently of other operations within the server, allowing other functions to resume after an I/O operation has been initiated. See Figure 2-1 on page 13.

The CSS also provides communication between logical partitions within a physical server by using supported internal channels such as IBM HiperSockets™ feature.

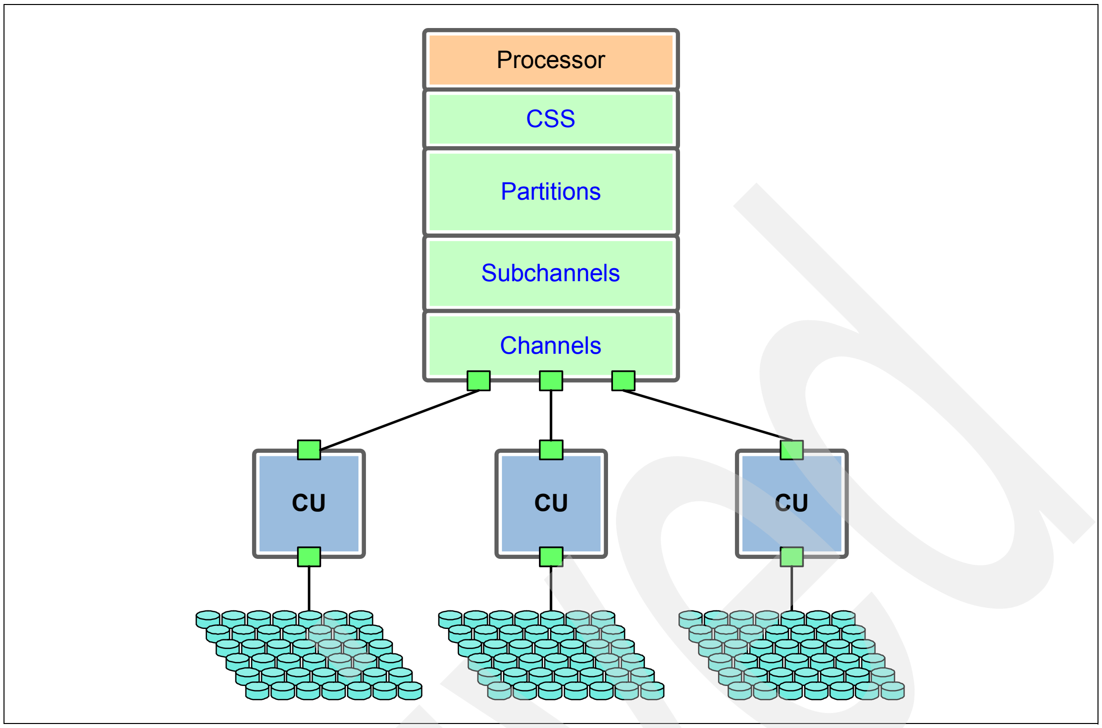


Figure 2-1 Channel subsystem relationship to channels, control units, and I/O addresses

Several key entities in the CSS are described in the following list:

- Channel: This communication path is from the channel subsystem to the connected control units and I/O devices. The channel subsystem communicates with I/O devices by means of channel paths between the channel subsystem and control units.
- Channel path identifier (CHPID): This value is assigned to each channel path of the system and that uniquely identifies that path. A total of 256 CHPIDs are supported by one CSS. On a z10 EC system, a CHPID number is assigned to a physical location by the user through HCD, HCM, or IOCP.
- Subchannel: The subchannel provides the logical appearance of a device to the program, and it contains the information required for sustaining a single I/O operation. A subchannel is assigned for each device that is defined to the logical partition.

> **Note:** Multiple subchannel sets (MSS) are available on System z10 to increase addressability. Two subchannel sets are provided; subchannel set-0 can have up to 63.75K subchannels and subchannel set-1 can have up to 64K subchannels (see 2.2.2, “Multiple subchannel sets” on page 14 for more information).

- Control unit: This unit provides the logical capabilities necessary to operate and control an I/O device and it adapts the characteristics of each device so that it can respond to the standard form of control provided by the CSS. A control unit can be housed separately, or it can be physically and logically integrated with the I/O device, the channel subsystem, or within the server itself.
- I/O device: An I/O device provides external storage, which is a means of communication between data processing systems, or a means of communication between a system and its environment. In the simplest case, an I/O device is attached to one control unit and is accessible through one channel path.

2.2.1 Multiple channel subsystems

The *multiple channel subsystem* (MCSS) concept is implemented in the System z servers. The z10 EC supports up to four channel subsystems (CSSs); the z10 BC supports up to two CSSs.

The design of the System z servers offers considerable processing power, memory sizes, and I/O connectivity. In support of the larger I/O capability, the MCSS concept has been scaled up correspondingly. This concept provides relief for the number of supported logical partitions, channels, and devices available to the server.

Each CSS can have 1 - 256 channels and can in turn be configured with 1 - 15 logical partitions, with a maximum of 30 logical partitions (LPARs) per server on z10 BC, and up to 60 LPARs on z10 EC servers. CSSs are numbered 0 - 3; the numbers are sometimes referred to as the *CSS Image ID* (CSSID 0, 1, 2, or 3 for the z10 EC; and CSSID 0 and 1 for the z10 BC).

Note: The System z servers do not support basic mode. Only LPAR mode can be defined.

The structure of multiple CSSs provides channel connectivity to the defined logical partitions in a manner that is transparent to subsystems and application programs.

The System z servers provide the ability to define more than 256 CHPIDs in the system through the multiple CSSs. As mentioned, CSS defines CHPIDs, control units, subchannels, and so on. This approach enables the definition of a balanced configuration for the processor and I/O capabilities.

For ease of management, be sure that the HCD or HCM is used to build and control the System z input/output configuration definitions. HCD/HCM support for multiple channel subsystems is available with z/VM and z/OS. HCD or HCM provides the capability to make both dynamic hardware and software I/O configuration changes.

Logical partitions cannot be added until at least one CSS has been defined. LPARs are defined to a CSS, not to a server. An LPAR is associated with one CSS only. CHPID numbers are unique within a CSS; however, the same CHPID number can be reused within all CSSs. All CSSs are defined within a single I/O configuration data set (IOCDS). The IOCDS is loaded into the HSA and initialized during power-on reset. On a z10 EC server, the HSA has a fixed size of 16 GB; on the z10 BC server, the HSA has a fixed size of 8 GB, which is not included in the purchased memory.

2.2.2 Multiple subchannel sets

The number of devices that can be addressed by a logical partition can be a limitation for certain installations. The concept of multiple subchannel sets (MSS) provides relief for this problem. See Figure 2-2 on page 15.

Usually, a subchannel represents an addressable I/O device. A disk control unit with 30 drives uses 30 subchannels (for base addresses), and so forth. An addressable device is associated with a device number and the device number is commonly, but incorrectly, known as the *device address*. Subchannel numbers are limited to four hexadecimal digits by hardware and software architectures. Four hexadecimal digits provide up to 64K addresses, known as a *set*.

IBM reserves 256 subchannels, leaving 63.75K subchannels for general use.

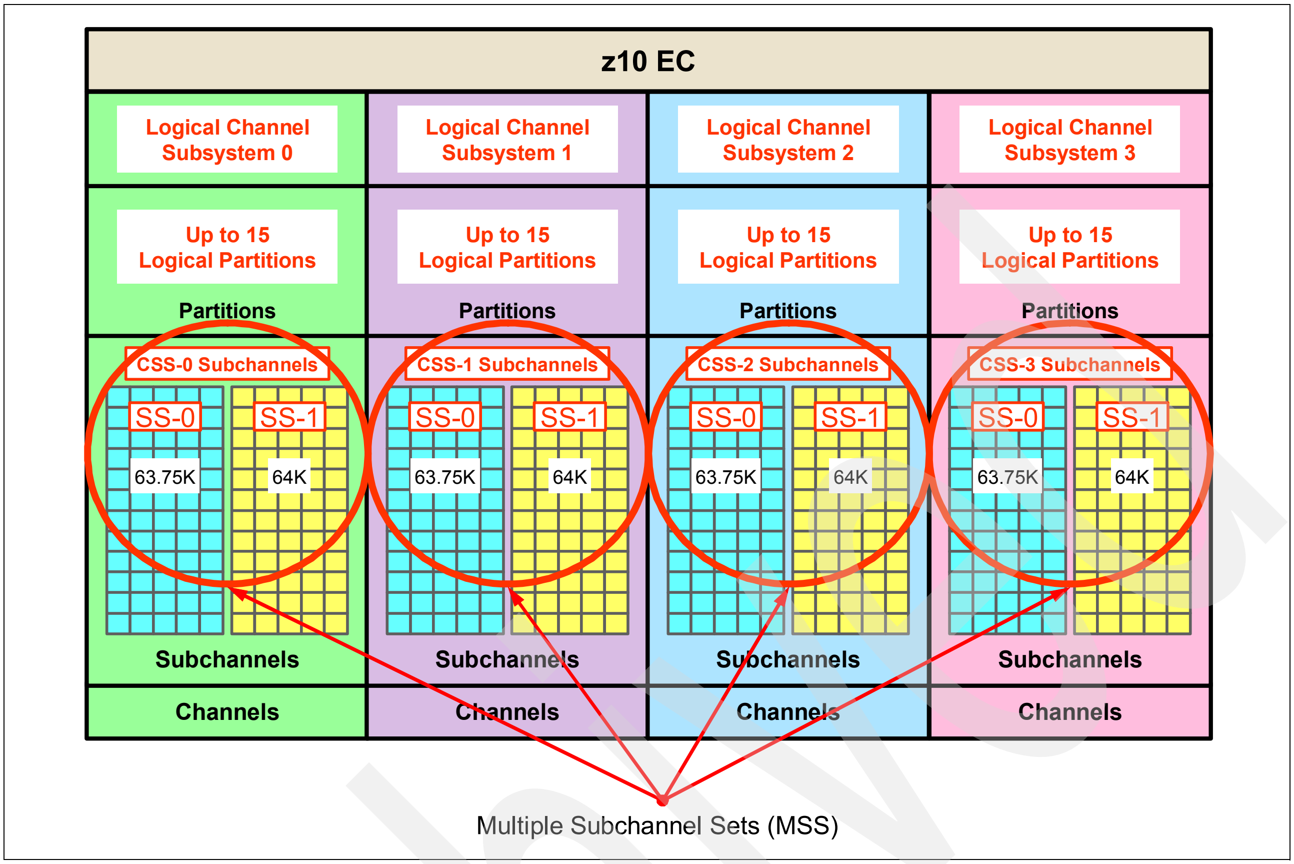


Figure 2-2 Multiple subchannel sets

The advent of parallel access to volumes (PAV) has made this 63.75K subchannels limitation a problem for larger installations. One solution is to have *multiple* sets of subchannels, with a current implementation of two sets.

Each set provides addresses of 64K minus 1. Subchannel set 0 still reserves 256 subchannels for IBM use. Subchannel set 1 provides to the installation the full range. Each CSS has two subchannel sets.

With two subchannel sets, a total of 63.75K subchannels can be in set 0 and an additional 64K subchannels in set 1. Subchannel set 1 can be used for disk alias devices. Subchannel set 0 can be used for base and for alias addresses.The appropriate subchannel set number must be included in IOCP definitions or in the HCD definitions that produce the IOCDS. The subchannel set number defaults to zero

With the availability of HyperPAV, the requirement for PAV devices is greatly reduced. See 12.10, “HyperPAV” on page 399.

2.3 Hardware Management Console and Support Element

The Hardware Management Console (HMC) is a hardware management appliance for System z. It provides the capability to configure and manage server, partition, I/O channels, and other resources of multiple System z servers. The HMC also provides views of system resources and provides tasks for system administration including real-time monitoring, backup, and recovery. The HMC provides these management controls of multiple servers through the Support Element (SE). See Figure 2-3.

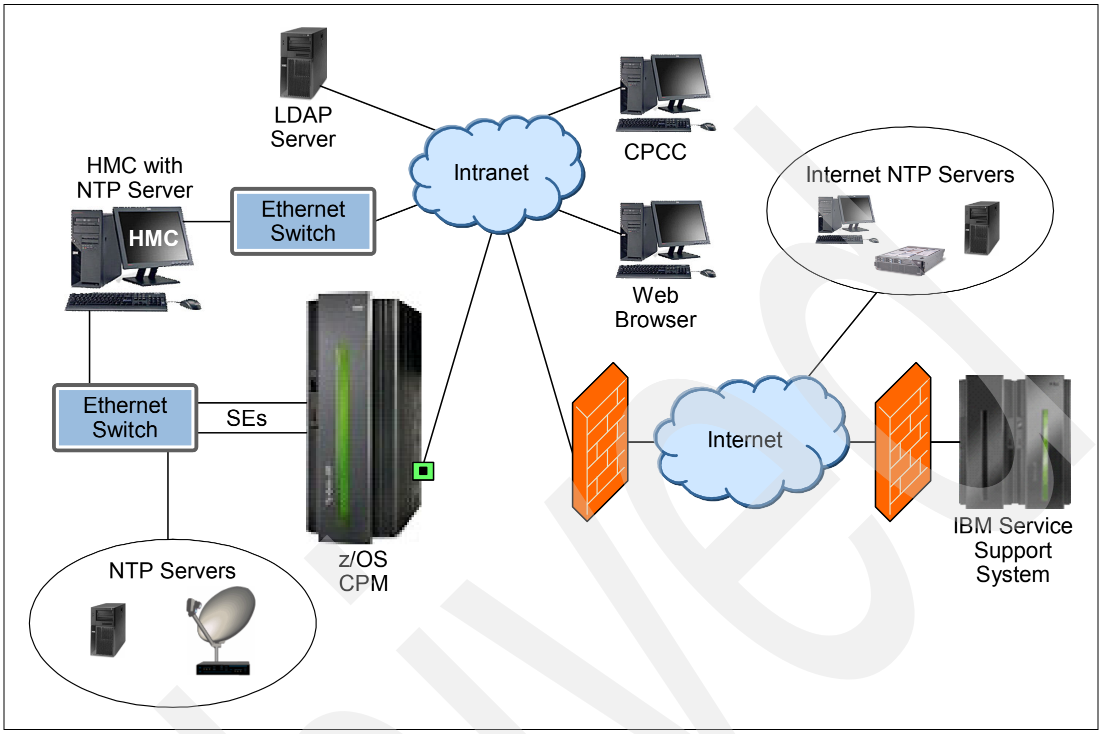


Figure 2-3 HMC and SE network

The HMC communicates to each System z server through the (SE), a dedicated workstation that is directly attached to the server itself. The SE, plus an alternate SE, is supplied with each server to provide a console for monitoring and operating the system, usually used by service personnel to perform maintenance operations on the system. Using this communication path through the SE, the HMC can perform numerous operations and tasks to assist in the maintenance and operations of the central processor complex (CPC), logical partitions, I/O and other physical and logical entities on the system.

The user interface of the HMC and SE is entirely Web-based. It is easy to use, providing a single point of operation and management for your z Systems. Because the user interface for the HMC and SE is Web-based, all that is required for remote access is a Web browser. When tasks are performed at the HMC, the commands are sent to one or more SEs, which then issue commands to their CPCs. CPCs can be grouped at the HMC so that a single command can be passed to as many as all of the CPCs that are defined to the HMC.

One HMC can control up to 100 SEs; one SE can be controlled by 32 HMCs.

The IODF resides within the SE and is used to create the IOCDS. Through this HMC, you can select a zServer and then select the required POR, image, or load profile, with the required IOCDS.

2.4 IOCP, IOCDS, ICPIOCP, stand-alone IOCP and IODF

The CSS and the operating system (OS) need to know what hardware resources are available in the computer system and how these resources are connected. This information is commonly called *the hardware configuration*.

Before HCD was available, you had to use the I/O configuration program (IOCP) to define the hardware to the channel subsystem and the MVS Configuration Program (MVSCP) to define the hardware to the operating system.

To run IOCP you needed to specify the logical partition, the channel paths on the CPC and how they were assigned to the logical partitions, the control units attached to the channel paths, and then the devices assigned to the control units.

With MVSCP and IOCP, you were limited to defining one processor or operating system for each input data set, therefore you needed more than one data set when you used MVSCP and IOCP.

IOCP builds a configuration definition and writes reports. IOCP then stores the definition in an IOCDS on the SE hard disk to be used by the I/O subsystem.

The CPC has four IOCDS slots: A0, A1, A2, and A3. The IOCDS slots exist on the SE hard disk. The configuration data in the IOCDS is accessed and transformed to a data format that the Licensed Internal Code in the I/O subsystem uses when you perform a power-on reset (POR) by selecting **Power-on Reset** from the SE console or HMC.

The I/O subsystem then controls I/O requests and uses the configuration data from the IOCDS that was specified for the POR.

IOCP can read from any IOCDS produced by the current version of IOCP (currently ICPIOCP Version 2 Release 2.0). However, IOCP can write only to an IOCDS that is not write-protected.

The IOCP generation process requires as input an I/O configuration input file containing IOCP statements. You can write an IOCDS with the z/OS, z/VM, VSE, or stand-alone version of IOCP.

Appendix A, "Configuration example IOCP data sets" on page 411 contains the full IOCP deck for the I/O configuration we used for this book. Figure 2-4 on page 18 shows a sample of that IOCP deck.

```
ID      MSG1='IOCDSDS',MSG2='PREBENE.IODF10 - 2009-10-28 08:43',*
        SYSTEM=(2097,1),LSYSTEM=CPCPKR2,                           *
        TOK=('CPCPKR2',00800006991E209408430327010930lF00000000,*
        00000000,'09-10-28','08:43:03','PREBENE','IODF10')
RESOURCE PARTITION=((CSS(0),(CFPKR203,3),(LPPKR204,4),(*,1),(**
        ,2),(*,5),(*,6),(*,7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D*
        ),(*,E),(*,F)),(CSS(1),(LPPKR212,2),(*,1),(*,3),(*,4),(**
        ,5),(*,6),(*,7),(*,8),(*,9), ... ),(CSS(2),(*,1),(*,2),(*
        *,3),(*,4),(*,5),(*,6),(*,7),(*,8),(*,9), ...),(CSS(3),(*
        *,1),(*,2),(*,3),(*,4),(*,5),(*,6),(*,7),(*,8),(*,9*)...)
CHPID PATH=(CSS(0,1),14),SHARED,                                   *
        PARTITION=((CSS(0),(LPPKR204),(=))),PCHID=3A0,TYPE=OSC
CHPID PATH=(CSS(0,1),1C),SHARED,                                   *
        PARTITION=((CSS(0),(LPPKR204),(=))),PCHID=170,TYPE=OSD
...
CHPID PATH=(CSS(0),B8),SHARED,                                     *
        PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),98),    *
        CSYSTEM=CPCPKR1,AID=1B,PORT=1,TYPE=CIB
CHPID PATH=(CSS(0),B9),SHARED,                                     *
        PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),99),    *
        CSYSTEM=CPCPKR1,AID=1B,PORT=2,TYPE=CIB
CHPID PATH=(CSS(0,1),F0),SHARED,                                   *
        PARTITION=((CSS(0),(LPPKR204),(=))),CHPARM=C0,TYPE=IQD
CHPID PATH=(CSS(0),F8),SHARED,TYPE=ICP,                            *
        PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),F9)
CHPID PATH=(CSS(0),F9),SHARED,TYPE=ICP,                            *
        PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),F8)
CHPID PATH=(CSS(1),F4),SHARED,PARTITION=((0),(LPPKR212)),         *
        CPATH=(CSS(0),F8),CSYSTEM=CPCPKR3,AID=0C,PORT=1,TYPE=CIB
CHPID PATH=(CSS(1),F5),SHARED,PARTITION=((0),(LPPKR212)),         *
        CPATH=(CSS(0),F9),CSYSTEM=CPCPKR3,AID=0C,PORT=1,TYPE=CIB
CNTLUNIT CUNUMBR=3100,PATH=((CSS(0),1C),(CSS(1),1C)),UNIT=OSA
IODEVICE ADDRESS=(3100,015),CUNUMBR=(3100),UNIT=OSA
IODEVICE ADDRESS=310F,UNITADD=FE,CUNUMBR=(3100),UNIT=OSAD
CNTLUNIT CUNUMBR=3C00,PATH=((CSS(0),F0),(CSS(1),F0)),UNIT=IQD
IODEVICE ADDRESS=(3C00,128),CUNUMBR=(3C00),UNIT=IQD
...
CNTLUNIT CUNUMBR=EF00,PATH=((CSS(1),79)),UNIT=FCP
IODEVICE ADDRESS=(EF00,254),CUNUMBR=(EF00),UNIT=FCP
CNTLUNIT CUNUMBR=F100,PATH=((CSS(0),14),(CSS(1),14)),UNIT=OSC
IODEVICE ADDRESS=(F100,048),MODEL=X,CUNUMBR=(F100),UNIT=3270
CNTLUNIT CUNUMBR=FFF9,PATH=((CSS(1),F4,F5)),UNIT=STP
CNTLUNIT CUNUMBR=FFFB,PATH=((CSS(0),F8,F9)),UNIT=CFP
IODEVICE ADDRESS=(FFC8,007),CUNUMBR=(FFFB),UNIT=CFP
IODEVICE ADDRESS=(FFCF,007),CUNUMBR=(FFFB),UNIT=CFP
CNTLUNIT CUNUMBR=FFFC,PATH=((CSS(0),B8,B9)),UNIT=CFP
IODEVICE ADDRESS=(FFD6,007),CUNUMBR=(FFFC),UNIT=CFP
IODEVICE ADDRESS=(FFE4,007),CUNUMBR=(FFFC),UNIT=CFP
```

Figure 2-4 Several sample IOCP deck statements

HCD provides an interactive interface that allows you to define the hardware configuration for both a processor's channel subsystem and the operating system running on the processor.

The configuration you define with HCD can consist of multiple processors with multiple channel subsystems, each containing multiple partitions.

HCD stores the entire configuration data in a central repository called the *input/output definition file (IODF)*. The IODF is a single source for all hardware and software definitions for a multiprocessor system. One IODF can contain definitions for several processors (or LPARs) and several z/OS or z/VM operating systems. It contains all information used to create IOCDSs and the information necessary to build the UCBs and EDTs. When HCD initiates the function to build the IOCDS, the IODF is used as input. The IOCDS with the channel subsystem definitions of a processor is then used to perform POR. The same IODF is used by z/OS to read the configuration information directly from the IODF during IPL, eliminating the need to maintain several independent MVSCP or IOCP data sets.

2.5 IRD, WLM, and DCM

In this section, we discuss two of the functions of the Intelligent Resource Director (IRD), Workload Manager (WLM) and Dynamic Channel Path Management (DCM), as they relate to the HCD.

2.5.1 Intelligent Resource Director (IRD)

IRD is not actually a product or a system component; rather it is three separate but mutually supportive functions:

- WLM LPAR CPU and Weight Management
- Dynamic Channel Path Management (DCM)
- Channel subsystem I/O Priority Queuing (CSS IOPQ)

We discuss only a portion of WLM and DCM, as they relate to HCD.

2.5.2 Workload Manager (WLM)

WLM is a z/OS component, responsible for managing resources so that workloads that have been identified as being the most important can achieve their objectives. This process is accomplished through dynamic alias management and DCM, among other things.

The two ways for the administrator to control dynamic alias management are either at a sysplex-level option in specifying the WLM policy or at a device-level option in HCD:

- The default for the sysplex-level option is NO and the WLM policy setting is for the entire sysplex.
- The device-level option in HCD enables or disables dynamic alias management for a particular PAV device. The default is YES.

> **Note:** As with OFFLINE=YES/NO, WLMPAV=YES/NO is specified in the HCD Define Device Parameters/Features panel and is specific to a system image. Therefore, a possibility is to have a separate WLMPAV specification for the same alias device on separate system images. This is useful in situation where an installation has more than one sysplex with shared access to a direct access storage device (DASD) control unit (logical control).

When dynamic alias management is enabled, WLM monitors the device performance and automatically reassigns alias addresses from one base to another to help meet its goals and to minimize I/O queuing.

Do not use dynamic alias management for a device unless all systems sharing that device have dynamic alias management enabled. Otherwise, WLM will be attempting to manage alias assignments without taking into account the activity from the non-participating systems.

For dynamic alias management to be most effective, the aliases must be spread out in the initial definition (at least two aliases must be assigned to each base). If one base device has several alias devices while other base devices have none, it will take more time for WLM to reassign the aliases for the maximum benefit.

WLM can take time to detect the I/O bottleneck and to coordinate the reassignment of alias addresses within the sysplex. If the workload was fluctuating or had a burst character, the job that caused the overload of one volume might have ended before WLM had reacted and the I/O Supervisor Queue (IOSQ) time was not completely eliminated.

For more information about dynamic PAV and WLM, see *System Programmer's Guide to: Workload Manager*, SG24-6472.

2.5.3 Dynamic Channel Path Management (DCM)

DCM provides the ability to have the system dynamically manage ESCON® and FICON Bridge (FICON converter, or FCV) connected to DASD subsystems, based on the current work load and its service goals. HCD allows channel paths to be designated as static (fixed) or managed (not assigned to any specific control unit) when they are defined. Managed channels can be viewed as a pool of channels (CHPIDs) that can be assigned dynamically to control units at the discretion of the system.

Be sure to identify the number of logical paths in use before you introduce DCM, and calculate the number that will be in use after you enable DCM, to be sure that you do not exceed the number of supported logical paths to each control unit. Remember that this must step be done for each control unit, and that various control unit types support differing numbers of logical paths.

After you have selected the appropriate channels and control units for dynamic channel path management, two HCD definitions must be changed:

- Channel definitions
- Control unit definitions

To define a channel path as being managed, you must specify YES in the Managed field on the Add Channel Path HCD panel.

A managed channel path cannot be connected to LPARs, but you must define the name of the LPAR cluster to which an LPAR must belong in order to have this channel in its configuration. This information is specified in the IO Cluster field and it must match the sysplex name of the software running in the logical partition. The channel must also be defined as shared.

Note: Managed channels can be shared only by logical partitions in the same LPAR cluster. All managed paths to a control unit must be attached through a director (switch). This attachment provides the optimum flexibility and connectivity.

A managed channel path cannot be connected to a control unit by HCD. To define a control unit on the Add Control Unit HCD panel as managed you must indicate how many managed channel paths can be connected to the control unit. Enter at least one static channel path (although two can reduce single point of failure) and the corresponding link address, and, in addition, an asterisk (‘*’),instead of the channel path ID and link address for each managed channel path. The number of asterisks you specify limits the number of managed channel paths per CPC (or managed channel paths per logical channel subsystem). The total number of non-managed and managed channel paths (or managed channel paths per logical channel subsystem) cannot exceed 8.

The assignment of managed channels to a control unit is done on a logical channel subsystem (LCSS) level. Managed channels cannot be spanned. Therefore, the managed channels used for the LPAR cluster in CSS0 differ from the managed channels that are used for the LPAR cluster in CSS1, or CSS2, or CSS3. Managed channels cannot cross cluster boundaries either.

Note: See the *z/OS V1R11.0 HCD User’s Guide*, SC33-7988 for more information about the panels to define managed channels and control units.

So that DCM can gather the topology information that it needs, the Control Unit Port (CUP) on every director (switch) that is attached to managed channels must be defined as a device in the control unit definition and in the operating system definition in HCD or HCM. This requirement was new with z/OS.

When defining the control unit and device for the director in HCD/HCM, a good idea is to use the switch ID as the last two digits of the device number. For example, if the switch ID is AE, the device number might be 6CAE. This approach helps for relating the device number back to the switch definition in HCD and HCM.

When defining managed control units, remember that the control unit definition is for a physical processor. If the processor supports multiple LCSSs, the control unit definition must be for a single LCSS. By limiting the number of I/O clusters defined in each LCSS, limiting the number of LCSSs an LPAR cluster spans, and by maximizing the number of managed channels that are defined to a control unit, the customer can provide DCM with greater flexibility in assigning resources.

The HCD Control Unit List panel column named MC indicates how many managed CHPID slots are designated for that control unit. This column contains a value only if managed channel paths are defined for the control unit.

HCD does not save information about whether you want DCM to be able to use a specific port on the director. In the first section of the “Add a Control Unit” HCD panel, define the Switch and Port that every adapter port on a managed control unit is attached to. If you do this step, when you use HCD (Option 2.6.6) to create a CONFIGxx member, a complete matrix of every port on every director that DCM can use is displayed. At this time, you can specify which ports you do *not* want DCM to use. This step results in a CONFIGxx member that contains a set of SWITCH statements, which specify the desired DCM state (DCM or NODCM) of each director port.

The default is for all the ports connected to managed control units to be DCM-enabled. If you want to stop DCM from using some of those ports, you must either issue V SWITCH commands or use the CONFIGxx member with the CONFIG MEMBER(xx) command to change the port status. This information is not saved anywhere in HCD; therefore, you must enter it each time you create a new CONFIGxx member for SYS1.PARMLIB.

Use of the CONFIGxx member:

- Be careful when using the **`CONFIG MEMBER(xx)`** command. This command automatically adjusts your configuration to bring it into line with the model configuration you specified in the CONFIGxx member.
- If you have made any changes to the configuration since the CONFIGxx member was built, for example, if you took a CHPID offline for service, issuing the **`CONFIG MEMBER(xx)`** command resets the configuration to match the definition in the CONFIGxx member.
- Never issue the CONFIG MEMBER(xx) command without first issuing a **`D M=CONFIG(xx)`** command to determine what changes will be made when you issue the **`CONFIG MEMBER(xx)`** command, and confirming that no unexpected changes will be made.
- When the first system in the LPAR cluster has been through IPL, this is not an issue. However, if one system has been through IPL, the other systems in the LPAR cluster are already running, and you have made configuration changes in the interim, issuing the **`CONFIG MEMBER(xx)`** command resets those changes. This process can potentially result in performance or availability problems.

DCM-related commands

The following commands are DCM-related:

- `D IOS,DCM`

  This command displays the current operating status of DCM. This always displays DCM as active unless you turns off DCM.
- `SETIOS DCM=ON/OFF`

  This command turns DCM on or off. The scope is LPAR cluster-wide.
- `D M=CU`

  This command will display the current status of a control unit. The pertinent information for DCM is the total number of managed CHPIDs and the managed CHPIDs that have already been assigned. If a control unit is ineligible for DCM the reasons why will be displayed.
- `D M=DEV`

  This is similar to the `D M=CU`. It displays the total number of DCM managed CHPIDs that can be assigned and the currently assigned CHPIDs.
- `D M=CHP`

  This command displays a matrix of all possible CHPIDs and the status and type for each CHPID. DCM managed online CHPIDs show up in the matrix as an ‘*’. DCM CHPIDs that are managed and offline show up in the matrix as a ‘#’.
- `D M=SWITCH`

  This command can display a matrix of all ports on a switch or individual ports. It includes information about DCM eligibility and operator removal of ports.
- `VARY SWITCH(`*`ssss,pp[-pp][,pp[-pp]...`*`),DCM=OFFLINE[,UNCOND] ,DCM=ONLINE`
  - `ssss` specifies the switch device.
  - `pp[-pp][,pp[-pp]]` specifies the switch port address or address list.
  - `DCM=OFFLINE[,UNCOND]` specifies that the switch port is to be varied offline to DCM. If `UNCOND` is specified, the `UNCOND` option will be passed.
  - `DCM=ONLINE` specifies that the switch port is to be varied online to DCM.

The operator uses this command to control the eligibility of destination ports to DCM. The scope of this command is LPAR cluster-wide. If a control unit link needs service, the operator must first vary the affected ports offline to DCM using this command.

- `VARY PATH`

  This command is rejected for DCM managed paths. To remove a destination port for service, use the VARY SWITCH command. To remove a CHPID for service, use the **`CF CHP(cc),OFFLINE`** command.

- `CF CHP(cc),OFFLINE|ONLINE`

  Use this command to remove a managed CHPID from DCM. Issue it to all systems in the I/O cluster. Remember that DCM assumes that the state of any given managed channel is consistent across all the systems: online or offline to all systems in the I/O cluster. If the state of the managed CHPID is not consistent across all systems, DCM's attempted change to the managed channel fails.

  > **Note:** Only the z/OS CF CHP(cc) removes a CHPID from online status. This cannot be done using the Support Element (SE) commands.

- `D IOS,CUGRP`

  This command was created for FICON DCM so that you can display information about the control unit groups that DCM has created. The general display shows the names of the control unit groups, what static CHPIDs are assigned to the group, how many managed CHPIDs are allowed for the group, how many control units are in the group, and the DCM status of the group.

  More detailed information can be obtained for each group including:

  – A list of all the control units in a group

  – Serial number of the physical control unit

  – Information concerning problems that might make the control unit group ineligible for DCM management

FICON Dynamic Channel Path Management (FICON DCM)

Effective with z/OS 1.11 we now offer FICON DCM.

In order for FICON DCM to function properly, it must communicate with all its peers that are sharing the same managed channels. This means that *all systems in the IO cluster* (not all members of the sysplex) must be at z/OS Release 11 (plus APAR OA28321) or later.

With FICON, multiple data blocks can be sent concurrently without waiting for the notices of receipt, making FICON DCM more responsive to changing needs.

FICON DCM assigns managed channels to a set of control units called a *control unit group*. These groups have the following characteristics:

- Created by DCM when it initializes
- Maintained by DCM when a change occurs to the configuration that affects a group (For example, a dynamic activation may cause two groups to merge into one or a group to split.)
- Defined as a set of control units (logical subsystems) within the same physical control unit with identical static channels

When DCM determines that a control unit needs an additional managed channel, that channel is assigned to all control units in the control unit group. Additionally, a managed channel is assigned only to one control unit group at a time.

A control unit group is created based on the following aspects:

- The group must be a set of control units with identical set of static CHPIDs defined.
- The group may include both managed and non-managed control units.
- All managed group members must have the identical number of managed channels (such as asterisks on the HCD panel) defined to be considered for channel assignment. The group will be created, but no control units in the group will be managed until this is corrected.
- A group cannot cross two or more physical control units.
- There is no limit to the number of control units within a group beyond the architectural device limit of 16K devices.
- Only DASD control units are included in the control unit groups.
- The static CHPIDs may be defined to other control unit types such as tape, switch, or FCTC because these attachments have no bearing on control unit group formation.
- CHPID order is irrelevant to grouping.
- Online or offline status is irrelevant to grouping.
- Port assignments (such as destination link addresses) are irrelevant to grouping.

When a group of control units share identical static channels, and those static channels are not shared by control units outside that group, we say that the configuration is *symmetric*. See Figure 2-5 on page 25.

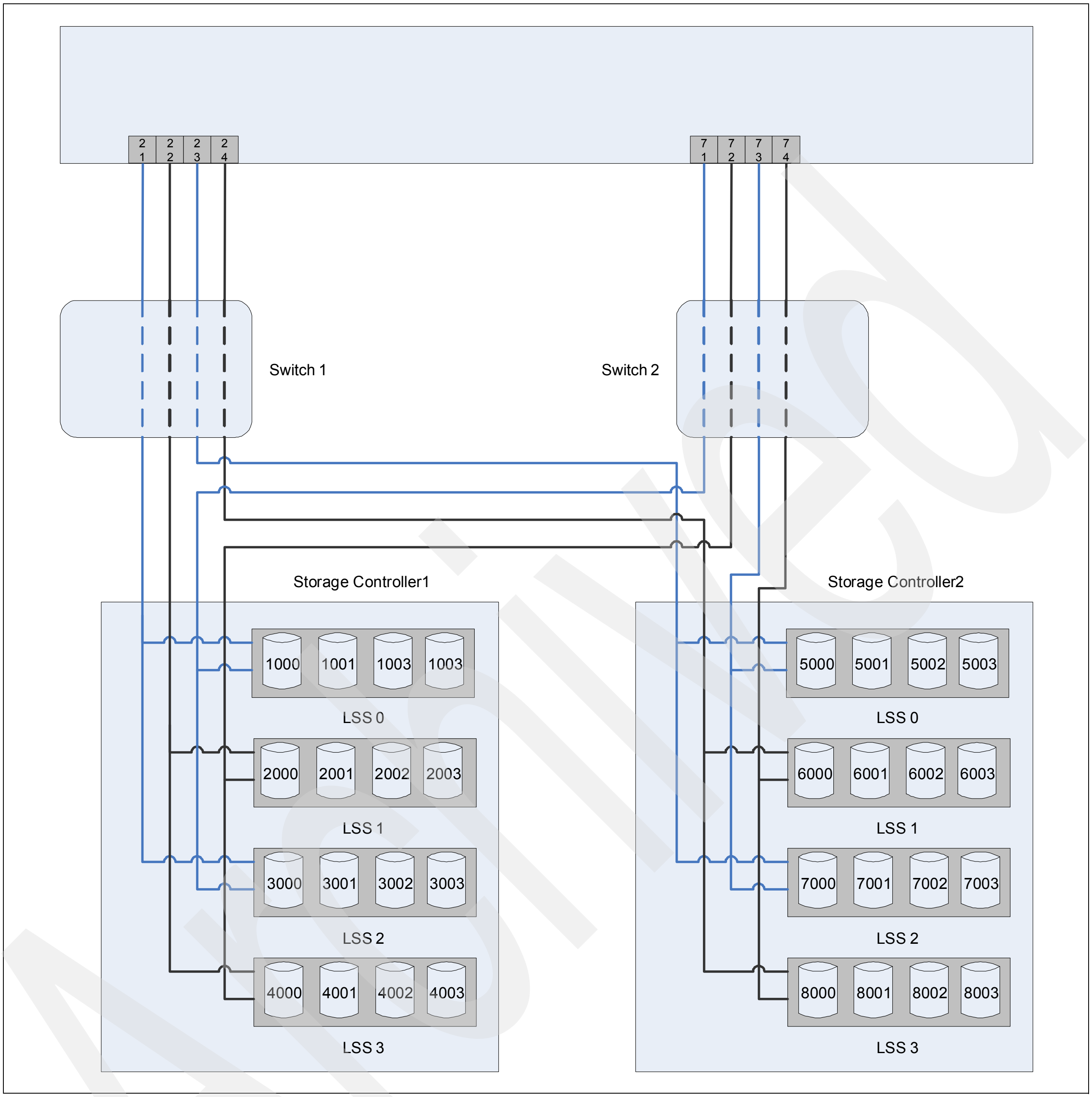


Figure 2-5 Symmetric control unit groups

If two otherwise autonomous groups share a channel, therefore the static channel assignments are not consistent across multiple control units, we say that configuration is *asymmetric*. See Figure 2-6 on page 26.

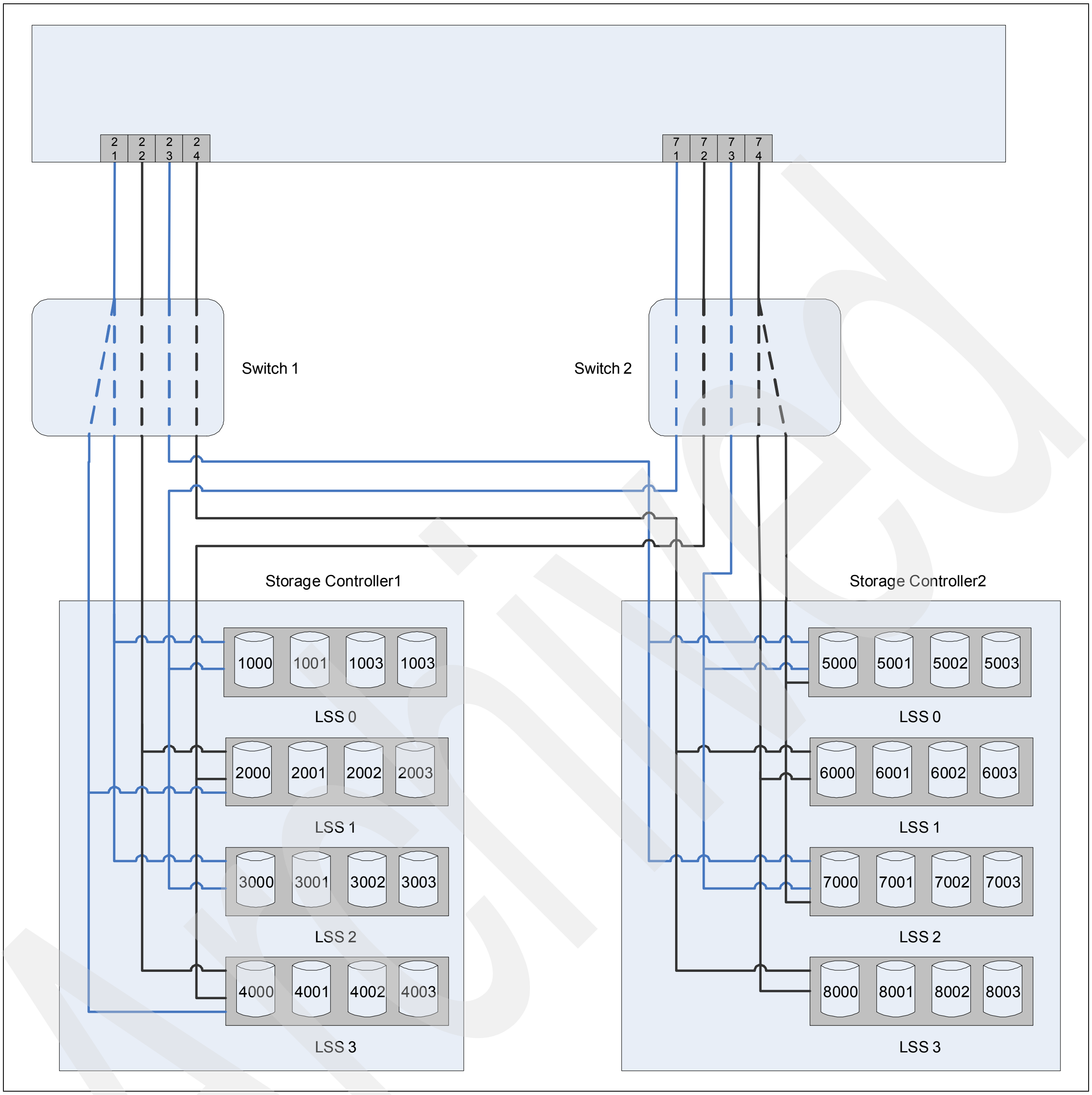


Figure 2-6 Asymmetric control unit groups

When the configuration is asymmetric, DCM creates more control unit groups that, in turn, might result in control unit groups with few or only one control unit. DCM management is not optimal under these conditions. DCM is more efficient if symmetric configurations were created with the static CHPIDs being the same for several control units. The number of control units that are defined within a group and the number of static channels that are shared depend on the workload requirement during peak periods.

If you change to DCM and do not currently have symmetric configurations, consider evolving your current configurations over time to become more symmetric. The rule for determining the number of control units per group looks at the number of channels (static or managed) that are attached to each group. Note the following information:

- Be sure that enough control units are in the group to adequately use at least four channels during normal utilization. A loss of any one channel can reduce the channel bandwidth only by 25%. If only two channels exist and one is lost, bandwidth might be reduced by 50%. Although DCM reacts to this spike in channel utilization, it can take time.
- Be sure that control unit groups do not contain more control units than can be adequately served by six channels (static and managed) during peak utilization periods. DCM may not be able to adequately manage any unanticipated peak demands if the group requires more than six channels. Nevertheless, be sure to define the control unit with all eight managed slots filled in. This allows DCM to add additional managed channels to the control unit group to cover unanticipated peak utilizations.

2.6 Sysplex Timer: ETR and STP

The Sysplex Timer is an IBM unit that synchronizes the time-of-day (TOD) clocks in processors. This section discusses the external time reference and Server Time Protocol.

External time reference (ETR)

The Sysplex Timer provides an external master clock that can serve as the primary time reference, with a link connecting each server in the IBM Parallel Sysplex® to the Sysplex Timer.

The ETR architecture link is used for both setting the local TOD clocks and maintaining time synchronization between the clocks.

The TOD-clock synchronization facility provides an interface between the OS and the Sysplex Timer, so that the OS can perform these tasks:

- Coordinate setting the local clocks with the Sysplex Timer.
- React to losses in synchronization through an external interruption, so that data integrity is maintained.

The 9037 model 2 Sysplex Timer was withdrawn from marketing on 31 December 2006. We suggest using Server Time Protocol.

Server Time Protocol (STP)

Server Time Protocol (STP) is a server-wide facility that is implemented in the Licensed Internal Code of the z10 EC, z10 BC, z9 EC, z9 BC, z990, and z890 servers. STP presents a single view of time to IBM Processor Resource/Systems Manager™ (PR/SM™), and provides the capability for multiple STP configured servers to maintain time synchronization with each other.

As the follow-on to the Sysplex Timer. STP allows events that occur in separate servers to be properly sequenced in time. STP is designed for servers that have been configured in a Parallel Sysplex or a basic sysplex (without a coupling facility), and servers that are not in a sysplex, but need to be time-synchronized.

STP is a message-based protocol in which timekeeping information is passed over data links between servers. The timekeeping information is transmitted over externally defined coupling links.

Coupling links that can be used to transport STP messages are as follows:

- ISC-3: InterSystem Channel-3 links configured in peer mode
- ICB-4: Integrated Cluster Bus-4 links
- PSIFB: Parallel Sysplex InfiniBand links

There are significant differences between the three with respect to the speed of the link and the maximum supported distance.:

- ISC-3 links in peer mode support a link data rate of 2 Gbps and are used for server-to-server communication for distances up to 10 km (6.2 miles) without repeaters. A wavelength division multiplexer (WDM) is considered a repeater.
- ICB-4 (FC 3393) supports a link data rate of 2 Gbps and is used to connect z10 EC, z10 BC, z9 EC, z9 BC, z990, and z890 at a distance of 7 meters (23 feet).
- PSIFB links can be used for distances up to 150 meters (492 feet); PSIFB LR (long reach) links can be used for distances up to 10 km on supported servers. PSIFB links consist of a host channel adapter (HCA) coupled directly to the processor I/O interface. The IBM System z10 supports a 12x (12 lanes of fiber in each direction) InfiniBand Double Data Rate (IB-DDR) coupling link that can support a total link data rate of 6 Gbps. Another option is the PSIFB LR link, which supports a 1x (one lane of fiber in each direction) InfiniBand Double Data Rate or InfiniBand Single Data Rate coupling link with a distance of up to 10 km (6.2 miles) and is capable of a data rate of 5 Gbps.

  Note: ISC links are used when servers are more than 7 meters (23 feet) apart and PSIFB links are not an option.

3

Software details

In this chapter, we introduce the software components that are used in the configuration process.

This chapter contains the following topics:

- Hardware Configuration Definition (HCD)
- Hardware Configuration Manager (HCM)
- CHPID Mapping Tool (CMT)
- Base Control Program internal interface (BCPii)

3.1 Hardware Configuration Definition (HCD)

The z/OS HCD is an interactive product, based on Time Sharing Option/Extensions (TSO/E) and Interactive System Productivity Facility (ISPF), to define, update or view I/O configurations for hardware and software. To define configurations to the hardware and software, you use HCD to create an input/output definition file (IODF). As you enter data, HCD performs validation checking to help avoid data entry errors before you attempt to use the I/O configuration.

Apart from defining the I/O configurations, HCD is used for maintaining the I/O configuration files (change, copy, delete, import and export functions), verifying and activating the I/O configuration at parallel sysplex level, query hardware that is supported by the z/OS system, updating I/O control data sets (IOCDSs), and maintaining director information.

Together with the IBM Tivoli Directory Server for z/OS and the IBM RACF® back-end Selective Directed Broadcast Mode (SDBM), the HCD Lightweight Directory Access Protocol (LDAP) back end can be used to access and update IODF data through the standardized LDAP, based on Transmission Control Protocol/Internet Protocol (TCP/IP).

3.1.1 Reporting

HCD includes a number of reporting functions to view and print I/O configuration data in print files or data sets. Furthermore, *compare* functions are available to support comparisons to other I/O configuration files and to the current hardware and software setup.

Log, message, and trace functions are available for documenting updates, saving messages, and reporting errors.

3.1.2 Installation

The HCD product is installed as part of the z/OS base product. Prerequisites are TSO/E, ISPF, job entry subsystem (JES2 or JES3) for batch jobs that are submitted by HCD and optionally Graphical Data Display Manager (GDDM®) for graphical displays.

The HCD product can be customized as part of the z/OS installation setup. Furthermore, options are available for individual customization.

For more information about getting started with HCD, see *Hardware Configuration Definition Planning,* GA22-7525.

3.1.3 I/O definition file (IODF)

The output of HCD is an I/O definition file (IODF), which contains I/O configuration data. An IODF can define multiple hardware and software configurations to the z/OS operating system. When you activate an IODF, HCD defines the I/O configuration to the channel subsystem, the operating system or both.

Three types of IODFs exist:

- Work IODF

  Use a work IODF to create a new I/O configuration definition or modify an existing one. A work IODF provides a way to build or modify an IODF before you use it to activate a configuration. It is a working copy that cannot be used for IPL selection or dynamic activation. When a work IODF is ready to use, build a production IODF from it.

- Validated work IODF

  A validated work IODF satisfies all validation rules for building production IODFs. It might include physical channel identifiers (PCHIDs). In cooperation with HCD and the CHPID Mapping Tool, a validated IODF is required to accept new or updated PCHIDs. From such a validated work IODF, an IOCP input deck that is suitable for use with the CHPID Mapping Tool is generated. After all PCHIDs are inserted or updated in the validated work IODF, the production IODF can be built. In HCD, you can use various methods to obtain a validated work IODF.

- Production IODF

  A production IODF defines one or more valid I/O configurations. A configuration in a production IODF can be activated dynamically or selected during IPL. Although you can build multiple production IODFs, only the one that is selected during IPL or activated during dynamic configuration is the active production IODF.

To change a configuration, create a work IODF from a production IODF. When you attempt to change a production IODF, HCD automatically copies the production IODF into a work IODF so you can make your changes. When changes are complete, build a production IODF from the work IODF.

3.1.4 Terminology

The terminology used in operating systems differs from that used in the products for maintaining or controlling the use of the I/O configuration. See Table 3-1.

Table 3-1 Terminology

z/OS	HCD	HCM	HMC	Other
IODF	Work and production IODF	Work and production IODF	Not applicable	Not applicable
Configuration ID	OS Config	OS Config	Not applicable	Not applicable
CPC or CPU	Processor	Processor	Server	CEC
LPAR	Partition	Partition	Image	Not applicable
Physical Channel ID or Channel Path	PCHID or CHPID	PCHID or CHPID	Channel Path	Not applicable
Not applicable	CUADD disk control unit	CUADD disk control unit	Not applicable	SSID (storage or RMF)
Not applicable	Control unit	Controllers and control unit	Not applicable	Not applicable
Unit	Device	String and device	Not applicable	Not applicable
MIF ID	Channel subsystem ID and partition number	Channel subsystem ID and partition number	Partition identifier	Not applicable
Not applicable	One or more control units	One or more control units	Not applicable	LCU (RMF)

3.1.5 Documentation

Consider documenting the current work and production IODFs including OS configurations, EDTs, consoles, LOADxx members, IOCDSs, and others that are used. Documenting the current work IODF that is used can help prevent you from losing work IODF updates, because new work IODFs can be created from a production IODF. Documenting the setup is useful for operators and other people managing the systems, helps you limit time spent during backup procedures, and minimizes the risk of errors.

For more detailed information about HCD and its functions, consult the *z/OS V1R11.0 HCD User's Guide*, SC33-7988.

3.2 Hardware Configuration Manager (HCM)

The z/OS and z/VM HCM is a PC-based client/server interface to HCD that combines the logical and physical aspects of hardware configuration management.

HCM presents an interactive configuration diagram, which allows us to maintain both the logical connectivity data in the IODF, and the physical information about the configuration. The logical information in the IODF represents the operating system and the channel subsystem definitions; the physical information (cabinets, patchports, crossbar switches, cables and locations) adds the infrastructure to the logical data.

Furthermore, the logical and physical information for each object in the configuration match because they are created by the same process. When we create an object, we add its logical and physical information at the same time. When we connect, for example, a controller to a processor, the selected control units are logically defined to the selected CHPID through a controller channel interface; the physical connection, including the cable, is displayed visually in the configuration diagram.

Finding and fixing configuration problems is made much easier because physical and logical information cannot diverge. We can, therefore, use HCM to accurately represent our hardware configuration, by supplementing the IODF data.

3.2.1 Reporting

HCM can interface with HCD and produce HCD style reports, HCD compare operations, and HCM's style of reports. HCM can also produce wall chart configuration drawings of selected hardware.

3.2.2 Installation

To install HCM, perform the following steps:

1. Enable, configure, and start the HCM address space on the z/OS or z/VM host LPAR. Note the following information:
   - HCM is an optional, exclusive, priced feature. The z/OS libraries are installed as part of your ServerPac, CBPDO, or SystemPac® z/OS installation. This procedure is performed by the system administrator at the host and is described in the z/OS Program Directory for z/OS, or, for z/VM, in the HCD and HCM for z/VM Program Directory.

– HCM is a client/server application using HCD on the host as its server. The communications protocol between the workstation and the host is TCP/IP.
– UNIX® Systems Services and TCP/IP must be running and the HCM user ID must be entitled to access the UNIX Systems Services.

2. The HCM installation utility is stored in the following data set on the z/OS or z/VM host:

   `SYS#.SEEQINST(EEQINSTM)`

   Install HCM on the workstation, according to the following steps:

   a. Download the installation utility to your workstation in binary mode, and rename the file *on your workstation* with extension of `.msi` (Microsoft® software installer, from Version 1.11).
   b. Run the downloaded installation utility `EEQINSTM.msi` or double-click the file.
   c. Follow the installation prompts.

3. Set up the TCP/IP definitions.

   Two system procedures must be configured on the host so that the HCM can communicate with HCD by using TCP/IP:

   – HCM dispatcher: The HCM dispatcher runs as a started task on the host and listens on a specific TCP/IP port (51107 is the default port) for incoming HCM login requests. The JCL for this task is in the `SYS1.IBM.PROCLIB(CBDQDISP)` location.
   – HCM agent/HCD server: This batch job is submitted by the HCM dispatcher and listens for HCM requests from the workstation, after an HCM client is logged in. The JCL for this task is in the `SYS1.IBM.PROCLIB(CBDQAJSK)` location.

For more information about setting up HCM and its functions, see *HCM User's Guide*, SC33-7989.

3.3 CHPID Mapping Tool (CMT)

The CMT maps your hardware I/O ports (or PCHIDs) to the CHPID definitions in your IOCP source statements. This mapping helps you to avoid connecting critical paths to single-points-of-failure.

The CMT supports System z10 Enterprise Class, System z10 Business Class, System z9 Enterprise Class, System z9 Business Class, zSeries 990, and zSeries 890 servers, and can be used for new system builds, upgrades, and miscellaneous equipment specification (MES) upgrades.

3.3.1 Installation

Log on to Resource Link with a valid IBM Registration ID (IBM ID):

http://www.ibm.com/servers/resourcelink

You may then download the CHPID Mapping Tool (or an upgraded version of it) to your workstation from the Tools section. After downloading the program, install it on your workstation.

Also under downloads in the Tools section is another link named *CFReport (I/O Configuration data)*. Click this link if you have a current Configuration Control Number (CCN). A CCN is generated when a new processor, or processor upgrade, is ordered.

Enter the CCN to retrieve the CFReport file containing the processor hardware information. Download this file to your workstation. If you are unable to retrieve the CFReport file, contact your IBM support representative to retrieve or recreate it for you.

CMT uses the CFReport as part of its analysis, the other part is an IOCP source file that is generated from a validated work IODF.

Therefore, now that the CMT has a file showing how the physical hardware looks (CFR) and a file showing how the IODF looks (IOCP), CMT can map the IODF to the CFReport data for best availability.

Along with other fine tuning features, the CMT can also produce detailed control unit and PCHID reports for cabling and operations support.

For more detailed information about setting up CHPID Mapping Tool and its functions, consult the *CHPID Mapping Tool User's Guide*, GC28-6825.

3.4 Base Control Program internal interface (BCPii)

The BCPii function is a secure z/OS interface to your HMC/SE that allows authorized applications to query, change, and perform basic operational procedures against the installed System z hardware base. BCPii offers complete communication isolation of existing networks (intranet/Internet) from the HMC network.

3.4.1 BCPii address space

As a base BCP component, the new BCPii address space (HWIBCPII) allows authorized z/OS applications to access the local Support Element (SE) and other SEs in the HMC network to perform HMC-like functions through a set of high-level application program interfaces for data exchange and command requests. For APIs or callable services, see *z/OS MVS Programming: Callable Services for High-Level Languages*, SA22-7613.

The new BCPii address space is the bridge between a z/OS application and the SE. Note the following information about the BCPii address space:

- Manages all application connections.
- Builds and receives all internal communication requests to the SE.
- Provides an infrastructure for storage required by callers and for the transport communicating with the SE.
- Provides diagnostic capabilities to help with BCPii problem determination.
- Provides security authentication of requests.

When correctly configured, the BCPii address space attempts to start automatically during IPL, and it can be stopped and restarted through the START HWISTART command.

3.4.2 BCPii installation steps

To install BCPii, perform the following steps:

1. Apply all hardware microcode updates, including HMC updates.
2. Apply the BCPii enabling PTF (UA47493).
3. Configure the local SE to support BCPii and you authorize an application to use BCPii.

4. Configure the BCPii address space.
5. If required, set up the event notification mechanism for UNIX System Services callers.
6. IPL the z/OS again to fully enable BCPii.

3.4.3 Functions performed using BCPii APIs

Use BCPii APIs to perform the following functions:

- Obtain the System z topology of the current interconnected CPCs, images (LPARs), and capacity records. Examples of this information are as follows:
  - CPC information: such as Name, Serial number, Machine type/id, Networking information
  - Image information: such as Name, Operating system information
  - Capacity record information: such as Name, Activation/Expiration dates, Activation days
- Query various CPC, image (LPAR) and capacity record information. Examples of this information are as follows:
  - CPC information: such as general, operating, and other status values, various CBU information, capacity on demand information, processor configuration including IFA, IFL, ICF, and IIP
  - Image information: such as defined capacity, processor weights
  - Capacity record information: such as record status and the entire capacity record
- Issue commands against both the CPC and image to perform hardware and software-related functions:
  - CPC commands
    - Activate or deactivate an entire CPC
    - Capacity BackUp (CBU) activate or undo
    - On/Off capacity on demand activate or undo
  - Image commands
    - System reset
    - Load
    - Start or stop all CPs
    - Add or remove temporary capacity
    - Issue operating system commands
- Listen for various hardware and software events that might take place on various CPC and images. Examples of events to listen for are command completions, status changes, capacity changes, disabled waits, and BCPii status changes.

3.4.4 Enhancements at z/OS 1.11

Several features are relevant to I/O configuration with z/OS R1:

- New callable service (HWISET) to set various CPC and image (LPAR) attributes.
- BCPii applications can now query and modify all activation profile definitions on the Support Element including reset, image and load activation profiles.
- New IPL token attribute introduced so that XCF can obtain knowledge about the status of another system, and upon the demise of the system, can potentially partition the failed member out of the sysplex immediately and reset the demised system.

4

z/OS I/O supervisor

The main purpose of any computing system is to process data obtained from I/O devices. This chapter discusses the life of an I/O operation, the terminology of what is involved, and the I/O supervisor (IOS).

4.1 The workflow of an I/O operation

Figure 4-1 shows the workflow of an I/O operation. This chapter discusses the components shown in the figure.

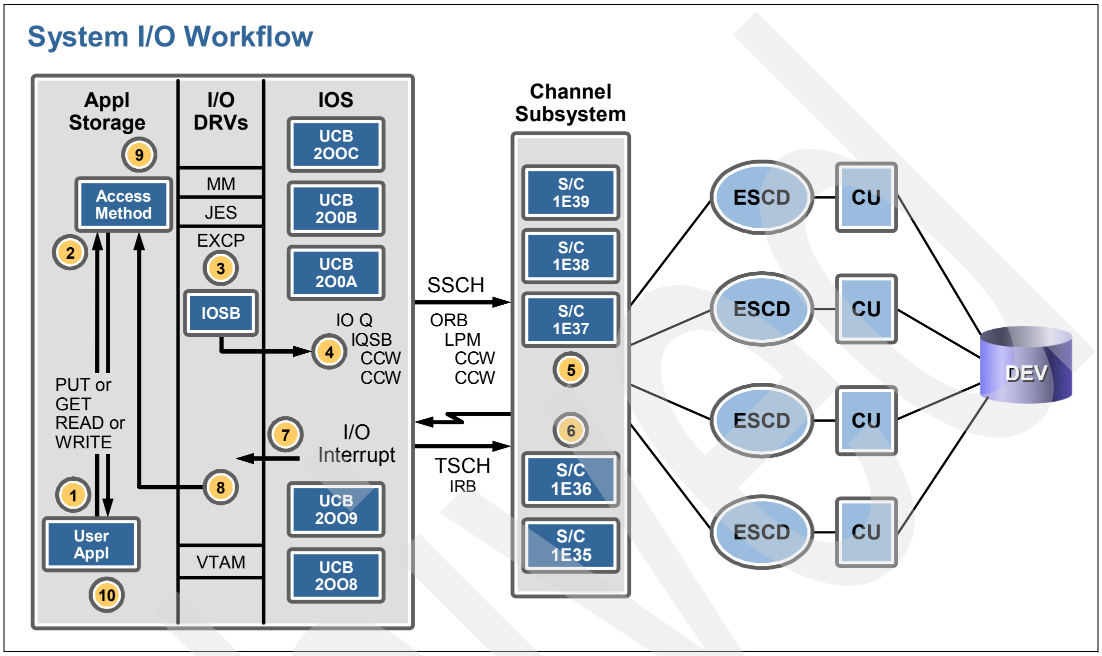


Figure 4-1 Workflow of an I/O operation

This diagram shows the flow of an I/O operation starting with the request from an application until the operation completes. The diagram shows the following steps:

1. The user program begins an I/O operation by allocating a data set. The OPEN macro instruction causes the user's access authority to be granted (in this example, we assume that the user has authority) and the data set to be allocated to this program. The program uses an I/O macro instruction, such as GET, PUT, READ, or WRITE. The I/O macro instruction invokes an access method (through a branch instruction) that interprets the I/O request and determines which system resources are required to satisfy the request.
2. An access method performs the following functions:
   - Creates the channel program (with virtual addresses) knowing the physical organization of the data.
   - Implements buffering.
   - Guarantees synchronization.
   - Automatically redrives the I/O request following a failure.

   Although the user program can bypass the access method, it must consider many details of the I/O operations, such as the physical characteristics of the device. The program also must create a channel program consisting of instructions for the channel subsystem, and invoke the EXCP processor, an IOS driver, to handle the next phase of the I/O process. There are several z/OS access methods, each of which offers various functions to the user program. Examples of access methods are Virtual Storage Access Method (VSAM), basic partitioned access method (BPAM), queued sequential access method (QSAM), and so on. The access method that is used depends on how the program accesses the data (such as randomly or sequentially) and the data set organization (sequential, partitioned or PDS, VSAM, and so on).

3. To request the movement of data, either the access method or the user program presents information about the I/O operation to an I/O driver routine (usually the EXCP driver) by issuing the EXCP macro instruction, which expands into an SVC instruction. The I/O driver (now in supervisor mode) translates the virtual storage addresses in the channel program (CCW Command Chain Addresses and CCW Data Addresses) to real storage addresses, which are in a format acceptable to the channel subsystem, fixes the pages containing the channel programs (CCWs) and the data buffers, guarantees the data set extents, and invokes the I/O supervisor (IOS). Media Manager (represented by an MM in Figure 4-1) is the I/O driver of the VSAM access method.
4. IOS places the request for I/O on the queue for the chosen I/O device in the UCB and issues the Start Subchannel (SSCH) instruction to send the request to the channel subsystem. Generally at this point, the task that initiated the I/O is placed in a wait state, and the CPU continues processing other tasks until the channel subsystem indicates, with an I/O interrupt, that the I/O operation has completed.
5. The channel subsystem selects a channel path to initiate the I/O operation between the channel and control unit or device, and controls the movement of data between the channel and processor storage.
6. When the I/O operation is complete, the channel subsystem signals completion by generating an I/O interrupt.
7. IOS processes the interruption by determining the status of the I/O operation (successful or otherwise) from the channel subsystem using a Test Subchannel (TSCH) instruction. If page fixing was done for the request, the unfix process takes place.
8. EXCP macro or the user program indicates that the I/O is complete by posting the access method and calling the dispatcher.
9. When appropriate, the dispatcher reactivates the access method.
10. The access method returns control to the user program, which can then continue its processing.

4.2 Unit control block (UCB)

z/OS (and OS/390® before it) uses a UCB to represent a device and its state. System programmers use HCD to define I/O devices in an I/O definition file (IODF), and to connect the devices to an operating system configuration. During the IPL, the IODF is read and one UCB is built in SQA for each I/O device definition found in the IODF. The load parms that are used during IPL of the operating system control which IODF is used. Note that with z/OS 1.10, the IOS UCB extension (UCBX) control block has been moved to a new virtual storage area above the 2 GB bar called *High Common Storage Area (HCSA).*

If a device physically exists but is not defined in the IODF, a UCB is not built, and applications are unable to access the device. Subsequent to the IPL, devices can also be dynamically defined, changed, or deleted by using HCD or the z/OS ACTIVATE command.

The UCB contains all the information necessary for z/OS to use the device for performing I/O requests, and records the last known status of the physical I/O device. The UCB describes the characteristics of a device to the operating system. The UCB is used by the I/O supervisor (IOS) when performing I/O requests, and by the job scheduler during data set allocation.

A subset of the information in the UCB can be displayed using the UCB option of the DEVSERV QDASD operator command, as shown in Figure 4-2 on page 40.

```
IEE459I 09.16.42 DEVSERV QDASD
 UNIT VOLSER SCUTYPE DEVTYPE       CYL  SSID SCU-SERIAL DEV-SERIAL EFC
0D010 Z1ARA1 2107922 2107900     10017  D000 0175-BALB1 0175-BALB1 *OK
****      1 DEVICE(S) MET THE SELECTION CRITERIA
****      0 DEVICE(S) FAILED EXTENDED FUNCTION CHECKING
```

Figure 4-2 Output of DS QDASD command

Because traditional devices do not allow more than one I/O at a time, IOS uses the UCB as a queue anchor block. If the device is already executing a previous I/O operation initiated by this system, a new I/O request is queued in the UCB.

4.3 Channel subsystem

The System z channel subsystem contains the following items:

- One or more special processor units (PU), which are called *system-assist processors* (SAPs)

  An SAP runs special I/O Licensed Internal Code. The SAP takes responsibility for some of the processing during the execution of an I/O operation, freeing up the operating system CPs to do other work. It schedules an I/O operation, checks for the full availability of the I/O path, and provides a queue mechanism if an I/O path is not available.

- Channels, which are able to communicate with I/O control units (CUs) and manage the movement of data between processor storage and these control units

  They are located in I/O cards in the zSeries I/O cage. Maximum number of addressible channel paths is 256 per logical control unit.

  Specifically, the channels can perform the following functions:

  – Send channel commands from the processor to a CU with electrical or optical signals.
  – Transfer data during read and write operations.
  – Receive status at the end of operations.
  – Receive sense information from control units (such as detailed error information)

- Up to 64K subchannels (also called UCWs).
- I/O devices, which are attached through control units.

An I/O operation starts when an SSCH instruction is executed by IOS, which issues the instruction on behalf of a z/OS dispatchable unit (TCB or SRB). It ends when an I/O interrupt is received by the processor (forcing the execution of IOS code again).

4.3.1 Start Subchannel (SSCH) logic

SSCH is a privileged instruction that is issued by IOS to start an I/O operation. The SSCH instruction has two operands:

- Subchannel number, which is an index to the subchannel associated with the I/O device where the I/O operation will be executed. See 4.8, “Subchannel number” on page 44 for more information about subchannels.
- Operation Request Block (ORB) address, which contains information about *what to do* during the I/O operation; among other fields it contains the channel program address.

The SSCH moves the ORB contents into the respective subchannel and places the subchannel in a specific hardware system area (HSA) queue named the *initiative queue*.

4.3.2 SAP logic

Depending on the processor model, one or more SAPs are in a channel subsystem. The SAP finds the subchannel in the initiative queue and tries to find a channel that succeeds in *initial selection* (connects to a control unit and starts the I/O operation). The SAP uses information in the subchannel to determine which channels and control units can be used to reach the target device.

Initial selection can be delayed for any of the following reasons:

- One or more channels (serving the device) are busy.
- The Switch port connecting the control unit is busy.
- The control unit is busy.
- The device is busy, because of activity from another system.

During all of these delays, the request is serviced by an SAP without z/OS having to become involved. When the I/O operation finishes, the SAP queues the subchannel (containing all the I/O operation final status information) in the I/O interrupt queue.

4.3.3 Interrupt processing

System z I/O processing is an interrupt-driven architecture rather than a polling architecture. The only exception to this rule is the handling of the z/OS and coupling facility communication, where polling is used. When a CPU is enabled for I/O interrupts, and it detects a unit control word (UCW) from the subchannel in the interrupt queue, the I/O interrupt is accepted and control is passed to IOS. An Interrupt Response Block (IRB) describing the final status of the I/O operation is moved to storage. Another way to receive this interrupt is by IOS synchronously issuing the test pending interrupt (TPI) instruction. Normally, IOS then posts the z/OS process waiting for the I/O operation.

In certain error situations, when the I/O interrupt is not generated within an expected time frame, the Missing Interrupt Handler (MIH), a timer-driven routine, alerts IOS about this condition.

4.4 Channel types and CHPID

This section discusses the types of channels.

Understand the difference between the terms *channel* and *CHPID*:

- A *channel* is the piece of hardware with logic in the CPC and to which you connect a cable in order to communicate with an outboard device.
- *Channel path identifiers (CHPIDs)* are the 2-byte *identifiers* for channels. You use a CHPID to identify a channel to the hardware and software in the HCD.

Although the two terms are often used interchangeably, we refer to attaching a control unit to a *channel* and using the *CHPID* in a z/OS CONFIG command to identify the channel you want to bring online or offline.

Many types of channels are available. The following channels can connect a DASD subsystem:

- ESCON channels

  ESCON channels were introduced in 1990 on the 3090 J series of processors, and can run at speeds up to 17 MB per second using fiber cables. Unlike parallel channels, ESCON channels are point-to-point topology (each channel connects to only one control unit). However, ESCON channels can be used with a switch (the ESCON Director) to give a single ESCON channel access to more than one physical control unit. ESCON channels can be shared between logical partitions in the same CPC using the multiple image facility (MIF).

- FICON bridge (FCV) channels

  These channels were introduced with the 9672 G6 CPCs, and are available on the 9672 G5 and G6 and IBM zSeries 900 CPCs. FICON bridge channels protect the investment in control units with ESCON adapters by allowing those control units to be used with the newer FICON channels. FICON bridge channels are connected to the DASD controllers through the ESCON Director, using special bridge cards in the director. FICON bridge channels provide higher bandwidth and greater distances than ESCON channels, and support up to 16K devices per channel compared to the ESCON implementation limitation of 1024. FICON bridge (FCV) channels can be shared between LPs in the same CPC using MIF.

- FICON channels

  FICON offers many advantages over ESCON. It enables multiple concurrent I/O operations to occur simultaneously to multiple control units. This feature is one of the fundamental differences between FICON and ESCON, with its sequential I/O operations. FICON uses fiber cabling more efficiently, thereby enabling improved performance, longer distances, and more addresses

4.5 Directors (switches)

A *director*, by which we mean an ESCON director or a FICON director, provides a means of attaching more than one physical control unit to a single channel, and also allows you to effectively attach more than one channel to a single control unit port. You may also connect a channel to another channel (as in a CTC) or a control unit to another control unit, as in a remote copy scenario.

ESCON directors and FICON directors are high-speed switching devices that can dynamically connect two or more ports. The ports can be connected on a permanent basis, known as a static connection, in which those ports cannot communicate with any other port. More significantly, in the context of this book, are the connections that are dynamic, providing the ability for a single host channel to communicate with more than one physical control unit and vice versa.

When the director is defined in HCD, it is given a 2-byte ID. This ID is used when you tell HCD which director a given channel or control unit is attached to.

When you use HCD to define a control unit that is connected through a director, you must tell HCD, for each path on the control unit, which channels, which directors (or *Switch*, in HCD terminology), and which ports (link) on the director the control unit is attached to. This information is then used by the channel to build the address by which it communicates with the device (LINK.CUADD.UA).

Note the following information:

- *Link* is the port address that the control unit is connected to. The CUADD parameter identifies the logical control unit image that contains the requested device.
- The *Unit Address (UA)*, is the name by which a channel knows a device attached to one of its control units. The UA is two hexidecimal digits in the range of 00 - FF.

  Note: The UA does not need to match any part of the device number, but you must be careful during device definition in HCD because the unit address defaults to the last two digits of the device number, if not explicitly specified.

  The UA that is specified in HCD for a device must match the hardware UA on the physical control unit the device is attached to. The hardware UA is set by the engineer when the device is installed.

Specifying the port that the channel is connected to is not mandatory because the channel obtains that information at initialization in a dialog with the director. However, to maximize the value of HCD as a repository of physical and logical connectivity, be sure to specify this information when you define the channel.

4.6 Control units

This section clarifies the terms *controller*, *control unit*, *logical control unit (LCU)*, and *physical control unit*. Figure 4-3 shows control unit terminology.

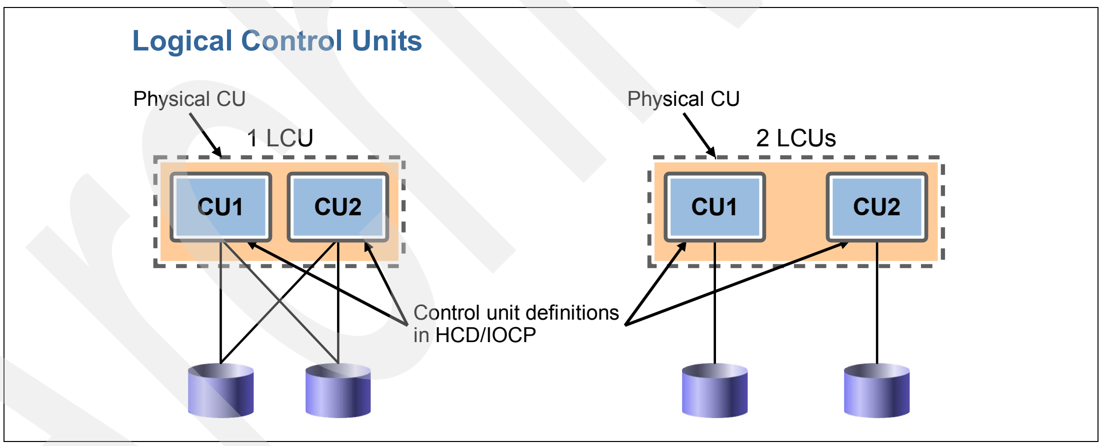


Figure 4-3 Pictoral view of control unit terminology

The terminology of control units is explained in the following list:

- Control unit (CU)

  In all cases, an I/O-device operation is regulated by a control unit that provides the functions necessary to operate the associated I/O device. The control unit is also responsible for interfacing with the channel (ESCON or FICON). The control unit function may be housed with the I/O device or a separate CU may be used. The term control unit is often used, depending on context, to refer to either a physical control unit, a logical control unit, or a logical control unit image.

- Physical control unit

  This unit is also called a *controller* or *DASD subsystem* and is the piece of hardware that sits on your computer room floor.

- Logical control unit (LCU)

  The LCU is defined in the *System z Input/Output Configuration Program User's Guide for ICP IOCP*, SB10-7037 as a channel subsystem concept and that represents a set of control units, which attach common I/O devices. When you define an I/O configuration by using HCD or HCM, you define channels, control units, and I/O devices. When you define the device, you specify to which CU or CUs the I/O device is attached. When you perform a power-on reset (POR), LCUs are built in HSA, providing an anchor point to queue I/Os to one of the devices in that LCU.

4.7 Device number

The device number is like a nickname and is used to identify a device in interactions between the user and the system. Device numbers are used in JCL, console commands, console messages, and error recording.

Every channel-attached device in a z/OS configuration is assigned a unique device number HCD or HCM when the system programmer defines the device to the channel subsystem (hardware) and HCD or HCM. The arbitrarily assigned number in the range 0000 - FFFF (16 bits) allows for a maximum of 64K devices available per channel subsystem (CSS).

Note: If the device is shared between two systems in separate CPCs, be sure that the same device number is used in each system to identify the same device.

4.8 Subchannel number

The subchannel number identifies a device during the execution of the SSCH instruction and the I/O interrupt processing.

Every device defined through HCD or HCM in the IOCDS is assigned a subchannel number (UCW). Subchannels are the hardware representation of devices. They are used by the channel subsystem to represent devices and to control I/O operations over channels to devices. In order for IOS to communicate to a device, a subchannel must exist in the channel subsystem.

Subchannels are built at POR time in HSA, at LPAR activation, as a result of CHPID reconfiguration (if it adds the first path to the device for this LPAR), or when they are dynamically added using the HCD or the z/OS ACTIVATE command. Note the following information:

- Subchannels are used in communications between IOS and the channel subsystem (CSS).
- During the execution of the SSCH instruction, the addressed subchannel is located in the subchannel table through its subchannel number (which is the index into the table).
- Subchannel numbers are contiguous, starting at 0000 (for each CSS) and are assigned when the IOCDS is created.

- Subchannel numbers are usually not required by the operator and are not displayed in the output from any operator commands.
- The contents of the subchannel can be displayed on the HMC. Two types of information can exist in a subchannel:
  - Static information, such as which CHPIDs can access the device, is obtained from the IOCDS.
  - Dynamic information reflects the current state of the device and the current I/O operation.

When subchannels are built (at POR time) they are left in a disabled state. They are also disabled during the initial stage of IPL. Subsequently, in IPL processing, z/OS attempts to match devices (UCBs) and subchannels (UCWs). Any subchannel that has a matching UCB is enabled for that LPAR.

All the I/O data contained in IOCDS is used by the channel subsystem; control units are not *aware* of the IOCDS. Certain *devices* are not defined in HCD or HCM, but are represented by a subchannel number, such as the ADMF function and cryptographic PCI-CC.

4.9 Paths

A path is simply a route to a device.

From an operation system point of view, a path flows from the UCB, which represents the device to z/OS, through the subchannel (UCW, which represents the device in the channel subsystem), over a channel, possibly through a director (switch), and through the control unit to the device itself.

From a hardware perspective, a path runs from the channel subsystem, through the director, to the control unit, and out to the device.

All those components must physically exist and be connected correctly so that the path can exist. The IOCDS must accurately reflect the actual physical connectivity so that problems can be avoided.

The paths to a device are initialized during IPL by a process called *path validation*. During path validation, the state of each path is determined. If a component of the supporting hardware is unavailable, that path is not brought online.

Two requirements exist for an operating system to be able to access a device through a given path:

- The hardware must be configured so that physical connectivity exists between the device and the CPC; *and* configuration must have been defined correctly using HCD or HCM.
- The software must be aware of the paths, and must have varied those paths online.

Part 2

Configuration

In this part, we discuss the details of planning and executing an I/O configuration.

5

I/O configuration process

Based on the concepts and tools explained in previous chapters, in this chapter, we discuss how the tools relate.

> **Note:** The scenario in this chapter runs with the premise that the I/O configuration is built from a central location and the IODF is transmitted to the IODF volume on a target processor.

We categorize the I/O configuration steps into groups of common functions:

1. Initiation: Requesting a change
2. Prerequisites: Reviewing a prework checklist
3. Design: Planning the IODF configuration
4. Define: Creating the work IODF configuration
5. Check: Checking the work IODF configuration
6. Create: Building the production IODF configuration
7. Test: Testing the production IODF on the target system
8. Available: Making the production IODF available for POR
9. Apply: Activating the production IODF on the target system
10. "Communicate: Documenting and relaying configuration changes

5.1 Initiation: Requesting a change

This section summarizes the components that are involved when a new processor or processor change is initiated by the customer.

The following topics are discussed regarding the initiation of an I/O configuration:

- New order
- IBM configurator for e-business (e-Config)
- CCN for retrieving the CFReport
- Resource Link
- CFReport
- Machine information
- PCHID Report from e-Config

5.1.1 New order

The configuration process starts as a new order in either of the following ways:

- A customer requests a configuration design.
- An IBM support representative suggests a configuration design.

The configuration design can be to add to, modify, or remove hardware from the customer's configuration environment.

5.1.2 IBM configurator for e-business (e-Config)

The new order is then initiated with the IBM configurator for e-business (e-Config) to IBM manufacturing by the IBM support representative.

5.1.3 CCN for retrieving the CFReport

In this process, the customer receives the following information from the IBM support representative (see Figure 5-1):

- A New Order report, which shows the configuration summary of what is being ordered.
- The CCN (Configuration Control Number) which can be used to retrieve the CFReport from Resource Link. The CFReport is a data file that contains a listing of hardware configuration and changes for a CPC. See 5.1.5, "CFReport" on page 51.

```
1.  Version : 20090914
    C:26853678 N:4604724
    ID1:haimo@us.ibm.com
    ID2:haimo@us.ibm.com
    Region:US
    ************************************************************
    *   Configuration                        Customer          *
    *   Control Number                        Number           *
    *   **************                   **************        *
    *   *            *                   *            *        *
    *   *  26853678  *                   *  4604724   *        *
    *   *            *                   *            *        *
    *   **************                   **************        *
    *                                                          *
    * Customer Service Representative:                         *
    ************************************************************
```

Figure 5-1 CCN: Example from e-Config report

5.1.4 Resource Link

The first step in planning for installation of the CPC is accessing IBM Resource Link. You must register with an IBM Registration ID (IBM ID) and a valid e-mail address. Your IBM support representative can assist you with this registration process.

After registering with Resource Link, you have access to a number of resources and tools that are needed in the installation process, and information regarding the CPC. A number of tools are available to simplify the installation process of a CPC. Even if you have worked with most of them before, be sure to check for the latest versions that are relevant to your CPC.

The Education tab contains information about the new HMC application, an online tutorial, and an education module for the CHPID Mapping Tool.

You must have an IBM ID to sign onto the Resource Link Web site. Registering to obtain an IBM ID takes several minutes. Go to the IBM Resource Link Web address:

http://www.ibm.com/servers/resourcelink

After you have an IBM ID, you may customize your profile to the servers that you are responsible for.

5.1.5 CFReport

The CFReport file is a positional data file to be used only as input to the CHPID Mapping Tool. Figure 5-2 shows a sample segment of the CFReport data file.

```
060049001MDDSW Region^1^^SV_DEFAULT_CATEGORIES^0^
060045001VPDDATE=20090124^TIMESTAMP=14:59:44^
07                                                     2097E2602001DE50
060024001XMLCCN^26853678
012BASE CONFIGURATION
10
252097 E26    10084       20114      470156       10162       60163       30164       40165
952097E26          02001DE50                                 1             460472420091009
060034001BED1^1^1D69E64C^1EE6AF9C^
960084                                          HMC w/Dual EN
960114                    N                     I/O Cage Full Card Airflow
960156                    N                     CEC
960162                                          HCA2-C Fanout
960163                                          HCA2-O Fanout 2 IFB Links
960164                                          MBA Fanout Card
```

Figure 5-2 CFReport: Sample from e-Config

5.1.6 Machine information

To access any of the machine information, your IBM ID must be authorized. To have it authorized, use the line “Register for machine information,” on the Machine information Web page, as follows:

1. Sign in to the Resource Link Web site:

   http://www.ibm.com/servers/resourcelink

2. Under Servers in the Tools panel, click **Machine information**.

3. Click **View all machines**.

   If none of your servers is accessible, you must request access through your IBM customer support representative. To access your site's machine information, update your Resource link profile with your customer ID. After it is approved, you will have access to your site's machine information.

   If your IBM ID is registered with your customer name and number, a list of servers that have been profiled for your customer number is displayed.

4. Click the serial number of the server you are inquiring about.

Reports that are available include information about customer data, system status, RC/MCL, CHPIDs, and MES.

5.1.7 PCHID Report from e-Config

The PCHID report lists the PCHIDs that the CPC will have after the change, and a summary of what is changing. Figure 5-3 shows a sample segment of the PCHID report.

```
CHPIDSTART
  CCN Unavailable              PCHID REPORT                      Oct 20,2009
  Machine: 2097-E26  02001DE50
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Source          Cage  Slot  F/C    PCHID/Ports or AID             Comment
  06/D2           A25B  D206  0163   AID=09

  06/D6           A25B  D606  0163   AID=0B

  15/D2           A25B  D215  0163   AID=19

  15/D6           A25B  D615  0163   AID=1B

  06/D5           A25B  D506  3393   014/J01 015/J02

  06/DA           A25B  DA06  3393   01E/J01 01F/J02

  15/D5           A25B  D515  3393   034/J01 035/J02

  15/DA           A25B  DA15  3393   03E/J01 03F/J02

  15/D9/J01       A01B  01    0863   100/P00 101/P01

  06/D9/J01       A01B  D102  0218   110/J00 111/J01

  06/D9/J01       A01B  D202  0218   118/J00 119/J01

  15/D9/J01       A01B  03    3365   120/J00 121/J01
```

Figure 5-3 PCHID Report: Sample from e-Config report

5.2 Prerequisites: Reviewing a prework checklist

Be sure to check the following items before you begin an IODF change to the configuration and to the installation process:

- Order the PSP Bucket if new device types are being defined.
- Run the SMP/E report with *Fix Category (FIXCAT)* exceptions that will show any PTFs that may be required to be applied.
- Ensure that you have the PCHID report from the IBM support representative for the CPC if PCHIDs are being added, removed, or modified.
- Obtain the CCN from the IBM support representative to retrieve the CFReport file to use as input to the CHPID Mapping Tool (CMT) if PCHIDs are being added or changed for your processor.

5.3 Design: Planning the IODF configuration

Consider the following information during planning:

- Type of installation
- Any new device types
- Performance considerations
- Naming standards
- Whether the CPC is a new installation, upgrade, replacement, or additional to the site configuration

> **Note:** See *IBM System z10 Enterprise Class Configuration Setup*, SG24-7571 for more in-depth details to these situations.

- Items to check on the PCHID report:
  - What PCHID numbers are being added or removed?
  - How many ports have been purchased and installed on the new PCHID cards?
  - Is recabling required if PCHIDs are being changed?
- New hardware device specifications that are required:
  - If new DASD has been purchased, determine how many interface cards have been installed, and in which rack, enclosure, and slot they have been installed.
  - Determine whether the I/O ports are Short Wave (SX) or Long Wave (LX) 2 Gbps, 4 Gbps, or 8 Gbps port speed.
  - Plan for which I/O ports will be used for System z, Open Systems and PPRC connections, FC or FCP.
  - Verify with new ATL and VTS controllers, how many interfaces have been purchased and inquire the LIBRARY-ID and LIBPORT-ID.

- The number of CHPIDs to be defined for a particular device type

  Be sure you have not exceeded the logical path limits.

- Implementing or maintaining naming standards

  Suggestions include the following standards:

  – For a processor, use CPCPKR1:
    - CPC signifies a processor.
    - PK is the site location.
    - R1 is a unique identifier (outside the 00 - FF range).
  – For a partition, use LPPKR102:
    - LP signifies an LPAR.
    - PK is the site location.
    - R1 is a unique identifier (outside the 00-FF range).
    - 02 indicates CSS-0 and MIFID-2.
  – For a controller, use VTSPK01:
    - VTS signifies the device category.
    - PK is the site location.
    - 01 is a unique identifier.

5.4 Define: Creating the work IODF configuration

This section contains more detail about each of the configuration components that you define in the IODF:

- OS configurations
- FICON director
- Processors
- Partitions
- PCHIDs and CHPIDs
- DASD: DS8000 type 2107
- Tape, Cart, ATL, VTS
- Consoles
- Network
- FICON CTCs
- Coupling facility
- External time reference (ETR) sysplex timer source
- Server Time Protocol (STP) Sysplex Timer source

5.4.1 OS configurations

An operating system configuration (OS config, or OS configuration) contains the configuration data that is used to build control blocks and contains the relevant data needed to properly IPL an operating system. You must define the type of operating system, define the devices that the operating system can use (usually in groups called *Generics* and *Esoterics*) and define the operator consoles that will be used during the IPL. The following data is defined in the OS configuration:

- Operating system type, such as MVS or VM
- Eligible Device Tables (EDT) and Esoterics
- Nucleus initialization program (NIP) Console, added to after console devices are defined

5.4.2 FICON director

Note that various terms that were used in IOCP and HCD have been carried over from the ESCON environment. For clarity, we use the following terminology throughout this section to describe the definitions in IOCP and HCD, for cascading FICON directors, and switched point-to-point configurations:

- Entry switch: This switch is the FICON director that is directly connected to the processor's FICON channel and to the CU (destination) or another FICON director.
- Cascaded switch: This switch is the FICON director that connects to the CU (destination) and to the entry switch.
- Inter-switch link (ISL): The entry switch and cascaded switch are interconnected through an ISL. Although IODF does not require ISL connections between FICON directors in a cascaded configuration to be defined and shown as dedicated connections, doing so is a good idea. The reason is primarily for port management purposes. Defining them also completes the configuration when defining the ISLs with HCM.
- Switch identifier (ID) and switch address (1-byte value): These terms address a FICON director.
  - Switch ID: This ID must be assigned by the user, and it must be unique within the scope of the definition (IOCP and HCD). The switch ID in the CHPID statement is basically used as an identifier or label. Although the switch ID can differ from the switch address or domain ID, be sure to use the same values as the switch address or domain ID when referring to a FICON director.
  - Switch address (or domain ID): The switch address is a hexadecimal number used in the System z environment. The domain ID and the switch address must be the same when referring to a switch in a System z environment. Each FICON director in a fabric must have a unique switch address. The switch address is used in the HCD or IOCP definitions, and it can be any hexadecimal value in the range of x'00' - x'FF'. The valid domain ID range for the FICON director is vendor-dependant.
- Port address (1-byte value): This is used to address the physical port on the FICON director.
- Switch control unit port (CUP): z/OS uses this function to manage a FICON director with the same level of control and security as an ESCON switch. Host communications include blocking and unblocking ports, and monitoring and error reporting functions.
- Hexadecimal ID values and decimal ID values: The domain ID or switch address is specified in the FICON director as a decimal value that is converted to a hexadecimal value for the use in the System z server and when defining in the IODF.
- Configuring one or two switches: To provide adequate redundancy against power failure, hardware component failure, or disruptive microcode upgrades, be sure that the channel path connections to vital hardware are configured over two separate FICON directors.

5.4.3 Processors

Consider the following information when you define a processor in HCD:

- Network name and CPC name
- Processor IDs
- Local system name

Meaningful CPC names (such as what it is, where it is, and unique identifier; for example CPCPKR1) are important.

5.4.4 Partitions

Consider the following information when you define partitions:

- Maxdev keyword: Set to 65280 in subchannel set-0 for each of the four channel subsystems; set to 65535 in subchannel set-1 for each of the four channel subsystems. See Figure 5-4.

```
 Channel Subsystem List                                             Row 1 of 4
Command ===> ____________________________________________ Scroll ===> PAGE

Select one or more channel subsystems, then press Enter.  To add, use F11.

Processor ID . . . : CPCPKR1

  CSS Devices in SS0    Devices in SS1
/ ID  Maximum + Actual  Maximum + Actual  Description
_ 0   65280     0       65535     0       ______________________________
_ 1   65280     0       65535     0       ______________________________
_ 2   65280     0       65535     0       ______________________________
_ 3   65280     0       65535     0       ______________________________
```

Figure 5-4 HCD: MAXDEV definition for 2097 type processors

- Reserved partitions: By default, 15 partitions are defined per CSS as reserved, making a total of over four CSSs of 60 partitions.
- Meaningful names: Examples include CFPKR101 or LPPKR102.
- Type and usage information: Determine how the partition will be used:
  - CF: A coupling facility is to be used as a communication partition, so that high-performance data-sharing can be used among a group of processors. To define the usage as CF, the designated process must be in LPAR mode.
  - OS: An operating system partition is to be used for running an operating system in
  - CF/OS: A partition to be used either as a CF or an OS partition at partition activation. To define the usage as CF/OS, the designated processor must be in LPAR mode.
- Logical partition identifier: A number in the range of 00 - 3F, the identifier is assigned in the image profile through the Support Element or the Hardware Management Console. It is unique throughout the server and is also referred to as the *User Logical Partition ID (UPID)*. We suggest that you establish a numbering convention for the logical partition identifiers. We use the CSS number concatenated with the MIFID, which means logical partition ID “3A” will be in CSS “3” with the “A” MIFID. This approach fits within the allowed range of logical partition IDs and conveys useful information.
- Partition number: This is the MIF image ID, which is a one-digit hexadecimal value (except 0) for a logical partition number (MIF image ID) if the specified processor supports multiple image facility (MIF).
- Which CSS to use: Any of the four CSSs may be used to define the configuration however, each channel subsystem can have only 1 - 256 channels, and can in turn be configured with 1 - 15 logical partitions, with a maximum of 60 logical partitions.

5.4.5 PCHIDs and CHPIDs

When defining channels, be aware of the following types, modes and definition parameters:

- Channel path types:
  - CBP: integrated cluster bus peer
  - CBY: ESCON converter byte channel
  - CFP: coupling facility peer channel
  - CIB: coupling over InfiniBand channel
  - CNC: ESCON channel
  - CTC: ESCON channel-to-channel
  - CVC: ESCON converter channel
  - FC: FICON Channel
  - FCP: Open Fibre Channel Protocol
  - FCV: FICON Converter channel
  - ICP: Internal Coupling Peer channel
  - IQD: Internal Queued Direct communication
  - OSC: OSA Console channel
  - OSD: OSA Direct Express channel
  - OSE: OSA Express channel
  - OSN: OSA Network Control Program channel
- Channel path modes: These modes can be dedicated, reconfigurable, shared, or spanned. The following list explains when to use which channel path operation mode:
  - DED: Specify the channel path as dedicated if you want only one logical partition to access a channel path. You cannot reconfigure a dedicated channel path. This is the default mode.
  - REC: Specify the channel path as reconfigurable if you want only one logical partition at a time to access a channel path and you want to be able to reconfigure the channel path from one partition to another.
  - SHR: Specify the channel path as shared if you want more than one logical partition to access a channel path simultaneously.
  - SPAN: Specify the channel path as spanned if in XMP processors for certain channel types, you want to have a shared channel accessed by partitions from multiple logical channel subsystems.
- Access and candidate Lists: If you want a logical partition to access a dedicated, reconfigurable, or shared channel path when you initially activate the logical partition, place that logical partition in the channel path's access list. For shared channel paths and spanned channel paths, you can place more than one partition in the access list. If you do not want partitions in the access list, you are prompted for the candidate list (for reconfigurable and shared channel paths).
- Explicit device candidate list (EDCL) or Restricting Partition Access for Devices: You can restrict logical partition access to an I/O device on a shared channel path by using the explicit device candidate list to select the logical partition that can access that I/O device. This selection, which is on the Define Device/ Processor panel in HCD, can be No or Yes:
  - No: Specifies that all logical partitions can access the I/O device. No is the default; all logical partitions are in this I/O devices's candidate list.
  - Yes: Specifies that only your selected partitions can access this I/O device. Note that the partition must also be in the channel paths access or candidate list to access the device.

5.4.6 DASD: DS8000 type 2107

When you configure a DASD subsystem, such as a DS8000®, consider the following information:

- Whether it is directly connected to the CPC or through FICON directors
- Use the dscli **lsioport** command to determine card and port information:
  - The FICON cards or ports that are installed in the DS8000 type 2107
  - Whether the I/O ports are LW (long wave) or SW (short wave)
  - The FICON or SCSI-FCP I/O port modes

  Figure 5-5 shows a sample list of I/O ports from the **lsioport** command of a 2107 type.

```
dscli> lsioport -dev IBM.2107-7503461
IBM DSCLI Version: 5.1.0.297 DS: IBM.2107 7503461
ID    WWPN             State  Type             topo     portgrp
===============================================================
I0000 500507630300008F Online Fibre Channel-SW SCSI-FCP 0
I0001 500507630300408F Online Fibre Channel-SW SCSI-FCP 0
I0002 500507630300808F Online Fibre Channel-SW SCSI-FCP 0
I0003 500507630300C08F Online Fibre Channel-SW SCSI-FCP 0
I0100 500507630308008F Online Fibre Channel-LW FICON    0
I0101 500507630308408F Online Fibre Channel-LW SCSI-FCP 0
I0102 500507630308808F Online Fibre Channel-LW FICON    0
I0103 500507630308C08F Online Fibre Channel-LW FICON    0
I0130 50050763030B008F Online Fibre Channel-SW SCSI-FCP 0
I0131 50050763030B408F Online Fibre Channel-SW SCSI-FCP 0
I0132 50050763030B808F Online Fibre Channel-SW SCSI-FCP 0
I0133 50050763030BC08F Online Fibre Channel-SW SCSI-FCP 0
```

Figure 5-5 DS8000: The lsioport display

- ID (interface identifier, also known as logical port numbering): The DS8000 has two port layouts, which are a physical port layout and a logical port layout.

  A DS8000 can have two racks with I/O drawers installed.

  The physical port layout is written in the following way:

  `R1-I1-C1-T0`

  This layout is explained in the following list:

  - Rack: Rack 1 (R1) is the rack that contains the controllers and the management console. The rest of the notation is the same for Rack 2 (R2).
  - Enclosure: A rack can have four I/O drawers (I1-I4).
  - Slot: The I/O drawers consist of six card slots (C1-C6).
  - Interface: Each card can have four ports (T0-T3).

  Therefore, if we use an example of `I0211` as a logical port ID, that number tells us the physical location, as follows:

  - I0 = Rack 1
  - 2 = Drawer 3
  - 1 = Card Slot 2
  - 1 = Port 1

Note: The numbering between the physical and logical ports differs by a value of 1 for rack, drawer, and card slot. Add 1 to the logical port ID to determine the physical rack, drawer, and card slot. We have included a diagram to help locate the physical port when discovering the logical port ID (through, for example, the Tag field) in the Channel Problem Determination frame on the HMC, or through the Node descriptor information from a FICON director. See Figure 5-6 on page 59 and Figure 5-7 on page 60.

The **`lsioport`** command returns logical port information. With that information, you can use Figure 5-6 and Figure 5-7 on page 60 to determine physical port information. For example, for the logical port ID I0211 given in the example, you determine that `I0 = rack 1`. Then, you look at the Rack 1 diagram, take the last 3 digits of the logical port information, and locate that number in one of the cells. After you find it, you can identify the physical card by looking down the column. In this case, it is C2 (card 2). Locate the drawer by looking for the drawer ID that the column is attached to, in this case I3 (drawer/enclosure 3). The port number remains the same. Therefore, you now know that I0211 is rack 1, drawer 3, card 2, port 1.

I1							I2						
000	010	020	RIO	030	040	050	100	110	120	RIO	130	140	150
001	011	021		031	041	051	101	111	121		131	141	151
002	012	022		032	042	052	102	112	122		132	142	152
003	013	023		033	043	053	103	113	123		133	143	153
C1	**C2**	**C3**		**C4**	**C5**	**C6**	**C1**	**C2**	**C3**		**C4**	**C5**	**C6**
200	210	220	RIO	230	240	250	300	310	320	RIO	330	340	350
201	211	221		231	241	251	301	311	321		331	341	351
202	212	222		232	242	252	302	312	322		332	342	352
203	213	223		233	243	253	303	313	323		333	342	353
C1	**C2**	**C3**		**C4**	**C5**	**C6**	**C1**	**C2**	**C3**		**C4**	**C5**	**C6**
I3							I4						

Figure 5-6 Logical to physical mapping diagram for rack 1

I1							I2						
400	410	420	R	430	440	450	500	510	520	R	530	540	550
401	411	421	I	431	441	451	501	511	521	I	531	541	551
402	412	422	O	432	442	452	502	512	522	O	532	542	552
403	413	423		433	443	453	503	513	523		533	543	553
C1	**C2**	**C3**		**C4**	**C5**	**C6**	**C1**	**C2**	**C3**		**C4**	**C5**	**C6**
600	610	620	R	630	640	650	700	710	720	R	730	740	750
601	611	621	I	631	641	651	701	711	721	I	731	741	751
602	612	622	O	632	642	652	702	712	722	O	732	742	752
603	613	623		633	643	653	703	713	723		733	742	753
C1	**C2**	**C3**		**C4**	**C5**	**C6**	**C1**	**C2**	**C3**		**C4**	**C5**	**C6**
I3							**I4**						

Figure 5-7 'Logical to physical mapping diagram for rack 2

- WWPN: The WWPN is the worldwide port name.
- State: The state is online or offline.
- Type: The short wave (SW) or long wave (LW) type must match the type of channel connecting to this interface.

> **Note:** On the PCHID report, the System z FICON channels are referred to as FICON LX and FICON SX.

- Topology: Three possible topologies are available for each I/O port:
  - SCSI-FCP: Fibre Channel switched fabric (also called point-to-point)
  - FC-AL: Fibre Channel arbitrated loop
  - FICON: FICON for System z hosts only
- Portgrp: When creating hosts, you can specify the `-portgrp` parameter. By using a unique port group number for each attached server, you can easily detect servers with multiple Host Bay Adapters (HBAs).
- Control unit address (CUADD) or logical control unit (LCU): Specify the logical address for a control unit. For example, in the 2107 Enterprise Storage Server®, the control unit requires that the logical address that is specified with the CUADD keyword match the control unit image address associated with the corresponding control unit logical subsystem (LSS). The address is one-to-two hexadecimal digits in the range of 0 - F for CNC, CTC, and FCV channel paths and in the range of 00 - FF for FC, IQD, and OSD channel paths.
- Parallel Access Volume (PAV): PAV support provides the ability for a single operating system image to drive multiple concurrent I/O requests to a single device. A parallel access volume consists of a logical base device (for example 3390B) and associated logical alias devices (for example 3390A). These logical devices are identified by device numbers and represented by unit control blocks (UCBs) in the system. When you request I/O to a parallel access volume, the request identifies the base UCB and the system uses

the base UCB or one of its alias UCBs, depending on their availability, to initiate the I/O request. We use HCD to define multiple device numbers for a control unit that provides parallel access volumes. Base device numbers and alias device numbers are defined independently.

The base device number is used to allocate the device, but other device numbers are needed to represent each alias UCB. The base device number is the one used when any of the following events occurs:

- The device is allocated.
- The device is reconfigured with the MVS VARY command.

When we define a parallel access volume in HCD, we define a control unit type that provides parallel access volume capability, for example 2107. We define the devices for the control unit with parallel access volume device types. Base devices are defined using a base device type, for example 3390B. Alias devices are defined using an alias device type, for example 3390A.

The device numbers are associated with unit addresses on the control unit using the “unit address” parameter which specifies the starting unit address for the set of devices being defined. The number of consecutive device numbers and unit addresses to be assigned is specified with the “number of devices” parameter.

- Multiple subchannel sets ScS-0 and ScS-1: Starting with z9 EC processors, each channel subsystem contains more than one subchannel set (SS-0, SS-1) where you can place the devices. Starting with z/OS V1R7 HCD, we can place PAV alias devices (type=3380A and 3390A) into an alternative subchannel set. In SS-0, we can place 63.75K devices, and in SS-1 we can place 64K-1 PAV alias devices.

5.4.7 Tape, Cart, ATL, VTS

Consider the following information before you define tape devices:

- Whether the device is directly connected or is through FICON directors
- Control unit address (CUADD) or logical control unit (LCU): specifies the logical address for a Control Unit. For example, in the 2107 Enterprise Storage Server, the control unit requires that the logical address specified with the CUADD keyword matches the control unit image address associated with the corresponding control unit logical subsystem (LSS). The address is one-to-two hexadecimal digits in the range of 0 - F for CNC, CTC, and FCV channel paths and in the range of 00 - FF for FC, IQD and OSD channel paths.

5.4.8 Consoles

Consider the following information before you define consoles:

> **Note:** For a detailed explanation of OSA-Express Integrated Console Controller, see the *OSA-Express Integrated Console Controller Implementation Guide*, SG24-6364.

- OSA-ICC (type=OSC): Specifies that the channel path is an open systems adapter (OSA) channel that operates as an OSA-Express integrated console controller (OSA-ICC). The OSC channel path provides 3270 sessions that can serve as the system operator or master console for an operating system so you can perform an IPL. An OSC channel path can also connect to TPF through 3215 data streams.

  OSA-ICC is supported only on OSA-Express, OSA-Express2, and OSA-Express3 1000BaseT Ethernet cards. If an OSC channel path is specified on another type of hardware, the I/O subsystem flags the channel path with a definition error and the channel path is unavailable until a dynamic I/O change is made or power-on reset (POR) is performed with a new IOCDS to resolve the error.

The OSA-ICC is configured on a port-by-port basis, using CHPID type=OSC. Each port can support up to 120 console session connections, can be shared among logical partitions using Multiple Image Facility (MIF), and can be spanned across multiple Channel SubSystems. See Figure 5-8 for a sample of how an OSC may be configured. The IODF component is quite basic because most of the customizing is performed with OSA Advanced Facilities through the HMC.

```
CNTLUNIT CUNUMBR=F200,
              PATH=((CSS(0),14),(CSS(1),14),(CSS(2),14)),UNIT=OSC
         IODEVICE ADDRESS=(F080,032),MODEL=X,CUNUMBR=(F200),UNIT=3270
```

Figure 5-8 OSC: Sample definition from an IOCP statement

- Customizing the OSC through the HMC: OSA Advanced Facilities is used to perform most of the customizing for the OSC CHPID definition. Figure 5-9 shows a sample from the exported configuration file.

```
<OSC_SERVER>
  HOST_IP= 9.12.4.165
  DEFAULT_GATEWAY= 9.12.4.1
  SUBNET_MASK= 255.255.252.0
  PORT= 3270
  ETHERNET_FRAME= DIX
  MTU= 576
  NAME= OSAF080
</OSC_SERVER>


<CONFIG_SESSION>
<SESSION1>
  CSS= 00 IID= 07 DEVICE= F080
  GROUP=  "SCZCF080"
  CONSOLE_TYPE= 1    RESPONSE= OFF    READ_TIMEOUT= 60
</SESSION1>

<SESSION2>
  CSS= 01 IID= 07 DEVICE= F081
  GROUP=  "SCZCF081"
  CONSOLE_TYPE= 1    RESPONSE= OFF    READ_TIMEOUT= 60
</SESSION2>
....................................
....................................
<SESSION71>
  CSS= 00 IID= 01 DEVICE= F0BA
  GROUP=  "WTSC74"
  CONSOLE_TYPE= 1    RESPONSE= OFF    READ_TIMEOUT= 0
</SESSION71>

</CONFIG_SESSION>
```

Figure 5-9 OSC: Configuration sample (OSC-0121)

- Accessing the OSC console definition through a TN3270E emulator, such as IBM Personal Communications, is one method of accessing the console session defined on the OSA-ICC card.

  The following options are defined in the Host Definition page of the PCOM software (see Figure 5-10):

  – Host Name or IP address: This option is the IP address that was allocated to the OSA-ICC PCHID port. The Host IP Address must match the host IP address configured in the OSA-ICC server configuration.

  – LU Name: This is the LU name for this session. The LU name must match the LU name defined in the corresponding OSA-ICC PCHID session configuration

  – Port Number: This is the TCP port number used by OSA-ICC PCHID and workstation TN3270E session to initially establish session communications. This port number must match the port number defined in the corresponding OSA-ICC PCHID server configuration.

  – Auto-reconnect: With this option enabled, if the TN3270E session is disconnected (dropped) from the OSA-ICC, the TN3270E emulation program attempts to automatically reconnect the session. Be sure to enable the automatic reconnection function by selecting **Auto-reconnect**. See Figure 5-10.

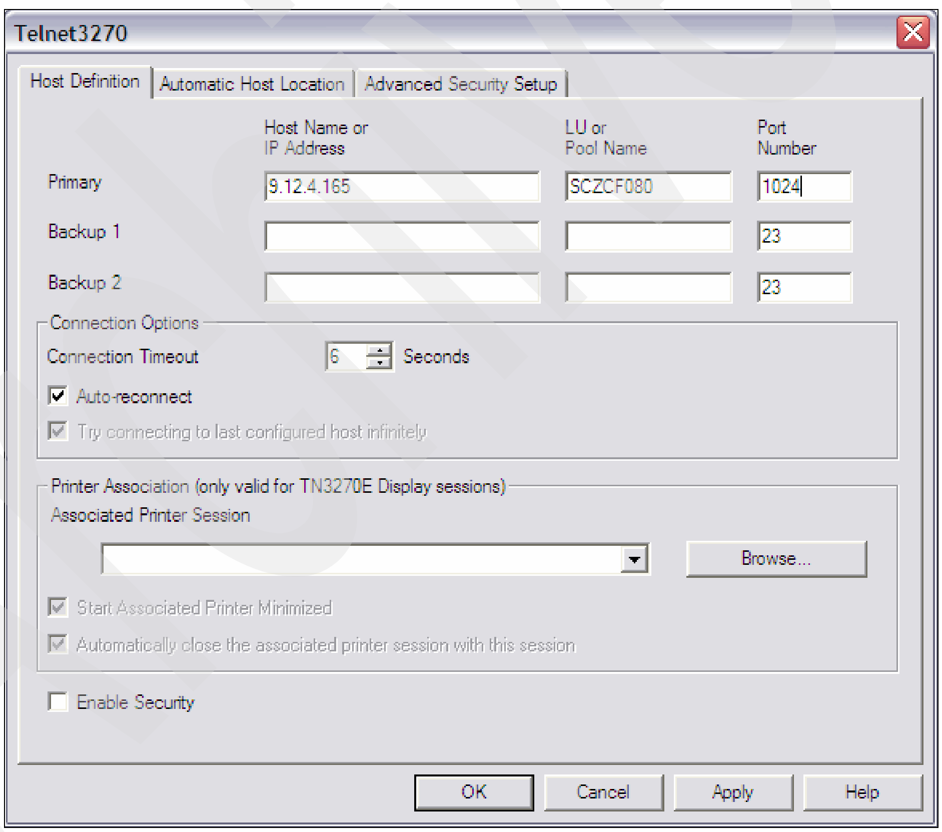


Figure 5-10 OSC: IBM Personal Communications Host Definition example

- NIP consoles: After you are satisfied that the console sessions are configured correctly, you may define the appropriate device addresses in the NIP Console List under the appropriate OS configuration. See Figure 5-11 on page 64.

```
+--------------------------- NIP Console List ----------------------------+
|   Goto  Backup  Query  Help                                             |
| ----------------------------------------------------------------------  |
|                                                           Row 1 of 16  |
| Command ===> _______________________________________ Scroll ===> PAGE   |
|                                                                         |
| Select one or more consoles, then press Enter. To add, use F11.        |
|                                                                         |
| Configuration ID . : TEST2094     Sysplex systems                       |
|                                                                         |
|   Order   Device                                                        |
| / Number  Number  Device Type                                           |
| _    1     F080    3270-X                                               |
| _    2     F081    3270-X                                               |
| _    3     F082    3270-X                                               |
| _    4     F083    3270-X                                               |
| _    5     F084    3270-X                                               |
| _    6     F085    3270-X                                               |
| _    7     F086    3270-X                                               |
| _    8     F087    3270-X                                               |
```

Figure 5-11 HCD: NIP Console List sample

5.4.9 Network

You may use the following definitions when defining OSA devices (also see Table 5-1 on page 65):

- OSA (type = OSD): Specifies that the channel path is an open systems adapter (OSA) channel supporting the Queued Direct I/O (QDIO) architecture. An OSD channel path supports IP applications providing connectivity to Gigabit Ethernet, 10 Gigabit Ethernet, 1000Base-T Ethernet, Fast Ethernet, and Token Ring LANs. All OSA channel hardware supports OSD channel paths.
- OSA (type = OSE): Specifies that the channel path is an open systems adapter (OSA) channel that uses non-QDIO architecture. An OSE channel path provides connectivity for all LAN protocols supported by the non-QDIO architecture (1000Base-T Ethernet, Fast Ethernet, and Token Ring LANs). OSE channel paths are supported on OSA-Express and OSA-Express2 features. All OSA channel hardware except Gigabit Ethernet and 10 Gigabit Ethernet support OSE channel paths.
- OSA (type = OSN): Specifies that the channel path is an open systems adapter (OSA) channel for network control program (NCP). An OSN channel path supports traffic between an operating system image (for example, z/OS) and a Communication Controller for Linux® (CCL) image. OSN channel paths are supported on OSA-Express2 and OSA-Express3 features Gigabit Ethernet and 1000Base-T Ethernet.
- Internal Queued Direct (IQD) communication HiperSockets (type = IQD): HiperSockets provide a high speed internal TCP/IP connection between applications running on a CPC. These applications (for example, z/OS Communication Server or Linux for System z) might be in separate z/VM images or separate logical partitions. These *connections* are defined to the configuration with IQD communication channel path types.

  A CPC can support 4096 separate data queues. Typically, each queue is represented by one data device and two control devices. IOCP ensures no more than 12266 (3*4096) valid subchannels are defined for all IQD channel paths in the configuration.

  IQD communication channels are virtual attachments and require no real hardware. However, they do require CHPID numbers, and they do need to be defined in the IOCDS.

Table 5-1 OSA: summary of OSA connectivity

Channel type	Channel path type	Connectivity that the channel type provides
OSA QDIO	OSD	All LAN protocols supported by the OSA feature that use QDIO architecture.
OSA non-QDIO	OSE	All LAN protocols support by the OSA feature that use non-QDIO architecture.
OSA-ICC	OSC	TN3270E emulators and 3215 data streams
OSA for NCP	OSN	CDLC protocol from an operating system image and QDIO architecture from a CCL image. An OSA channel in the CCL image provides LAN connectivity.

Supporting more than 160 TCP/IP stacks for OSD channels: You can now have more that 160 TCP/IP stacks supported with OSD channels. This technique is done by disabling priority queuing for these channels. If priority queuing is disabled, the channel can support four times as many queues (4 * 480 = 1920 subchannels) corresponding to four times as many TCP/IP stacks (4 * 160 = 640) as with enabled queue prioritization.

When defining or changing channel paths of type=OSD, HCD prompts you with a dialog where you can select whether you require more than 160 TCP/IP stacks for the channel in question.

Also, you can now connect more than one logical control unit to an OSD channel.

Supporting multiple control units on OSD channels: Up to 16 control units may be defined on an OSD channel path, if each has a unique CU logical address (CUADD value). This approach allows a single partition to use all 480 supported valid subchannels.

5.4.10 FICON CTCs

Consider the following information when you define FICON CTCs:

- FICON CTC: A FICON channel-to-channel (CTC) connection consists of an I/O device that is used by a program in one system to communicate with a program in another system. A CTC communication is established between the two programs when the adapter is selected to respond to channel-command words (CCWs) that are issued by the channels in the CTC connection.

  FICON CTC connections require that at least one end of the connection be on a System z CPC that supports the FICON CTC control unit function.

  FICON CTC acts as a dual-sided control unit, providing control unit function for both the local inbound channel and an outbound channel on the other side of the fibre channel network. CTC function does not access storage to any system facilities.
- Defining FICON CTCs: To define a FICON CTC connection, you must define two FICON CTC control units with control unit type=FCTC. The FICON channels negotiate with each other and only one of the channels will contain a single CTC control unit internal to the channel for the CTC connection. This negotiation is described as *auto-configuration*.
- Auto-configuration: In the FICON architecture, device-level communication between a channel and a control unit requires that a Logical Path is established between them. In the case of FICON CTC, one or two channels each talk to a two-sided control unit, which is

internal to the FICON channel. Therefore, two logical paths are required for a complete CTC connection.

The *local* logical path is established across the internal link between the channel function and the CTC function on the same CHPID. The *remote* logical path is established across the Fibre Channel link. This path connects the two CHPIDs through a switch or can also be point-to-point. In the case of a single FICON channel used to configure LPAR-to-LPAR communication with a CPC, the channel establishes both local and remote logical paths

Auto-configuration determines which FICON channel contains the CTC control unit for each connection and pair of logical paths. If only one of the channels is on a CPC that supports FICON CTC control unit function, the FICON CTC control unit is always on that channel. If both channels are on a CPC that supports the FICON CTC control unit function, the channel performs load balancing to determine which channel will have the FICON CTC control unit. The channel with the fewest CTC logical paths will have the FICON CTC control unit for the connection. This technique balances the load that FICON CTC connections places on each channel.

- Meaningful control unit and device names (such as CPC, LPAR, device address): Defining suitable and meaningful names for FCTC control units and devices helps ease the setting up of an XCF, JES2 NJE and TCP/IP environment that incorporates FCTC devices, also when performing problem determination.

  One suggestion for naming involves giving the CPC a unique number for the first number, incorporating the logical partition identifier, which can be CSS and MIFID for the next two numbers, 0 (zero) for the last number for the control unit, and then zero up to “F” (0 - F) for the devices). The following example translates into devices 4120-4127 on CU 4120:

  – CU: 4120 represents CPC =4, LPid=12, CU=0.
  – Dev: 4120-4127 represents CPC =4, LPid=12, devices 4120-4127.

  These are the primary addresses that all other systems, which are connected and defined to the FICON CTC network, use to access logical partition 12 on CPC designated as number 4.

  Additionally devices 4128-412F on CU 4128 can be the alternate or backup addresses that all other systems, which are connected and defined to the FICON CTC network, use to access logical partition 12 on CPC designated as number 4.

Figure 5-12 shows a fully redundant configuration.

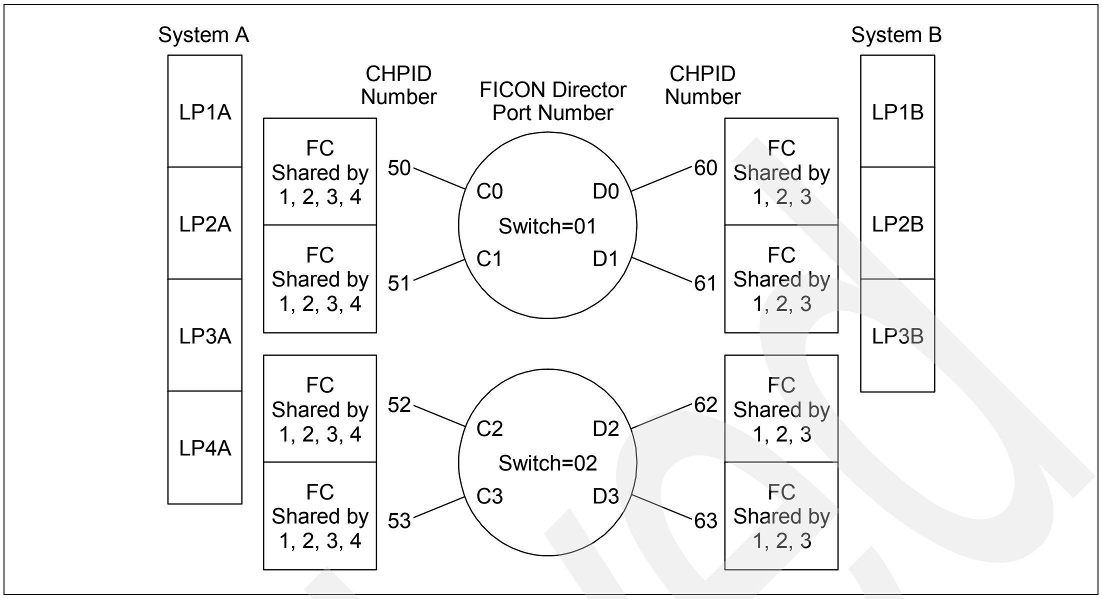


Figure 5-12 FCTC: Fully redundant configuration example

5.4.11 Coupling facility

Consider the following information before you define a coupling facility:

- Internal (type = ICP): Specifies that the channel path is an Internal Coupling facility Peer channel. Each ICP channel path that is assigned to a control unit must have seven devices defined.

  An ICP channel path connects to another ICP channel path. You cannot connect an ICP channel path to itself.

- External (type = CIB): Specifies that the channel path is a Coupling InfiniBand channel. Each CIB channel path that is assigned to a control unit must have seven devices defined.

  A CIB channel path connects to another CIB channel path. You cannot connect a CIB channel path to itself.

- External (type = CBP): Specifies that the channel path is an integrated cluster bus coupling facility peer channel. CBP channel paths are defined for ICB-3 and ICB-4 links. Each CBP channel path that is assigned to a control unit must have seven devices defined.

  A CBP channel path connects to another CBP channel path. However, an ICB-3 link must connect to another ICB-3 link and an ICB-4 link must connect to another ICB-4 link.

- External (type = CFP): Specifies that the channel path is a coupling facility peer channel. CFP channel paths are defined for ISC-3 links. Each CFP channel path that is assigned to a control unit must have seven devices defined.

  A CFP channel path connects to another CFP channel path.

5.4.12 External time reference (ETR) sysplex timer source

Consider the following information when planning for a sysplex time source (see Figure 5-13):

- The IBM external time reference (ETR) architecture provides a means of synchronizing TOD clocks in separate servers with a centralized time reference, which in turn can be set accurately based on an international time standard. The architecture defines a time-signal protocol and a distribution network, called the *ETR network*, which permits accurate setting and maintenance of consistency of TOD clocks.

  The ETR network consists of the following three elements, which are configured in a network:

  – Sysplex Timer sending unit
  – Sysplex Timer link
  – sysplex Timer receiving unit.

  The sending unit is a centralized, external time reference that transmits ETR signals over dedicated Sysplex Timer links. It also provides a means by which Sysplex Timer time can be accurately maintained with respect to external standard time service.

  The receiving unit in each server receives the Sysplex Timer signals and includes the means by which the TOD clocks are set and maintained, consistent with Sysplex Timer time.

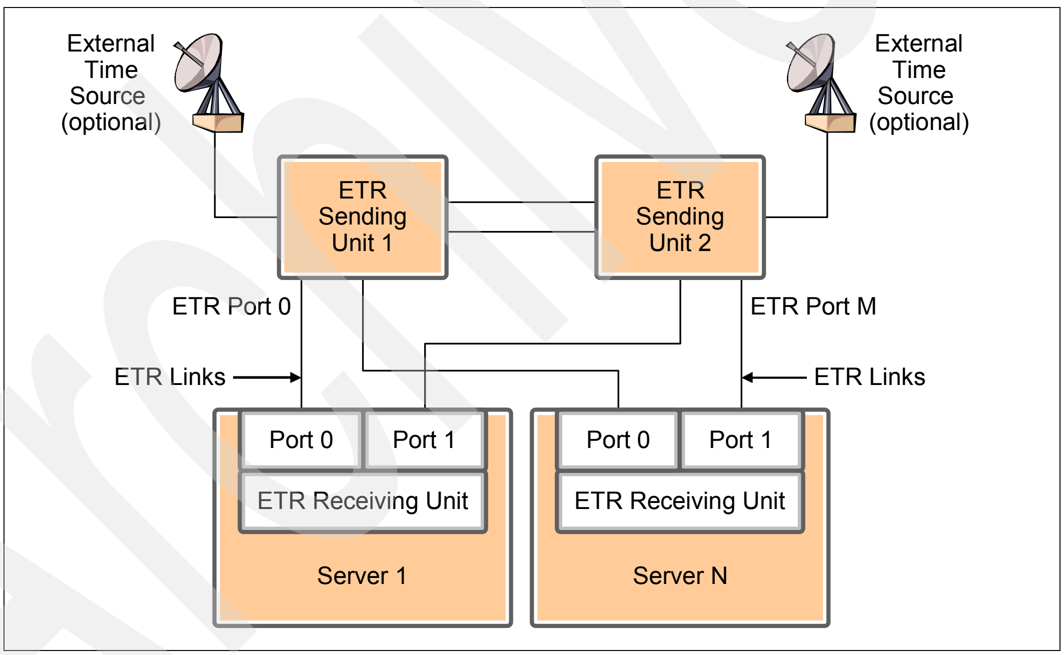


Figure 5-13 ETR: Fault-tolerant ETR network

- The IBM 9037 Sysplex Timer is the ETR sending unit. It provides the synchronization for the TOD clocks of multiple servers, and thereby allows events occurring on separate servers to be properly sequenced in time. When multiple servers update the same database and database reconstruction is necessary, all updates are required to be time-stamped in proper sequence.

Note: ETR Sysplex Timer links does not require definition in an IODF.

5.4.13 Server Time Protocol (STP) Sysplex Timer source

Consider the following information for an STP time source:

- STP is a server-wide facility that is implemented in the Licensed Internal Code of the System z servers. STP presents a single view of time to Processor Resource/Systems Manager (PR/SM) and provides the capability for multiple STP configured servers to maintain time synchronization with each other. It is the follow-on to the Sysplex Timer. With STP, events that occur in separate servers can be properly sequenced in time.

  STP is for servers that have been configured in a Parallel Sysplex or a basic sysplex (without a coupling facility), and servers that are not in a sysplex, but must be time-synchronized.

  STP is a message-based protocol in which timekeeping information is passed over data links between servers. The timekeeping information is transmitted over externally defined coupling links. Coupling links that can be used to transport STP messages are the Internal System Channel-3 (ISC-3) links configured in peer mode, Integrated Cluster Bus-3 (ICB-3) links, Integrated Cluster Bus-4 (ICB-4) links, and InfiniBand (IFB or CIB) links.

- STP *timing-only* links can be defined. For a server that is not part of a Parallel Sysplex but has to be in the came Coordinated Time Network (CTN), additional coupling links must be configured so that the server can be configured in the CTN. HCD has been enhanced to permit special timing-only links and control units to be defined. The timing-only links can be of type CFP for ISC-3 in Peer mode, or CBP for ICB-3/ICB-4, or CIB for PSIFB. The control unit type is STP and it has no devices defined to it.

  If a coupling facility link already exists between two servers, the “STP control unit” type cannot be defined. Likewise, if the STP control unit type is defined, a new CF link cannot be defined unless the STP control unit is removed.

Note: STP Sysplex Timer timing-only links only require definition in an IODF if no coupling facility links are defined between the servers.

STP timing-only links cannot coexist with coupling facility links between servers.

5.5 Check: Checking the work IODF configuration

When you check the work IODF configuration, export the *validated work* IODF into the CHPID Mapping Tool by using the CFReport and IOCP deck. Then, be sure to perform the following tasks:

1. Clarify hardware conflicts.
2. Assign CU priorities.
3. Assign PCHIDs.
4. Check for intersects.
5. Produce control unit, PCHID, and cabling reports.

See Chapter 10, “CHPID Mapping Tool (CMT)” on page 315 for a more detailed explanation of the CHPID Mapping Tool components.

5.6 Create: Building the production IODF configuration

The following steps are involved in building a production IODF:

1. Importing the validated work IODF into HCD
2. Building the production IODF
3. Saving the production IODF onto the repository volume
4. Copying or transmitting the production IODF to the target load volume.

5.6.1 Importing the validated work IODF into HCD

After the PCHIDs have been added or modified by the CHPID Mapping Tool, the updated IOCP deck must be imported back into the IODF so that the new PCHIDs can be used.

5.6.2 Building the production IODF

After importing the validated work IODF into HCD, build the production IODF by selecting **HCD Option 2.1**.

5.6.3 Saving the production IODF onto the repository volume

Using the methodology we discussed at the beginning of this chapter, save the IODF to a volume that is considered a repository volume, such as is used to maintain a collection of all IODFs for all CPCs that are managed.

You might want to consider using a separate high-level qualifier for the IODF data set name to indicate that these IODFs are not for Load Volumes use but are for a centralized repository or backup, for example:

- Repository IODF = SYSIODF.IODFxx
- Load Volume IODF = SYS1.IODFxx

5.6.4 Copying or transmitting the production IODF to the target load volume.

Using a file transfer program such as FTP or HCD Option 6.5 “Export I/O definition file” (if your target system is accessible through JES2 NJE), transmit the IODF from the repository volume to the target load volume.

You might want to consider using a separate high-level qualifier (HLQ) for the IODF data set name to indicate that these IODFs are for the load volume and are critical system data sets.

Consider the following example:

- Repository IODF = SYSIODF.IODFxx
- Load Volume IODF = SYS1.IODFxx

In summary: Repository volume IODF `SYSIODF.IODF26` is copied to target load volume IODF `SYS1.IODF26` to provide a centralized collection of IODFs, a backup of the production IODF and a unique HLQ, avoiding confusion over which IODF data sets are critical and which IODFs are repository.

5.7 Test: Testing the production IODF on the target system

Prior to activating a new production IODF you perform a test IODF *activate* operation, where possible.

IODFs that are modifying existing configurations may be tested in most cases to verify that the IODF is changing what is intended. Note the following information:

- `ACTIVATE IODF=XX,SOFT,TEST` is entered on all LPARs that have only OS configuration changes.
- `ACTIVATE IODF=XX,TEST` is entered on all LPARs and CPCs that have both OS configuration and hardware changes.

5.8 Available: Making the production IODF available for POR

If required, make the production IODF available for POR, which involves updating, as follows:

1. Updating the IOCDS.
2. Updating the load members.
3. Updating the Reset, Image, and Load profiles.

5.8.1 Updating the IOCDS

Using HCD, write the production IODF (IOCP data) to the next available IOCDS by using HCD Option 2.11 “Build and manage S/390® microprocessor IOCDSs and IPL attributes.”

5.8.2 Updating the load members

On target IODF load volume, create or update load members located in `SYS#.IPLPARM` data set. See 9.5.3, “Load profiles” on page 301 for more details about load members.

5.8.3 Updating the Reset, Image, and Load profiles

On the HMC, perform the following steps:

1. Create or update a Reset profile and select the IOCDS to where the IODF (IOCP data) was written. See 9.5.1, “Reset profiles” on page 296 for more details about Reset profiles.
2. Check or update any Reset, Image, or Load profile parameters where appropriate.
3. Check that the LPAR activation list and order are correct in the Activation tab of the Reset profile.
4. Select the Reset profile for activation on the CPC Details panel for the processor.
5. Verify that IODF volume, Load member, and IPL options match the HMC Load profile parameters. See 9.5.3, “Load profiles” on page 301 for more details about Load Profiles.

5.9 Apply: Activating the production IODF on the target system

Activating a production IODF involves the following steps:

1. Activating an IODF with power-on reset.
2. Activating an IODF with dynamic activation process.

5.9.1 Activating an IODF with power-on reset

Using the power-on reset process, select the CPC to be reset through the HMC and click **Activate**.

5.9.2 Activating an IODF with dynamic activation process

Using the dynamic IODF activation process, perform the following steps:

1. Use the following commands on all LPARs and CPCs where appropriate:

   ```
   ACTIVATE IODF=XX, SOFT
   ACTIVATE IODF=XX
   ```

2. Use the following command, where `YY` is the IOCDS where the IODF (IOCP data) was written:

   ```
   ACTIVATE ACTIOCDS=YY
   ```

   This step assumes that the **Use Active IOCDS** button is selected in the Reset profile. If it is not, access the current Reset profile and select the button next to the appropriate IOCDS.

3. On the target IODF volume, create or update the Load members located in the following data set:

   ```
   SYS#.IPLPARM data set
   ```

4. Perform the following to verify or check for any configuration deviations and update `SYS#.PARMLIB(CONFIGXX)` members where appropriate:

   ```
   D M=CONFIG(XX)
   ```

   If you have never used CONFIG members, they can be used as follows:

   – Generated from scratch by selecting the current Production IODF for the CPC you want to check in HCD Option 2.6.6.

   – Tailored to your requirements

   – Copied to SYS1.PARMLIB dynamically.

   – Tested immediately using the **`D M=CONFIGxx`** command.

Figure 5-14 shows an example of the CONFIG member.

```
* CHP AND DEV STATEMENTS GENERATED BY
* BUILD CONFIGXX REPLACE REQUEST
* 2009-10-21  19:50:44    IODF: SYS6.IODF26
* PROCESSOR: SCZP201   PARTITION: A01      OS CONFIGURATION ID: TEST328
CHP (00,01,06,07,08,09,0A,0B,0C,0D,0F,10,11),ONLINE
CHP (12,13,14,15,16,17,18,19,1A,1B,1C,1D,1E),ONLINE
CHP (1F,2C,2D,2F,30,31,3A,3B,3C,3D,40,41,42),ONLINE
CHP (43,44,45,46,47,48,49,4A,4B,4C,4D,4E,4F),ONLINE
DEVICE (001E),(3A),ONLINE
DEVICE (001F),(3B),ONLINE
DEVICE (0061),(4C),OFFLINE
DEVICE (0062),(4E),OFFLINE
DEVICE (0063),(60),OFFLINE
DEVICE (0064),(63),OFFLINE
DEVICE (0B00-0B0F),(60,63),OFFLINE
DEVICE (0B90-0B9F),(3B),OFFLINE
DEVICE (2280-228E),(06),ONLINE
DEVICE (228F),(06),ONLINE
```

Figure 5-14   HCD: CONFIGxx member sample

5.10 Communicate: Documenting and relaying configuration changes

Communicate to users the configuration changes to the System z Server and its LPARs. The following information is a useful summary of changes to send to users:

- IODF change summary
- Hardware definitions that were added, removed, or modified
- Current Reset Profile, IOCDS, IODF number
- CPC diagrams if LPARs have been added, removed, or modified. See Figure 5-15 on page 74.

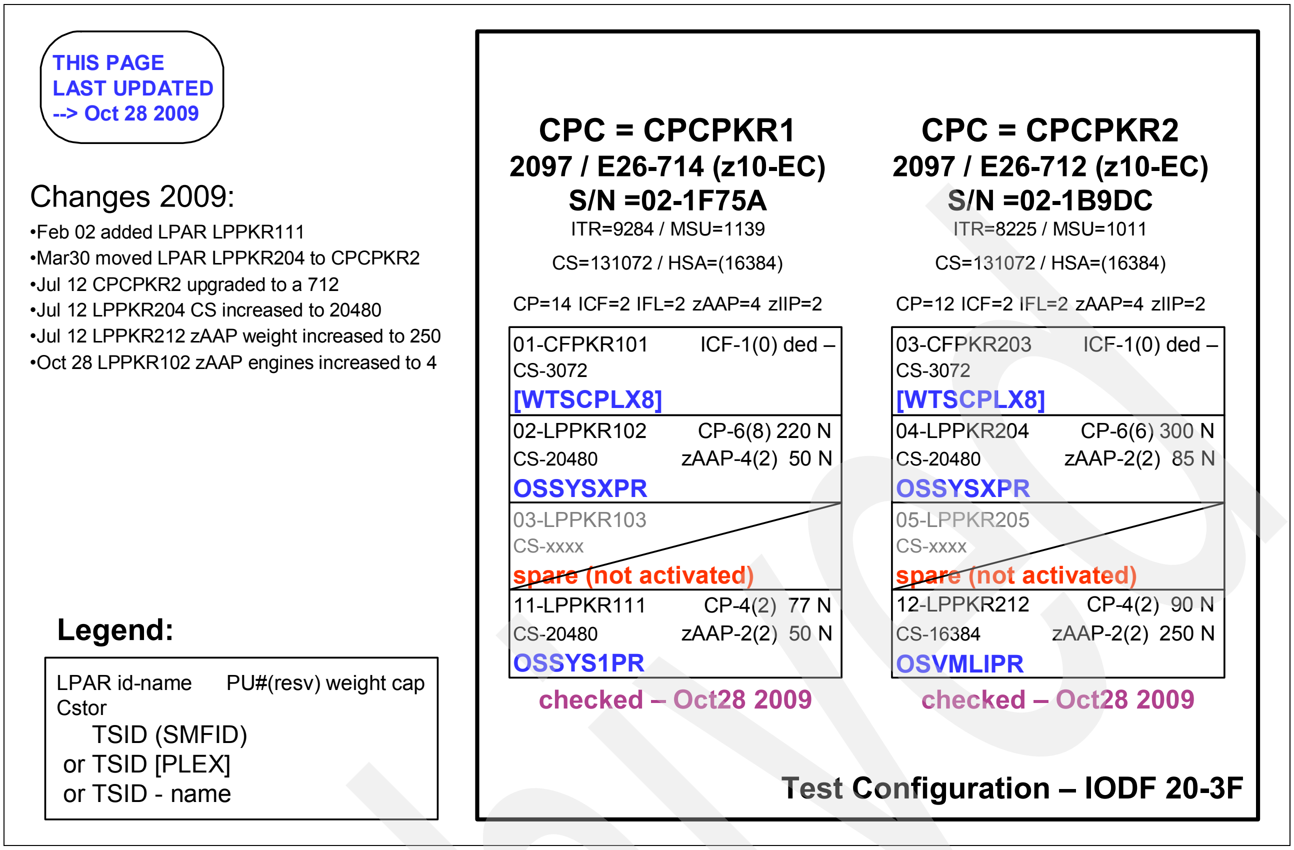


Figure 5-15 Sample processor configuration drawing

6

Customizing HCD

This chapter describes how to set up HCD using options and data sets, and discusses naming standards and IODF considerations.

6.1 HCD setup

This section describes how to customize the HCD setup by using a profile, set up a trace data set. It also discusses message and activity logs.

6.1.1 HCD profiles

HCD provides a profile dialog, available from the HCD entry panel. To use this option, you must create and allocate a profile data set. See *Hardware Configuration Definition User's Guide,* SG33-7988 for details about how to define a HCD profile data set.

The profile data set must be allocated using the HCDPROF DDname and can be personal or common to all HCD users. Allocation of a profile data set can be implemented in several ways. One way is to add allocation of the profile data set to the CBDCHCD CLIST.

The HCD profile dialog is merely an interface for updating the profile data set. The profile data set can still be updated by using the ISPF edit function.

Notice the update ENQ issue if you use a shared HCD profile data set. When you select HCD option 0, Edit profile option, HCD reads the profile data set. The profile is saved by HCD only if updated. If updating the profile, HCD will save the entire profile options back into the profile data set. This can cause loss of updated options if multiple users are updating shared profile options simultaneously.

When you select option **0** on the HCD entry panel, the panel in Figure 6-1 is displayed:

```
+---------------------------- HCD Profile Options ----------------------------+
|                                                   Row 1 of 37 More:       > |
| Command ===> ____________________________________________ Scroll ===> PAGE  |
|                                                                             |
| Edit or revise profile option values.                                       |
|                                                                             |
| HCD Profile : <userid>.HCD.PROFILE                                          |
|                                                                             |
| / Profile keyword          A Value +                                        |
| # ACTLOG_VOL               Y ____________________________________________   |
| _ ALLOC_SPACE              Y HCDASMP,75__________________________________   |
| _ ALLOC_SPACE              Y HCDRPT,75___________________________________   |
| # BATCH_IODF_NAME_CHECK    Y YES                                            |
| # BYPASS_UPD_IODF_FOR_SNA  Y NO                                             |
| # CHANGE_LOG               N YES                                            |
| # CHECK_IODF               Y YES                                            |
| # CHLOG_EXTENSION          Y 0                                              |
| # CHLOG_VOL                Y SBOX20                                         |
| # COLOR_BACKGROUND         Y ____________________________________________   |
| # COLOR_HIGH               Y RED                                            |
| # COLOR_NORM               Y GREEN                                          |
| # COLOR_TEXT               Y GREEN                                          |
| _ CU_ATTACHABLE_DEVICE     N ____________________________________________   |
| # DELAYED_GROUPING         Y NO                                             |
+-----------------------------------------------------------------------------+
```

Figure 6-1 HCD Profile Options

Consider using the HCD profile, because this can help you to get the most benefit from HCD.

Certain options can be specified multiple times, for example the ALLOC_SPACE option. Use any of the following line commands to add or delete options:

- /
- a
- d

Scroll to the right to view or update Description fields. In the example, the ALLOC_SPACE option has been added in order to update two separate parameters.

The following profile options are important:

- Use the ACTLOG_VOL option to place the activity log file on the same volume as the IODF data set. When you specify an asterisk (*) HCD allocates the activity log on the IODF volume. You can also specify a specific volume. This option applies only to data sets that are not SMS-managed.
- The CHANGE_LOG option specifies whether you want to activate change logging. Change logging is *not* a separate log file, but generates information about updated HCD resources, for example add, delete, connect, or disconnect devices and control units. The updates are written in the Activity Log File panel and you can edit these entries before saving the activity log file. HCD allocates a permanent <*work-iodf-name.CHLOG*> VSAM data set for managing the change log.
- Use the CHECK_IODF option to enable checks for consistency and structural correctness when the IODF that is accessed in update mode is unallocated. This corresponds to the TRACE ID=IODF command. It consumes processing time depending on the size of the IODF.
- Use the CHLOG_VOL option to specify the volume serial number for the linear VSAM data set used by HCD for change-logging. When specifying an asterisk (*), HCD allocates the linear VSAM change log data set on the IODF volume. You can also specify a specific volume. This option applies only to data sets that are not SMS-managed.
- Use the EXPORTED_HLQ option to specify the high level of exported IODF data sets. The default is the user ID doing the export, and might not be suitable if you are going to export data sets to another system or sysplex.
- The HCDDECK_VOL option specifies the volume serial number for allocating a new IOCP, HCPRIO, or other data set containing I/O configuration statements. You can also specify a specific volume. This option applies only to data sets that are not SMS-managed.
- Use the IODF_DATA_SPACE option to load the IODF into a data space instead of the default, which is the users address space.
- Use the MCF_VOL option to specify a volume for the HCM Master Configuration file. When you specify an asterisk (*), HCD allocates the HCM Master Configuration file on the IODF volume. This option applies only to HCM users and data sets that are not SMS-managed.
- Use the OS_PARM_DEFAULT option to override default values for UIMs. Specify the OSConfig parameter and the requested default value, for example `LOCANY,YES`. Default values *cannot* be set differently for separate device types.
- The SHOW_IO_CHANGES option must be set to YES (the default) if you need IOS500I messages to include information about updated, added, or deleted HCD resources.

6.1.2 HCD trace

The HCD trace facility is for locating internal HCD problems. It helps the IBM support representative to identify the cause of a failure. See *Hardware Configuration Definition User's Guide,* SG33-7988 for more information about the HCD trace facility.

The HCD trace data set is allocated by the CBDCHCD command list (CLIST) using the HCDTRACE DDname; the default HCD trace data set is `<userid.HCD.TRACE>`.

6.1.3 HCD message log

Use the HCD message log when saving messages from HCD message lists. This process enables you to reference message later. Messages from activities being performed in the background are written to the message log, for example messages from dynamic sysplex-wide test or activation. If HCD terminates abnormally, a CBDA000I message is written in the log, specifying the abend and reason code.

The HCD message log is allocated by the CBDCHCD CLIST using the HCDMLOG DDname; the default HCD message log data set is `<userid.HCD.MSGLOG>`.

6.1.4 HCD activity logging

The activity log is a sequential file. You are prompted to enter information when leaving HCD, after having updated the IODF. Date, time, user ID of the user who updated he IODF, the IODF data set name, and a change reference number is automatically written to the log.

With the CHANGE_LOG option in the HCD profile, the activity log is automatically updated to include information about adding, deleting, connecting, or disconnecting devices and control units.

Be sure to use the activity log for documenting updates to the IODF file. Figure 6-2 is an example of a manually updated activity log.

```
 BROWSE    SYS6.IODF26.WORK.ACTLOG                     Line 00000000 Col 001 080
 Command ===>                                                   Scroll ===> PAGE
******************************** Top of Data ********************************
REFERENCE   DATE        TIME      USER ID             IODF NAME
________________________________________________________________________________
000001:     2009-10-14 17:59:57  <userid>             SYS6.IODF26.WORK
        CPCPKR1.0 Add dev F010,016 (consoles req by MARKP)
        CPCPKR1.0 Add dev D400,256 (SSID for SYS1 CUST-1 req by STG MGMT)
________________________________________________________________________________
000002:     2009-10-15 23:08:14 <userid>             SYS6.IODF26.WORK
        CPCPKR2.0 Chg CHPid 1C OSA to be accessible from LPPKR212
        CPCPKRx.x Del 3590 dev B900,016 (Now replaced by B800)
________________________________________________________________________________
```

Figure 6-2 HCD: Activity log (manual update)

Consider documenting processor, LCSS, partition, customer, and requester information and more in the activity log.

Figure 6-3 on page 79 is an example of an activity log, updated by the CHANGE_LOG option only.

```
 BROWSE    SYS6.IODF26.WORK.ACTLOG                    Line 00000000 Col 001 080
 Command ===>                                                   Scroll ===> PAGE
********************************* Top of Data **********************************
REFERENCE   DATE        TIME      USER ID             IODF NAME
________________________________________________________________________________
000003:     2009-10-16  12:08:40  <userid>            SYS6.IODF26.WORK
        Device F010 (16) added
        CSS device CPCPKR1.0.F010 (16) added
        CSS device CPCPKR1.1.F010 (16) added
        Device F010 (group) connected to Control unit F000
        OS device OSSYSXPR.F010 (16) added
        OS device OSSYS1PR.F010 (16) added
________________________________________________________________________________
000004:     2009-10-16 18:21:18  <userid>           SYS6.IODF26.WORK
        CSS control unit CPCPKR1.0.4028 added
        CSS control unit CPCPKR1.0.4028 connected to CHPID CPCPKR1.0.44
        Control unit 4008 updated
        Control unit 4010 updated
        Device 4020 (32) added
        CSS device CPCPKR1.0.4020 (16) added
        Device 4020 (group) connected to Control unit 4020
        Partition CPCPKR1.0.LPPKR102 connected to
           ... CSS device CPCPKR1.0.4020 (group)
        OS device OSSYSXSE.4020 (32) added
        Control unit 4030 added
        Control unit 4030 connected to Port 11.02
        CSS control unit CPCPKR2.0.4030 added
        CSS control unit CPCPKR2.0.4030 connected to CHPID CPCPKR2.0.30
        Control unit 4038 disconnected from Port 14.02
        Control unit 4038 connected to Port 12.02
```

Figure 6-3 HCD: Activity log (CHANGE_LOG update)

Consider using a combination of manual and CHANGE_LOG updates.

6.2 IODF naming standards

Work IODF files are Virtual Storage Access Method (VSAM) linear files. The data set name format is as follows:

- High-level qualifier of up to 8 bytes
- Second-level qualifier of 6 bytes starting with IODF (last two bytes are hexadecimal characters 0-9 and A-F)
- Optionally more qualifiers
- When you use HCM, the entire data set name must not exceed 29 characters. When not using HCM, the entire data set name must not exceed 35 characters.

Production IODF files are VSAM linear files. The data set name format is as follows:

- High-level qualifier of up to 8 bytes
- Second-level qualifier of 6 bytes, starting with IODF (The last two bytes are hexadecimal characters 0 - 9 and A - F.)

Be sure to use a third level for work IODF files, for example:

```
SYS6.IODF26.WORK
```

This approach ensures that you never replace a production IODF. Consider using intervals for separate sysplexes, such SYS6.IODF1x for the production sysplex and SYS6.IODF2x for the development sysplex, or a monoplex system or separate intervals for separate customers on the same CPC.

You might consider naming standards for production IODFs data sets, matching IODF volumes and LOADxx members.

Catalog considerations

The IODF is a VSAM data set, and therefore can be catalogued in a single catalog only. However, if SYS1 is used for high-level, the data set can be catalogued in multiple master catalogs. When using high-level SYS1 and catalog entries in multiple master catalogs, entries must be synchronized manually.

A useful approach is to catalog the IODF in a user catalog that resides on the same volume as the IODF. With this approach, if the volume fails and must be restored, the catalog/IODF connection is always preserved during the restore operation. The catalog is used for referencing the IODF during HCD definition activities and during dynamic I/O reconfiguration (activation), *not* during IPL.

See *Hardware Configuration Definition User's Guide,* SG33-7988 for naming standards of associated data sets, such as the activity log file and the HCM master configuration file.

Device numbering schemes

Although you do not need a numbering scheme for control units and device numbers, consider having one. Several numbering schemes are possible, each of which is suitable for specific circumstances. Consider the following ideas as input for a numbering scheme:

- Device numbers for the primary site lower than device numbers in the secondary site, as follows:
  - Primary disk devices can be lower than secondary.
  - Local peer-to-peer tape devices can be lower than remote.
- Starting device numbers for FCTC that are connected using switch #1 can have postfix 0; starting device numbers for FCTC that are connected using switch #2 can have postfix 8.
- Group the device types into numbering intervals:
  - Network device number prefix EQ 3-
  - CTC device number prefix EQ 4-
  - Tape device number prefix EQ B-
  - Console device number prefix EQ F-

See *Hardware Configuration Definition Planning,* GA22-7525 for more information about device numbering schemes.

6.3 IODF considerations

This section describes IODF considerations including multiple user access, allocated space, and sysplex considerations.

6.3.1 Multiple user access

When allocating an IODF, you may specify a multi-user option so that multiple users can simultaneously update the IODF. The IODF is kept in exclusive update mode only for the duration of a single transaction. You can switch between single-user and multi-user mode by using an option in the Change I/O Definition File Attributes panel. Select option **6, Maintain I/O Definition files** on the HCD entry panel. Then, select option **3, Change I/O Definition File Attributes.** See Figure 6-4.

```
+--------------- Change I/O Definition File Attributes ---------------+
|                                                                     |
| Change the IODF attributes, then press ENTER.                       |
|                                                                     |
| IODF name  . . . . . . : 'SYS6.IODF26.WORK'                         |
|                                                                     |
| Creation date  . . . . : 2009-10-08                                 |
| Last update  . . . . . : 2009-10-12  14:27                          |
| Volume serial number . : SBOX38                                     |
| Activity logging . . . : Yes                                        |
|                                                                     |
| Multi-user access  . . . Yes  (Yes or No)                           |
| Description  . . . . . . ____________________________________________ |
|                          ____________________________________________ |
|                          ___________________________________________  |
|                                                                     |
+---------------------------------------------------------------------+
```

Figure 6-4 HCD: Change I/O Definition File Attributes

When updating the work IODF from a setting of `No` for Multi-user access to a setting of `Yes`, the VSAM Share options for the work IODF are changed from (1,3) to (3,3).

6.3.2 Allocated space

When allocating a new production or work IODF, you specify the requested size for the new IODF. The default size is 1024 4-KB blocks, corresponding to less than 15 tracks on a 3390 DASD volume.

Allocate space generously, because IODF data sets are relatively small and reallocating the IODF is a manual process. If you run out of space while adding resources to the IODF, a message is displayed and the resources are not added. You then have to exit the IODF, allocate a new larger one, and copy the old IODF to the new larger IODF. At that time, you can continue adding resources to the IODF.

To query currently allocated and used space, perform the following steps:

1. Select the **Maintain I/O definition files** option on the HCD entry panel.
2. Select option **4, View I/O definition file information**. The View I/O Definition File Information panel opens, as shown in Figure 6-5 on page 82.

```
+---------------- View I/O Definition File Information -----------------+
|                                                                       |
| IODF name  . . . . . . . : 'SYS6.IODF28.WORK'                        |
| IODF type  . . . . . . . : Work                                      |
| IODF version . . . . . . : 5                                         |
|                                                                       |
| Creation date  . . . . . : 2009-10-12                                |
| Last update  . . . . . . :            16:18                          |
|                                                                       |
| Volume serial number . . : SBOX20                                    |
| Allocated space  . . . . : 1024    (Number of 4K blocks)             |
| Used space . . . . . . . : 912 (Number of 4K blocks)                 |
|    thereof utilized (%)  100                                          |
| Activity logging . . . . : Yes                                       |
| Multi-user access  . . . : No                                        |
| Backup IODF name . . . . :                                           |
|                                                                       |
| Description  . . . . . . :                                           |
|                                                                       |
| ENTER to continue.                                                    |
+-----------------------------------------------------------------------+
```

Figure 6-5 HCD: View I/O Definition File Information

In this example, 912 (out a total of 1024 of the 4K blocks) is the amount of space that is used. Copy this work IODF into a larger one before doing major updates.

6.3.3 Sysplex considerations

To dynamically reconfigure the I/O configuration of a system within a sysplex from a focal point HCD, the processors and OS configurations of the sysplex systems must be defined in the same IODF. The reason is because a sysplex is sharing resources; resources should not be defined more than once because it is a time-consuming process and imposes a risk of the resources being out of synchronization.

7

Configuration with HCD

This chapter has a detailed description of how to define a complete configuration, starting from the beginning.

7.1 Configuration example

The detailed description of how to define a complete configuration in this chapter is only an example of a complete configuration. Other naming conventions, hardware sharing conventions, and more might apply to your site. For simplicity, issues such as disaster recovery and dual sites are not considered. Furthermore no free CHPIDs are defined.

After reading the introduction, each section can be used for reference individually. Various panels and commands are used in certain sections to help describe various approaches to the same tasks.

Figure 7-1 shows a configuration example.

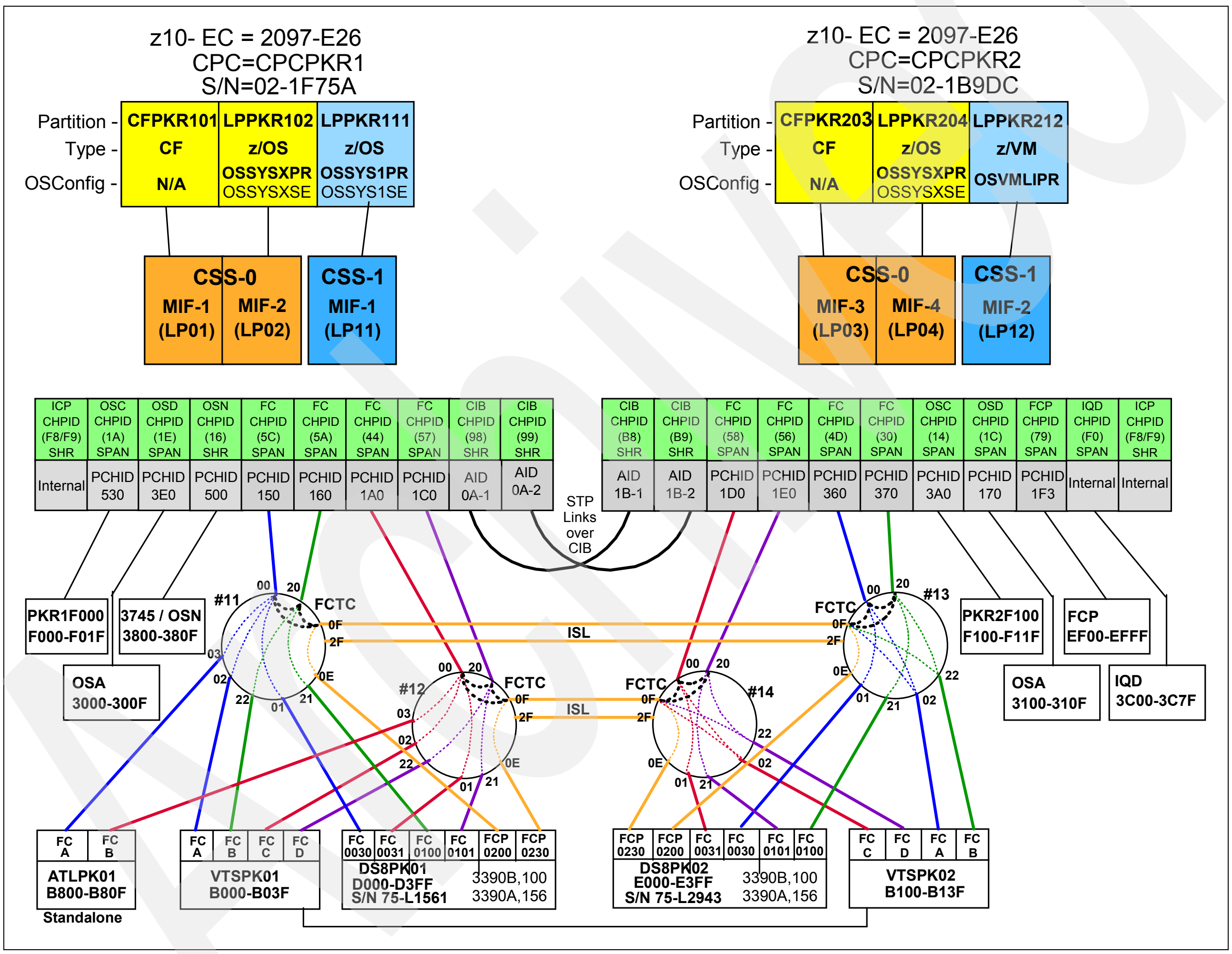


Figure 7-1 HCD: Configuration overview example

The following resources are included in the configuration example:

- OS configuration OSSYSXPR/OSSYSXSE for the SYSA/SYSB sysplex
- OS configuration OSSYS1PR/OSSYS1SE for the SYS1 monoplex
- OS configuration OSVMLIPR for z/VM Linux system (no PPRC, therefore no secondary)
- Processor CPCPKR1 2097-E26 and CPCPKR2 2097-E26
- Partitions LPPRR101 and LPPRR203 for SYSA/SYSB coupling facilities
- Partitions LPPRR102 and LPPRR204 for SYSA/SYSB z/OS systems
- Partition LPPRR111 for the SYS1 z/OS system

- Partition LPPRR212 for the z/VM and Linux system
- Switch device 0011,4 for the four FICON directors including ISLs
- CHPID type OSC, OSD, OSN, IQD, ICP, CIB, FCP and FC
- OSA device 3000,16 for the SYSA and SYS1 systems
- OSA device 3100,16 for the SYSB and z/VM Linux systems
- OSN device 3800,16 for the SYSA system
- IQD device 3C00.128 for the SYSB and z/VM Linux systems
- 2107 Primary Device D000,512 defined the SYSA/SYSB sysplex
- 2107 Primary Device D200,256 defined the SYS1 Monoplex
- 2107 Primary Device D300,256 defined the z/VM Linux system
- 2107 Secondary Device E000,512 defined the SYSA/SYSB sysplex
- 2107 Secondary Device E200,256 defined the SYS1 Monoplex
- 2107 Secondary Device E300,256 defined the z/VM Linux system
- 2107 Primary FCP device EF00,256 defined for the z/VM Linux system
- FCTC devices for SYSA-SYS1 communication duplexed using SW11/12
- FCTC devices for SYSA-SYSB communication duplexed using SW11/12/13/14 using ISLs
- TS7700 3490 device B000,64 cluster 0 for the SYSA/SYSB/SYS1 systems
- TS7700 3490 device B100,64 cluster 1 for the SYSA/SYSB/SYS1 systems
- ATL 3590 device B800,16 for the SYSA/SYSB/SYS1 systems
- OSC consoles device F000,16 for the SYSA system
- OSC consoles device F010,16 for the SYS1 system
- OSC consoles device F100,16 for the SYSB system
- OSC consoles device F020,16 for the z/VM Linux system
- Coupling facility devices (CIB and ICP) not included in the list

IOCP data sets for the processors are available in Part 3, “Appendix” on page 409.

Hardware subsystem I/O configuration requirements and considerations are described in various planning and implementation documentation for your hardware subsystem. Consult the relevant documentation for HCD details.

7.2 Introduction to HCD

In this section, we introduce several basic HCD function keys and commands that are used in our configuration example. For a detailed description of panels, lists, fields, commands, function keys, filtering, and more see *Hardware Configuration Definition User’s Guide,* SG33-7988.

The following information is used only in our configuration example:

- Prompt option is available. Several HCD entry fields are preceded by a plus sign (+). The plus sign indicates that the prompt option is available for that particular field. Place the cursor in the field and press the F4 key to view a list of values that are currently valid for field. Elect the requested value.
- To add new resources, such as operating system configurations, processors, control units, devices, and more, press the F11 key. An alternative to the F11 key is to enter the **A** line-command. This command is used next to an existing definition. The F11 key provides an empty data entry fields; the **A** line-command provides a model of an existing definition.
- Online help is available for panels and fields. Place the cursor on a data entry field and press the F1 key. Placing the curser outside data entry fields and pressing F1 provides you with extended help on panel level. Also available is a Help menu, which also includes key and instruction help.

- Line commands are available on list panels:

  / Forward slash. Use this character next to a definition to view a list of available line commands.

  ( ) Left parenthesis and right parenthesis. To select a range of definitions, use the left parenthesis in front of the first list definition and use the right parenthesis in front of the last list definition. You can view a list of available line commands as you do when using the forward slash (/).

When you start the HCD product, the Hardware Configuration (HCD) entry panel is displayed. See Figure 7-2.

```
                       z/OS V1.11 HCD
Command ===> ________________________________________________________________

                           Hardware Configuration

Select one of the following.

1   0.  Edit profile options
    1.  Define, modify, or view configuration data
    2.  Activate or process configuration data
    3.  Print or compare configuration data
    4.  Create or view graphical configuration report
    5.  Migrate configuration data
    6.  Maintain I/O definition files
    7.  Query supported hardware and installed UIMs
    8.  Getting started with this dialog
    9.  What's new in this release

For options 1 to 5, specify the name of the IODF to be used.

I/O definition file . . . 'SYS6.IODF10.WORK'                  +
```

Figure 7-2 HCD: Entry panel

This panel is where you specify the work IODF file. In this example, we define a complete configuration, and therefore a non-existing IODF work file name is specified.

To get started, follow these steps, beginning at the HCD entry panel, shown in Figure 7-2:

1. Select option **1, Define, modify, or view configuration data**. This is the only option used in this configuration example. All other sections of this chapter use the “Define, Modify, or View Configuration Data” panel rather than the HCD entry panel as a starting point.

   Because the work IODF file specified does not exist, the Create Work I/O Definition File panel is displayed. See Figure 7-3 on page 87.

   The IODF name that is specified on the HCD entry panel is displayed.

2. Specify the volume serial number (for non-SMS-managed data sets only). The default space allocation is 1024 (4K blocks). In this example, the space allocation is increased to 2048, and `Yes` is specified for both Activity logging and Multi-user access. The Description is optional.

```
+------------------ Create Work I/O Definition File ------------------+
|                                                                     |
| The specified I/O definition file does not exist. To create a new  |
| file, specify the following values.                                 |
|                                                                     |
| IODF name  . . . . . . 'SYS6.IODF10.WORK'                          |
|                                                                     |
| Volume serial number . SBOX20  +                                    |
|                                                                     |
| Space allocation . . . 2048 (Number of 4K blocks)                   |
|                                                                     |
| Activity logging . . . Yes     (Yes or No)                          |
|                                                                     |
| Multi-user access  . . Yes     (Yes or No)                          |
|                                                                     |
| Description  . . . . . Complete configuration example for ITSO____ |
|                        Redbook HCD and HMC Primer_________________ |
|                        ___________________________________________ |
|                                                                     |
|  F1=Help    F2=Split   F3=Exit    F4=Prompt  F9=Swap   F12=Cancel  |
+---------------------------------------------------------------------+
```

Figure 7-3 HCD: Create Work I/O Definition File

3. Press Enter to create the work IODF. The `New IODF SYS6.IODF10.WORK defined` message is displayed and the “Define, Modify, or View Configuration Data” panel (requested on the HCD entry panel) opens. See Figure 7-4.

```
+------------- Define, Modify, or View Configuration Data --------------+
|                                                                       |
|     Select type of objects to define, modify, or view data.          |
|                                                                       |
|   _  1. Operating system configurations                               |
|            consoles                                                   |
|            system-defined generics                                    |
|            EDTs                                                       |
|              esoterics                                                |
|              user-modified generics                                   |
|         2. Switches                                                   |
|            ports                                                      |
|            switch configurations                                      |
|              port matrix                                              |
|         3. Processors                                                 |
|            channel subsystems                                         |
|              partitions                                               |
|              channel paths                                            |
|         4. Control units                                              |
|         5. I/O devices                                                |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-4 HCD: Define, Modify, or View Configuration Data

On this panel, you can define operating system configurations, switches, processors, control units and devices. Several of these options are available from other panels also. As an example, to work with devices, select either option **5, I/O Devices** or option **4, Control units**. This configuration example includes only one way of defining resources, however separate approaches are used.

When adding resources, HCD panels display the required and optional entry fields by using separate colors. The colors used depend on your 3270 Personal Communications setup.

As a rule, configurations are defined from top to bottom, starting with the system software view (the operating system configuration), then switches, processors, control units, and devices, similar to the order on the “Define, Modify, or View Configuration Data” panel.

7.3 Defining the operating system configuration

First, in our example, we define operating system (OS) configurations. We start this way because it will then be easier to connect devices that are defined later to the already existing operating system configurations. The OS configuration can be considered as a software template to put on top of the physical configuration.

To define the OS configuration, perform the following steps:

1. Before you make any selections, consider the number of OS configurations required. Only one is required for a sysplex for each scenario, for example a sysplex running on primary disks and then another for the same sysplex running on secondary disks. However, more monoplexes or sysplexes can technically share a single operating system configuration.

   OS configurations include a list of NIP consoles and one or more esoteric device lists. Because devices are not yet defined, we will add NIP consoles and update EDT definitions later as part of adding devices for control units.

2. Select option **1, Operating system Configurations** on the Define, Modify, or View Configuration Data panel. The Operating System Configuration List panel opens; the list of operating system configurations is empty, because we have not defined any yet.

3. Press F11 to add an operating system configuration. The panel in Figure 7-5 opens.

```
+--------------- Add Operating System Configuration ----------------+
|                                                                   |
| Specify or revise the following values.                           |
|                                                                   |
| OS configuration ID  . . . . . OSSYSXPR                           |
| Operating system type  . . . . MVS      +                         |
|                                                                   |
| Description  . . . . . . . . . OSconfig SYSAB sysplex Primary     |
|                                                                   |
+-------------------------------------------------------------------+
```

Figure 7-5 HCD: Add Operating System Configuration

4. Specify the following information in the panel:

   – OS configuration ID (the name of the operating system configuration to be added)
   – Operating system type (MVS or VM)
   – Description

In this example we add the OSSYSXPR operating system configurations, type MVS for the SYSA and SYSB sysplex running on primary disks. Later when defining disks, we define the primary disks as being default online and the secondary disks as being default offline in this configuration. We will create another configuration for having the secondary disks default online and the primary default offline. If both are specified as default offline and the PPRC is not enabled for all volumes, duplicate volser messages will appear during IPL.

The naming standard used in this example is OS for OSconfig, SYSX for the sysplex, and PR for primary disks. Consider including system or sysplex, customer, disks, or any other information relevant to you.

Table 7-1 shows operating system configurations are added.

Table 7-1 OS configurations

OSconfig ID	Type	Description
OSSYSXPR	MVS	OSconfig SYSAB sysplex Primary
OSSYSXSE	MVS	OSconfig SYSAB sysplex Secondary
OSSYS1PR	MVS	OSconfig SYS1 monoplex Primary
OSSYS1SE	MVS	OSconfig SYS1 monoplex Secondary
OSVMLIPR	VM	OSconfig SYSAB sysplex Primary

5. We continue by creating Eligible Device Tables (EDTs) for each operating system configuration. See Figure 7-6.

```
+-------------------------------- Add EDT --------------------------------+
|                                                                         |
| Specify the following values.                                           |
|                                                                         |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary        |
|                                                                         |
| EDT identifier . . . 00                                                 |
| Description  . . . . Normal__________________________                   |
|                                                                         |
+-------------------------------------------------------------------------+
```

Figure 7-6 HCD: Add EDT

One EDT is created for each Operating System Configuration. In the individual EDTs, we will later define esoteric device groups and name of the generic device groups. Esoteric device groups are installation-defined groupings of I/O devices.

Now we have defined five operating system configurations, each with an empty EDT 00 list. No NIP consoles are defined yet.

7.4 Defining switches

To define the switches, perform the following steps:

1. Before you make any selections, identify the number of ports installed in the switches (the port range). If the configuration includes inter-switch links (ISLs), you must identify the ports used for ISL, by consulting your hardware technicians.
2. Select option **2, Switches** on the Define, Modify, or View Configuration Data panel. The “Switch list” panel opens; the list of Switches is empty, because we have not defined any yet. Press F11 to add a switch. See Figure 7-7.

```
+--------------------------- Add Switch ----------------------------+
|                                                                   |
| Specify or revise the following values.                           |
|                                                                   |
| Switch ID . . . . . . . . 11  (00-FF)                             |
| Switch type . . . . . . . 2032_________  +                        |
| Serial number . . . . . . __________                              |
| Description . . . . . . . FICON switch site 1 number 1___         |
| Switch address  . . . . . 11  (00-FF) for a FICON switch          |
|                                                                   |
| Specify the port range to be installed only if a larger range     |
| than the minimum is desired.                                      |
|                                                                   |
| Installed port range  . . 00  -  3F  +                            |
|                                                                   |
| Specify either numbers of existing control unit and device, or    |
| numbers for new control unit and device to be added.              |
|                                                                   |
| Switch CU number(s) . . . 0011  ____ ____ ____ ____  +            |
| Switch device number(s) . 0011  ____ ____ ____ ____               |
|                                                                   |
+-------------------------------------------------------------------+
```

Figure 7-7 HCD: Add Switch

3. Specify the following information:
   - Switch ID and Switch type: These are both required fields.
   - Description and Switch address: These are both option fields.
   - Installed port range: Port FE is a special port used for reporting. When you specify the installed port range, do not consider the FE port. If no ports are specified, all ports will by default by registered as not-installed, and can be specified as installed later.
   - Switch CU number and Switch device number: When specified as part of defining the switch, the control unit and devices will be added automatically. Alternatively you can add these manually later. If you define your switch using Switch type FCS, control unit and device number is not supported. You do have to connect the control units to CHPIDs and add the devices to the operating system configurations manually. This will be done later, because processors and CHPIDs are not defined yet.

   In our example, a total of four switches will be defined, connected two-by-two. The same value has been used for the Switch ID, Switch address, control unit and device. Consider using a standard for Switch IDs, making the relationship between switches visible, for example make uneven Switch IDs to uneven Switch IDs or Switch ID Ax to Bx.

Connecting a control unit through switches must always be done by using two separate switches in order to avoid a single point of failure. A dual site example might be as follows: A primary disk subsystem can be connected in site 1 using switch A1 and A2; the corresponding secondary disk subsystem is connected in site 2 through switch B1 and B2. Switch A1 is connected to B1 using ISLs. Switch A2 is connected to B2 using ISLs.

Table 7-2 lists the switches that are added.

Table 7-2 Switches that are added

ID	Type	Switch address	Description
ID 11	Type 2032	Address 11	FICON switch site 1 number 1
ID 12	Type 2032	Address 12	FICON switch site 1 number 2
ID 13	Type 2032	Address 13	FICON switch site 1 number 3
ID 14	Type 2032	Address 14	FICON switch site 1 number 4

4. We update port descriptions for the switches defined. On the Switch List panel, use the **P** line-command to open the Port List panel for the switch. See Figure 7-8.

```
 Port List                      Row 255 of 256
 Command ===> ____________________________________________ Scroll ===> PAGE

 Select one or more ports, then press Enter.

 Switch ID  . . . . : 11   Address : 11   FICON switch site 1 number 1


                                  ----------------Connection---------------
 / Port H Name +                     Unit ID          Unit Type         O
 _ FE   Y FICON director 11       CU 0011          2032              N
 _ FF   N ________________________                                   _
```

Figure 7-8 HCD: Switch Port List (Port FE)

Scroll to the bottom to see the FE port. This is the special port used for the Switch control unit added as part of the switch add. Be sure to specify a description in the Name field for all ports used. Descriptions in the Name fields must be unique within the switch.

5. Use PF3 to return to the Switch List.

Defining ISLs is not required in HCD but is a good practice. By defining ISLs you document the setup and enable the HCM product to provide accurate and complete configuration drawings.

6. Now, we define the ISL connections. On the Switch List panel use the **P** line-command to return to the Port List panel for the Switch. Locate the ports used for ISL and use the **W** line-command to open the "Connect to Switch" panel. See Figure 7-9 on page 92.

```
+--------- Connect to Switch ----------+
|                                      |
| Specify the following values.        |
|                                      |
| Switch ID  : 11  Port . . . : 30     |
|                                      |
| Switch ID  . . . . . 13  +           |
| Port . . . . . . . . 30  +           |
|                                      |
+--------------------------------------+
```

Figure 7-9 HCD: Connect to Switch

7. Specify the Switch ID and the Port for ISL connection. Use the same port number in each switch for a connection for example port 30 to port 30. This is repeated for switch 12 but *not* for switch 13 and 14, because they are now connected to switch 11 and 12.

   After defining the ISLs, we also update the description in the Name field for the ISL ports on all four switches.

8. Now, we define a switch configuration for each switch. A switch configuration is used to specify dedicated connections between ports for blocking ports, and to allow or prohibit connections between the individual ports.

> **Attention:** A switch configuration is not written to the physical switch as part of the I/O configuration. Switch configuration on the physical switch must be synchronized using HCD option 2.8 Activate Switch Configuration, I/O operations or be updated on the switch manually.

9. On the Switch List panel, enter the **S** line-command (Work with Switch Configurations) to access the Switch Configuration List panel. Use the F11 key to add a new Switch Configuration. See Figure 7-10.

```
+----------------- Add or Repeat Switch Configuration ------------------+
|                                                                        |
| Specify or revise the following values.                                |
|                                                                        |
| Switch ID . . . . . . . : 11     FICON switch site 1 number 1          |
|                                                                        |
| Switch configuration ID . ALLOW11_                                     |
|                                                                        |
| Description . . . . . . . Switch config 11________________             |
|                                                                        |
| Default connection  . . . 1_  1.  Allow                                |
|                               2.  Prohibit                             |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-10 HCD: Add or Repeat Switch Configuration

10. Specify a Switch configuration ID, a Description, and the Default connection (connection between all ports allowed or prohibited by default).

    In this example, the default connection is Allow. This switch is used by this I/O configuration only and all connections are specified in the I/O configuration.

11. To view or update the switch configuration that you just created, use the **S** line-command to open the Port Matrix panel. See Figure 7-11.

```
Port Matrix          Row 1 of 48 More:       >
Command ===> ______________________________________________ Scroll ===> PAGE

Select one or more ports, then press Enter.

Switch ID  . . . . . . . . : 11         FICON switch site 1 number 1
Switch configuration ID  . : ALLOW11    Default connection : Allow

                              Ded    --Dynamic Connection Ports 0x--
/ Port Name +              B  Con +  0 1 2 3 4 5 6 7 8 9 A B C D E F
_ 00  ________________________ N  __     * * * P * * * * * * * * * * * *
_ 01  ________________________ N  __     * * * * * * * * * * * * * * * *
_ 02  ________________________ N  __     * * * * * * * * * * * * * * * *
_ 03  ________________________ N  __     P * * * * * * * * * * * * * * *
```

Figure 7-11 HCD: Switch Port Matrix

The Port Matrix panel includes ports installed on the switch only. Because we installed port 00/3F, the list includes a total of 64 ports.

On the Port Matrix panel you can specify blocked ports, dedicated connections, and allow or prohibit connections to individual ports as follows:

- To specify a dedicated connection between port 00 and 20 simply type 20 in the Ded Con column for port 00. The column is automatically updated for port 20.
- To block a port, enter “Y” in the B column. Specify “N” to unblock a port. Blocking a port means no connections to or from the port is possible. Ports are typically blocked when physical cables are in the process of being connected, or when connections are no longer to be used.
- To specify allow or prohibit for a dynamic port connection, specify “A” or “P” in the Dynamic connection ports matrix. If the default Dynamic connection is Allow, it does not make sense to specify “A”, but you can. To prohibit dynamic connection between port 00 and 03, specify “P” in the forth column of the matrix next to port 00.

Remember, the switch configuration is not automatically updated on the switch when activating the I/O configuration. Update the switch manually or use I/O operations to synchronize the switch configuration.

In our example, we do not need the switch configurations. No dedicated connections are established, no ports are blocked, and no dynamic connections are prohibited.

Table 7-3 lists the switch configurations that are added.

Table 7-3 Switch configurations that are added

ID	Config ID	Switch address	Description
ID 11	Allow11	Address 11	FICON switch site 1 number 1
ID 12	Allow12	Address 12	FICON switch site 1 number 2
ID 13	Allow13	Address 13	FICON switch site 1 number 3
ID 14	Allow14	Address 14	FICON switch site 1 number 4

Now, we have defined operating system configurations and four switches including switch configurations that are not required in this example.

7.5 Defining processor

Before you order a processor, review the CFReport file that is supplied by your IBM support representative. The file contains information about the processor model and type, serial number, and more. Furthermore, know the SNA address (the network name and CPC name) for the processors. This is the processor ID on the token-ring LAN that connects the processor to the HMC.

To define the processors, perform the following steps.

1. Select option **3, Processors** on the Define, Modify, or View Configuration Data panel. The Processor List panel opens and the list of Processors is empty, because we have not defined any yet.
2. Press F11 to add a processor. Figure 7-12 shows the Add Processor panel.

```
+------------------------------- Add Processor --------------------------------+
|                                                                              |
| Specify or revise the following values.                                      |
|                                                                              |
| Processor ID . . . . . . . . . . CPCPKR1                                     |
| Processor type . . . . . . . . . 2097      +                                 |
| Processor model  . . . . . . . . E26       +                                 |
| Configuration mode . . . . . . . LPAR      +                                 |
| Number of channel subsystems . . 4         +                                 |
|                                                                              |
| Serial number  . . . . . . . . . 21F75A2097                                  |
| Description  . . . . . . . . . . CPC Poughkeepsie R1 Usage notes             |
|                                                                              |
| Specify SNA address only if part of an S/390 microprocessor cluster:         |
|                                                                              |
| Network name . . . . . . . . . . IBM390PS  +                                 |
| CPC name . . . . . . . . . . . . CPCPKR1   +                                 |
|                                                                              |
| Local system name  . . . . . . . CPCPKR1_                                    |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 7-12 HCD: Add Processor

3. Specify the Processor ID, Processor type, Processor model, Configuration mode, Number of channel subsystems, Serial number, Description, and SNA address.

   In this example the processor name is CPCPKR1. CPC for processor, PK for Poughkeepsie and R1 is a unique identifier for the Poughkeepsie sites. Consider using a unique ID as the two low-level bytes of your processor names. By default the HCM product uses these two bytes to identify the processor when displaying switch ports and more.

   If you are creating a System z/9 processor, the number of channel subsystems can be less than four. Defining more channel subsystems uses up resources. Adding a channel subsystem later will require a power-on reset (POR).

This configuration includes z10 processors only, therefore the Configuration mode is LPAR and the number of channel subsystems is 4. The serial number is a six byte number prefixed by the Processor type.

Be sure to use the processor ID for the SNA address CPC name, because this name is used on the HMC.

A local system name is required on every processor that will use CIB CHPids. If a local system name is not specified for a processor that uses CIB CHPIDs, a CBDG539I error message is issued during production IODF build. Therefore, use the same processor ID that is specified for the processor on the Hardware Management Console. This approach can help to prevent naming conflicts. For more information about, see 9.2.1, “Processor IDs, CPC names, and local system names” on page 286.

4. Select the support level for the new processor. See Figure 7-13. See also the CFReport file supplied by your IBM support representative. Specify either of the following characters next to the support level, and then press Enter:

   – S
   – /

```
+------------------------- Available Support Levels -------------------------+
|                                                   Row 1 of 4 More:       > |
| Command ===> ___________________________________________________________   |
|                                                                            |
| Select the processor support level which provides the processor            |
| capabilities you want to use.                                              |
|                                                                            |
|                                                                            |
|   Support Level                                                            |
|   XMP, 2097 support                                                        |
| #                                                                          |
|   XMP, 2097 support, RPQ 8P2337                                            |
| #                                                                          |
| ***************************** Bottom of data ***************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-13 HCD: Available Support Levels

Table 7-4 lists the processors that are added.

Table 7-4 Processors that are added

Processor	Type	Model	Mode	Serial	Description
CPCPKR1	2097	E26	LPAR	21F75A2097	CPC Poughkeepsie R1 usage note
CPCPKR2	2097	E26	LPAR	21B9DC2097	CPC Poughkeepsie R2 usage note

Now we have defined operating system configurations, switches, two z10 processors with 60 reserved partitions on each. No partitions or CHPIDs are defined on the processors yet.

7.6 Defining partitions

Before you begin, identify the number and usage of partitions to be created. Because this example includes two processors, we must also consider placement of partitions between the processors.

To define the partitions on the processors that were just created, perform the following steps:

1. Because the Processor List panel is open and includes processors that were just created, select the processor so you can view a list of the channel subsystems that are defined on the processor. See Figure 7-14.

```
Channel Subsystem List                    Row 1 of 4
Command ===> ______________________________________________ Scroll ===> CSR

Select one or more channel subsystems, then press Enter.  To add, use F11.

Processor ID . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note

  CSS Devices in SS0    Devices in SS1
/ ID  Maximum + Actual  Maximum + Actual  Description
_ 0   65280     0       65535     0       Production sysplex
_ 1   65280     0       65535     0       Development monoplex
_ 2   65280     0       65535     0       Not used
_ 3   65280     0       65535     0       Not used
```

Figure 7-14 HCD: Logical Channel Subsystem List

2. Select the logical channel subsystem (LCSS) to have partitions added or defined using the **P** line-command. A new z10 always includes four LCSSs each including 15 reserved partitions.

   Because this is a z10 processor, HSA storage is not part of storage available for operating systems, and therefore no reason exists for decreasing the maximum number of devices in subchannel set 0 (SS0) and subchannel set 1 (SS1). The Actual devices column contains all zeroes (0), because no devices has been defined yet.

   In this example we are placing production LPARs on LCSS 0 and Development LPARs on LCSS 1. Consider issues such sharing of CHPIDs and the ability to add more LPARs in the LCSS when placing LPARs on the individual LCSSs. An LCSS supports a maximum of 15 partitions. We suggest using the Description field. See Figure 7-15 on page 97.

```
+------------------------------ Partition List -----------------------------+
|   Goto  Backup  Query  Help                                               |
| ------------------------------------------------------------------------  |
|                                                             Row 1 of 15  |
| Command ===> ________________________________________ Scroll ===> CSR     |
|                                                                           |
| Select one or more partitions, then press Enter. To add, use F11.         |
|                                                                           |
| Processor ID  . . . . : CPCPKR1   CPC Poughkeepsie R1 Usage note          |
| Configuration mode  . : LPAR                                              |
| Channel Subsystem ID  : 0         Production sysplex                      |
|                                                                           |
| / Partition Name   Number Usage + Description                             |
| _ LPPKR101         1      CF      Prod sysplex CFOA                       |
| _ *                2      CF/OS   ________________________________        |
| _ *                3      CF/OS   ________________________________        |
| _ *                4      CF/OS   ________________________________        |
| _ *                5      CF/OS   ________________________________        |
| _ *                6      CF/OS   ________________________________        |
+---------------------------------------------------------------------------+
```

Figure 7-15 HCD: Partition List

Now we define the partitions for the LCSS that is selected.

3. Use the **C** line-command to change a reserved partition into a partition for an operating system. When changing a partition, the Change Partition Definition panel opens. See Figure 7-16.

   Consider the LPAR numbers. During a POR, by default the low number LCSS is activated first and the partitions are activated in LPAR number order. Therefore coupling facility LPARs use a lower number than the corresponding z/OS LPARs.

   In this example the first LPAR name LPPKR101 has been defined.

   When creating a z9 processor, the partition lists in the LCSSs are empty, and you must use the F11 key to add a partition. Add reserved partitions on a z9.

```
+-------------- Change Partition Definition ---------------+
|                                                          |
| Specify or revise the following values.                  |
|                                                          |
| Partition name . . . LPPKR102                            |
| Partition number . . 2      (same as MIF image ID)       |
| Partition usage  . . OS     +                            |
|                                                          |
| Description  . . . . Prod Sysplex SYSA_______________    |
|                                                          |
+----------------------------------------------------------+
```

Figure 7-16 HCD: Change Partition Definition

In this example the LPAR name is LPPKR101. LP for logical partition, PK for Poughkeepsie, R1 for the processor ID and 02 for LCSS 0 LPAR number 2. Consider a naming standard that suits your requirements. The partition name identifies the LPAR on the HMC.

A z/OS LPAR for the SYSA production system part of a sysplex is added. Partition usage can be OS, CF or both. Partition number is higher than the partition for the corresponding coupling facility. A description has been specified.

4. Repeat the create partition task until all requested partition has been added on the individual processors and LCSSs.

Table 7-5 lists the partitions that are added.

Table 7-5 Partitions that are added

Partition	ID	Type	Description
LPPKR101	1	CF	Prod sysplex CF0A
LPPKR102	2	OS	Prod sysplex SYSA
LPPKR111	1	OS	Development monoplex SYS1
LPPKR203	3	CF	Prod sysplex CF0B
LPPKR204	4	OS	Prod sysplex SYSB
LPPKR212	2	OS	Prod z/VM Linux

We have now defined operating system configuration, switches, two z10 processors. The processors both have two partitions in LCCS 0 and a single partition in LCSS 1.

7.7 Defining channel path identifiers (CHPIDs)

In this section, we define the CHPIDs for the processors.

Before you order the processor, review the CFReport file that is supplied by your IBM support representative. The file contains information about the number of types of PCHIDs installed on the processor. Furthermore, know the types and numbers of CHPIDs required on each LCSS. If you do not know, simply spread the CHPIDs on the LCSSs on which you have defined partitions, and update them to your specific needs later, when you connect them to control units.

When defining CHPIDs for a new processor, you must add CHPIDs for all PCHIDs that are specified in the CFReport file except for cryptographic adapters such as the Crypto Express2, because no CHPIDs should be defined for cryptographic adapters. You might also have to add internal CHPIDs (CHPIDs with no physical ports or PCHIDs).

In this example, we must define a number of CHPID types such as OSA and FICON. We define only the CHPIDs to be used; we do that one CHPID type at a time. Each section describes only the differences to CHPIDs that are already defined. The examples presented in this section do not include CHPIDs that are managed by the IBM Intelligent Resource Directory technology, therefore the Managed field is always set to `No` and the I/O Cluster field remains blank when you define the CHPIDS on the Add Channel Path panel. See 2.5, “IRD, WLM, and DCM” on page 19 for more information about IRD.

PCHIDs are not specified in this example, because the CHPID Mapping Tool is later used to add the PCHIDs. See Chapter 10, “CHPID Mapping Tool (CMT)” on page 315 for details about how to add PCHIDs using the CHPID Mapping Tool. Several comments about how to specify PCHIDs manually are included.

To start the process, perform the following steps:

1. Select option **3, Processors** on the Define, Modify, or View Configuration Data panel. The Processor List panel opens.
2. Select the processor by using the **S** line-command.
3. Select the LCSS by using the **S** line-command.

7.7.1 Defining OSC CHPIDs

To define OSC CHPIDs, perform the following steps:

1. When you add CHPIDs for an OSA-Express2 Integrated Console Controller (OSA-ICC), the channel type to use for the definition is OSC. Press F11 on the Channel Path List panel to add CHPIDs. Figure 7-17 shows the Add Channel Path panel.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                           |
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note        |
| Configuration mode . : LPAR                                               |
| Channel Subsystem ID : 0            Production sysplex                    |
|                                                                           |
| Channel path ID  . . . . 1A    +            PCHID . . . ___               |
| Number of CHPIDs . . . . 1                                                |
| Channel path type  . . . OSC   +                                          |
| Operation mode . . . . . SPAN  +                                          |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +       |
| Description  . . . . . . CONS F000,0032 3366       R1-ALL                 |
|                                                                           |
| Specify the following values only if connected to a switch:               |
| Dynamic entry switch ID  __  + (00 - FF)                                  |
| Entry switch ID  . . . . __  +                                            |
| Entry port . . . . . . . __  +                                            |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-17 HCD: Add (OSC) Channel Path

2. Specify information in these fields: Channel path ID (CHPID) to be added, Number of CHPIDs, Channel path type, Operation mode, Managed and I/O Cluster, and Description.

   Note the following considerations about the Channel path ID field:

   – Consider using numbering schemes for the individual types of CHPIDs for example using CHPID 0x for all OSAs.

   – Consider the need for Spanned CHPIDs. If a CHPID is spanned the CHPID number will be the same on all LCSSs including the CHPID.

   In this example the Channel path type is OSC, because this is added to be used for consoles. The Operation mode is SPAN, because the console CHPID must be available from more than one LCSS (consoles for all OS partitions defined on the processor). Because OSC channels are not connected to switches, the three Connect to a switch fields are unused.

Note the following information about the Operation mode field:

– If operation mode DED is specified, be aware that when you add access to other partitions dynamically later, the CHPID will have to be taken offline during activation of the I/O configuration. You can specify an operation mode of SHR and have only one partition in the access list.

– If operation mode SPAN is specified, select partitions on more than one LCSS. If you do not, the operation mode will automatically be updated to SHR.

Note the following information about the Description field:

– This field can like several others be used for filtering. Consider specifying data like Network, Disk or Tape enabling you with more filter options than the control unit type. An alternative is specifying device numbers is numbering schemes are used.

– If you are not using the Chpid mapping tool CMT when adding CHPIDs and starting to use currently free CHPIDs, consider specifying the Cage, slot and channel type/feature code in the description field for all or for free only CHPIDs.

– Description can also be used for filtering on sites, sysplexes, customers and more.

3. Press Enter. The Define Access List panel opens, as shown in Figure 7-18. This panel is for specifying the partitions that will be able to access to CHPIDs.

```
+--------------------------- Define Access List ----------------------------+
|                                                                Row 1 of 3 |
| Command ===> ________________________________________ Scroll ===> PAGE    |
|                                                                           |
| Select one or more partitions for inclusion in the access list.          |
|                                                                           |
| Channel subsystem ID : 0      Production sysplex                          |
| Channel path ID  . . : 1A     Channel path type  . : OSC                  |
| Operation mode . . . : SPAN   Number of CHPIDs . . : 2                    |
|                                                                           |
|                                                                           |
| / CSS ID Partition Name   Number Usage Description                        |
| _ 0      CFPKR101         1      CF    Prod sysplex CFOA                  |
| / 0      LPPKR102         2      OS    Prod sysplex SYSA                  |
| / 1      LPPKR111         1      OS    Development monoplex SYS1          |
| *************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-18 HCD: Define Access List (OSC)

4. Select the partitions that will use the CHPID.

Consider selecting only a single partition in the access list for free CHPIDs. When free CHPIDs are later updated to be used on specific partitions for new hardware by, they must be configured offline on all partition on which they are no longer to be used.

In this example the CHPID is for Consoles, therefore all OS partitions are to access the CHPID. Because SPAN was specified for operation mode, partitions for both LCSS 0 and LCSS 1 are listed on the Define Access List panel. No partitions was defined on LCSS 3 and LCSS 4, therefore no partitions for these LCSSs are listed.

In this example, we have only one OS partition in each LCSS. Therefore, all partitions that are able to use the OSC CHPID have been selected (OSC CHPIDs does not apply to CF partitions). If another OS partition had been available in the Define Access List panel but not selected, the Define Candidate List (in Figure 7-19) would be displayed.

The Define Access List panel specifies partitions that are to have the CHPIDs online by default. The Candidate Access List panel specifies partitions where CHPIDs can be configured online but by default are offline.

```
+-------------------------- Define Candidate List --------------------------+
|                                                                Row 1 of 2 |
| Command ===> _________________________________________ Scroll ===> CSR    |
|                                                                           |
| Select one or more partitions for inclusion in the candidate list.       |
|                                                                           |
| Channel subsystem ID : 0      Production sysplex                          |
| Channel path ID  . . : 1A     Channel path type  . : OSC                  |
| Operation mode . . . : SPAN   Number of CHPIDs . . : 2                    |
|                                                                           |
| / CSS ID Partition Name   Number Usage Description                        |
| _ 0      CFPKR101         1      CF    Prod sysplex CFOA                  |
| _ 1      LPPKR111         1      OS    Development monoplex SYS1          |
| **************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-19 HCD: Define (OSC) Candidate List

If the LPPKR102 partition had been selected only on the Define Access List panel, the Define Candidate List panel would have been displayed, including all other unreserved partitions on the processor.

Table 7-6 lists the OSC CHPIDs that are added.

Table 7-6 OSC CHPIDs that are added

Processor	CHPID	Mode	Description
CPCPKR1	CHPID 1A	SPAN	CONS F000,0032 3366
CPCPKR2	CHPID 14	SPAN	CONS F100,0032 3366

7.7.2 Defining OSD CHPIDs for OSA-Express2 or OSA-Express3 adapters

Before adding OSD CHPIDs, consult your network specialists to determine whether the OSD CHPIDs will support more than 160 TCP/IP stacks. Another relevant OSA Channel path type that is not included in this example is OSE.

To add OSD CHPIDs (any non-console OSA CHPID), perform the following steps:

1. Press F11 on the Channel Path List panel to add CHPIDs. See Figure 7-20.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                            |
|                                                                            |
| Specify or revise the following values.                                    |
|                                                                            |
| Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note         |
| Configuration mode . : LPAR                                                |
| Channel Subsystem ID : 0            Production sysplex                     |
|                                                                            |
| Channel path ID  . . . . 1E    +            PCHID . . . ___                |
| Number of CHPIDs . . . . 1                                                 |
| Channel path type  . . . OSD   +                                           |
| Operation mode . . . . . SPAN  +                                           |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +        |
| Description  . . . . . . NETW 3000,0016 3364      R1-ALL                   |
|                                                                            |
| Specify the following values only if connected to a switch:                |
| Dynamic entry switch ID  __  + (00 - FF)                                   |
| Entry switch ID  . . . . __  +                                             |
| Entry port . . . . . . . __  +                                             |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-20 HCD: Add (OSA) Channel Path

2. Specify information in these fields: Channel path ID (CHPID) to be added, the Number of CHPIDs, the Channel path type, the Operation mode, Managed, I/O Cluster, and the Description.

   In this example we add a single OSD CHPID to be used by all OS partitions on the processor, therefore the Operation mode field is SPAN. We used the Description field to specify, that this is a CHPID used for Network, the device address, number of devices, the OSA feature code from the CFReport and that the CHPID is used by all partitions on the CPCPKR1 processor.

   Because the Channel path type field is OSD, the “Allow for more than 160 TCP/IP stacks” panel is displayed. See Figure 7-21.

```
+----------- Allow for more than 160 TCP/IP stacks -----------+
|                                                              |
| Specify Yes to allow more than 160 TCP/IP stacks,            |
| otherwise specify No. Specifying Yes will cause priority     |
| queuing to be disabled.                                      |
|                                                              |
| Will greater than 160 TCP/IP stacks                          |
| be required for this channel?  . . . No                      |
|                                                              |
+--------------------------------------------------------------+
```

Figure 7-21 HCD: Allow more than 160 TCP/IP stacks

3. Specify whether more than 160 TCP/IP stacks will be supported. Supporting more than 160 stacks is implemented by disabling priority queuing for the CHPID. Then, the CHPID can support four times as many queues corresponding to four times as many TCP/IP stacks. Consult your Network specialists. This panel is displayed for Channel path type OSD only.
4. Press Enter. The Define Access List panel is displayed. See Figure 7-22. This panel is for specifying partitions that are to be able to access to CHPID.

```
+--------------------------- Define Access List ----------------------------+
|                                                                Row 1 of 3 |
| Command ===> _________________________________________ Scroll ===> PAGE   |
|                                                                           |
| Select one or more partitions for inclusion in the access list.           |
|                                                                           |
| Channel subsystem ID : 0      Production sysplex                          |
| Channel path ID  . . : 1E     Channel path type  . : OSD                  |
| Operation mode . . . : SPAN   Number of CHPIDs . . : 2                    |
|                                                                           |
|                                                                           |
| / CSS ID Partition Name   Number Usage Description                        |
| _ 0      CFPKR101         1      CF    Prod sysplex CF0A                  |
| / 0      LPPKR102         2      OS    Prod sysplex SYSA                  |
| / 1      LPPKR111         1      OS    Development monoplex SYS1         |
| **************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-22 HCD: Define Access List (OSA)

5. Select the partitions that are to use the CHPID.

   In this example, the CHPID is for shared OSA, therefore all OS partitions are to access the CHPID. Because SPAN was specified for operation mode, partitions for both LCSS 0 and LCSS 1 are listed on the Define Access List panel. No partitions were defined on LCSS 3 and LCSS 4, therefore no partitions for these LCSSs are listed.

In this example, we have only one OS partition in each LCSS, therefore all partitions that are able to use the OSD CHPID have been selected (OSD CHPIDs are not defined to CF partitions). If another OS partition had been available on the Define Access List but not selected, the Define Candidate List would have been displayed.

The Access list specifies partitions that are to have the CHPIDs online by default. The Candidate Access list specifies partitions where CHPIDs can be configured online but by default are offline.

Table 7-7 lists the OSD CHPIDs that are added.

Table 7-7 OSD CHPIDs that are added

Processor	CHPID	Mode	Description
CPCPKR1	CHPID 1E	SPAN	NETW 3000,0016 3364
CPCPKR2	CHPID 1C	SPAN	NETW 3100,0016 3364

7.7.3 Defining FC CHPIDs

We are now ready to add FC CHPIDs (FICON).

In this example all FC CHPIDs are connected to switches, which is done as part of the add operation. The alternative not described in the example is of course to connect FC CHPIDs to switches later.

To add FC CHPIDs, perform the following steps:

1. Press F11 on the Channel Path List panel to add CHPIDs. See Figure 7-23.

```
+--------------------------- Add Channel Path -----------------------------+
|                                                                          |
|                                                                          |
| Specify or revise the following values.                                  |
|                                                                          |
| Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note       |
| Configuration mode . : LPAR                                              |
| Channel Subsystem ID : 0            Production sysplex                   |
|                                                                          |
| Channel path ID  . . . . 5C    +            PCHID . . . ___              |
| Number of CHPIDs . . . . 1                                               |
| Channel path type  . . . FC    +                                         |
| Operation mode . . . . . SPAN  +                                         |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +      |
| Description  . . . . . . DISK TAPE FCTC 3321       R1-ALL                |
|                                                                          |
| Specify the following values only if connected to a switch:             |
| Dynamic entry switch ID  11  + (00 - FF)                                 |
| Entry switch ID  . . . . 11  +                                           |
| Entry port . . . . . . . 02  +                                           |
|                                                                          |
+--------------------------------------------------------------------------+
```

Figure 7-23 HCD: Add (FICON) Channel Path

2. Specify information in these fields: Channel path ID (CHPID) to be added, Number of CHPIDs, Channel path type, Operation mode, Managed, I/O Cluster, and Description.

   In this example, we add a single FC CHPID to be used by all OS partitions on the processor, therefore the Operation mode is SPAN. We use the Description field to specify that this is a CHPID to be used for disk, tape and FCTC, the FICON feature code from the CFReport, and that the CHPID is used by all partitions on the CPCPKR1 processor.

3. Press Enter to display the Define Access List panel. See Figure 7-24 on page 105. This panel is for specifying the partitions that are to be able to access to CHPID.

```
+--------------------------- Define Access List ----------------------------+
|                                                                Row 1 of 3 |
| Command ===> _________________________________________ Scroll ===> PAGE   |
|                                                                           |
| Select one or more partitions for inclusion in the access list.          |
|                                                                           |
| Channel subsystem ID : 0      Production sysplex                          |
| Channel path ID  . . : 5C     Channel path type  . : FC                   |
| Operation mode . . . : SPAN   Number of CHPIDs . . : 1                    |
|                                                                           |
|                                                                           |
| / CSS ID Partition Name   Number Usage Description                        |
| _ 0      CFPKR101         1      CF    Prod sysplex CF0A                  |
| / 0      LPPKR102         2      OS    Prod sysplex SYSA                  |
| / 1      LPPKR111         1      OS    Development monoplex SYS1          |
| *************************** Bottom of data ****************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-24 HCD: Define (FICON) Access List

4. Select the partitions that are to use the CHPID.

   In this example the CHPID is for shared FICON, therefore all OS partitions are to access the CHPID. Because SPAN was specified for operation mode, partitions for both LCSS 0 and LCSS 1 are listed on the Define Access List panel. No partition was defined on LCSS 3 and LCSS 4, therefore no partitions for these LCSSs are listed.

   In this example, we have only one OS partition in each LCSS, therefore all partitions able to use the OSC CHPID have been selected (FC CHPIDs does not apply to CF partitions). If another OS partition had been available on the Define Access List panel but not selected, the Define Candidate List panel would have been displayed.

   The Access list specifies partitions that are to have the CHPIDs online by default. The Candidate Access List panel specifies partitions where CHPIDs can be configured online but by default are offline.

Table 7-8 lists the FC CHPIDs that are added.

Table 7-8 FC CHPIDs that are added

Processor	CHPID	Mode	Description	Switch
CPCPKR1	CHPID 5C	SPAN	DISK TAPE FCTC 3321	Switch 11 port 02
CPCPKR1	CHPID 5A	SPAN	DISK TAPE FCTC 3321	Switch 11 port 12
CPCPKR1	CHPID 44	SPAN	DISK TAPE FCTC 3321	Switch 12 port 02
CPCPKR1	CHPID 57	SPAN	DISK TAPE FCTC 3321	Switch 12 port 12
CPCPKR2	CHPID 58	SPAN	DISK TAPE FCTC 3321	Switch 14 port 02
CPCPKR2	CHPID 56	SPAN	DISK TAPE FCTC 3321	Switch 14 port 12
CPCPKR2	CHPID 4D	SPAN	DISK TAPE FCTC 3321	Switch 13 port 02
CPCPKR2	CHPID 30	SPAN	DISK TAPE FCTC 3321	Switch 13 port 12

7.7.4 Defining FCP CHPIDs

We can now add FCP CHPIDs (SCSI).

In this example a single FCP CHPID is defined to be used for Linux disk devices. The z/VM Linux partition is located on the CPCPKR2 processor in LCSS 1, so this is selected.

To define FCP CHPIDs, perform the following steps:

1. Press F11 on the Channel Path List panel to add CHPIDs. See Figure 7-25.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                           |
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Processor ID . . . . : CPCPKR2      CPC Poughkeepsie R2 Usage note        |
| Configuration mode . : LPAR                                               |
| Channel Subsystem ID : 1            z/VM Linux                            |
|                                                                           |
| Channel path ID  . . . . 78    +            PCHID . . . ___               |
| Number of CHPIDs . . . . 1                                                |
| Channel path type  . . . FCP   +                                          |
| Operation mode . . . . . DED   +                                          |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +       |
| Description  . . . . . . SCSI EF00,0256 3321       PKR212                 |
|                                                                           |
| Specify the following values only if connected to a switch:               |
| Dynamic entry switch ID   _  + (00 - FF)                                  |
| Entry switch ID  . . . . __  +                                            |
| Entry port . . . . . . . __  +                                            |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-25 HCD: Add (FCP) Channel Path

2. Specify information in these fields: Channel path ID (CHPID) to be added, Number of CHPIDs, Channel path type, Operation mode, Managed, I/O Cluster, and Description.

   In this example, we add a single FCP CHPID to be used by the z/VM Linux partitions only, therefore the Operation mode is DED (but can be SHR). We used the Description field to specify that this is a CHPID used for SCSI device EF00, the FICON feature code from the CFReport, and that the CHPID is used by the PKR212 partition only.

3. Press Enter. The Define Access List panel is displayed. See Figure 7-26 on page 107. This panel is for specifying the partition that are to be able to access to CHPID.

```
+--------------------------- Define Access List ----------------------------+
|                                                                Row 1 of 1 |
| Command ===> _________________________________________ Scroll ===> CSR    |
|                                                                           |
| Select one or more partitions for inclusion in the access list.           |
|                                                                           |
| Channel subsystem ID : 1      z/VM Linux                                  |
| Channel path ID  . . : 78     Channel path type  . : FCP                  |
| Operation mode . . . : DED    Number of CHPIDs . . : 1                    |
|                                                                           |
| / CSS ID Partition Name   Number Usage Description                        |
| / 1      LPPKR212         2      OS    Prod z/VM Linux 12                 |
| **************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-26 HCD: Define (FCP) Access List

4. Select the partition that are to use the CHPID.

   In this example the Operation mode is DED, therefore only a single partition can be specified (and we have only one in LCCS 1). Because the operation mode is DED, no Define Candidate List is displayed.

After defining the complete configuration you can export the FCP device configuration into a comma-separated value (CSV) file to be used as input to the WWPN Prediction Tool (FCP SAN configuration template file). See *Hardware Configuration Definition User's Guide,* SG33-7988 for details.

Table 7-9 lists the FCP CHPID that is added.

Table 7-9 FCP CHPID that is added

Processor	CHPID	Mode	Description
CPCPKR2	CHPID 79	DED	SCSI EF00,0256 3321

7.7.5 Defining ICP CHPIDs

Now we add ICP CHPIDs (internal coupling links). Because these are internal links, they are not listed in the CFReport file, and no PCHID can be assigned.

To define ICP CHPIDs, perform the following steps:

1. Press F11 on the Channel Path List panel to add CHPIDs. See Figure 7-27.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                           |
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note        |
| Configuration mode . : LPAR                                               |
| Channel Subsystem ID : 0            Production sysplex                    |
|                                                                           |
| Channel path ID  . . . . F8    +            PCHID . . . ___               |
| Number of CHPIDs . . . . 2                                                |
| Channel path type  . . . ICP   +                                          |
| Operation mode . . . . . SHR   +                                          |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +       |
| Description  . . . . . . COUP CF0A-SYSA NONE       PR-ALL                 |
|                                                                           |
| Specify the following values only if connected to a switch:               |
| Dynamic entry switch ID  __  + (00 - FF)                                  |
| Entry switch ID  . . . . __  +                                            |
| Entry port . . . . . . . __  +                                            |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-27 HCD: Add (ICP) Channel Path

2. Specify information in these fields: Channel path ID (CHPID) to be added, Number of CHPIDs, Channel path type, Operation mode, and Description. Do not specify the PCHID.

   In this example we define two ICP CHPID to be used for coupling facility links between the coupling facility partition and the OS partition for the sysplex, both on the same processor.

   We define two identical CHPIDs, with the operation mode of SHR, because both the coupling facility partition and the OS partition will be using the CHPIDs. We used the Description field to specify that these are coupling links used for CF0A-SYSA, no feature code and production.

   These are not physical but internal links, therefore no PCHID can be specified. Be sure to specify CHPIDs numbers that are not likely to be added later. ICP CHPIDs are peer links (communication both ways). Consider using a standard naming convention for internal CHPIDs, such as having all internal CHPIDs be defined in the range F0 - FF.

3. Press Enter. The Define Access List panel is displayed. This panel is for specifying the partition that are to be able to access to CHPID. See Figure 7-28 on page 109.

```
+---------------------------- Define Access List ----------------------------+
|                                                                 Row 1 of 2 |
| Command ===> _________________________________________ Scroll ===> CSR     |
|                                                                            |
| Select one or more partitions for inclusion in the access list.            |
|                                                                            |
| Channel subsystem ID : 0      Production sysplex                           |
| Channel path ID  . . : F8     Channel path type  . : ICP                   |
| Operation mode . . . : SHR    Number of CHPIDs . . : 2                     |
|                                                                            |
| / CSS ID Partition Name   Number Usage Description                         |
| / 0      CFPKR101         1      CF    Prod sysplex CF0A                   |
| / 0      LPPKR102         2      OS    Prod sysplex SYSA                   |
| **************************** Bottom of data ***************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-28 HCD: Define (ICP) Access List

4. Select both partitions to be accessible by the ICP CHPIDs.

Table 7-10 lists the ICP CHPIDs that are added.

Table 7-10 ICPCHPIDs that are added

Processor	CHPID	Mode	Description
CPCPKR1	CHPID F8	SHR	COUP CF0A-SYSA NONE
CPCPKR1	CHPID F8	SHR	COUP CF0A-SYSA NONE
CPCPKR2	CHPID F8	SHR	COUP CF0B-SYSB NONE
CPCPKR2	CHPID F9	SHR	COUP CF0B-SYSB NONE

7.7.6 Defining CIB CHPIDs

Now we add CIB CHPIDs (InfiniBand coupling links). In this example, we use infiniband for coupling links between the processors. Furthermore the infiniband links will be used for STP.

To define CIB CHPIDs, perform the following steps:

1. Press F11 on the Channel Path List panel to add CHPIDs. See Figure 7-29.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note        |
| Configuration mode . : LPAR                                               |
| Channel Subsystem ID : 0            Production sysplex                    |
|                                                                           |
| Channel path ID  . . . . 98    +            PCHID . . . ___               |
| Number of CHPIDs . . . . 1                                                |
| Channel path type  . . . CIB   +                                          |
| Operation mode . . . . . SHR   +                                          |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +       |
| Description  . . . . . . COUP xxxA-xxxB 0163______PR-ALL                  |
|                                                                           |
| Specify the following values only if connected to a switch:              |
| Dynamic entry switch ID  __  + (00 - FF)                                  |
| Entry switch ID  . . . . __  +                                            |
| Entry port . . . . . . . __  +                                            |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-29 HCD: Add (CIB) Channel Path

2. Specify information in these fields: Channel path ID (CHPID) to be added, Number of CHPIDs, Channel path type, Operation mode, and Description. Do not specify the PCHID.

   In this example we define a CIB CHPID to be used for coupling facility links between the processors to be used by both coupling partitions and the OS partitions, therefore the operation mode is SHR.

3. Press Enter. The Specify HCA Attributes panel is displayed. See Figure 7-30.

```
+------------------ Specify HCA Attributes -------------------+
|                                                              |
| Specify or revise the values below.                          |
|                                                              |
| Adapter ID of the HCA  . . 0A  +                             |
| Port on the HCA  . . . . . 1   +                             |
|                                                              |
+--------------------------------------------------------------+
```

Figure 7-30 HCD: Specify (HCA) Attributes

4. Specify the HCA attributes as defined in the CFReport file. The HCA attributes corresponds to a PCHID.

5. Press Enter. The Define Access List panel is displayed. This is for specifying the partitions that are to be able to access to CHPID. See Figure 7-31.

```
+--------------------------- Define Access List ----------------------------+
|                                                                Row 1 of 2 |
| Command ===> ________________________________________ Scroll ===> CSR      |
|                                                                           |
| Select one or more partitions for inclusion in the access list.          |
|                                                                           |
| Channel subsystem ID : 0      Production sysplex                          |
| Channel path ID  . . : 98     Channel path type  . : CIB                  |
| Operation mode . . . : SHR    Number of CHPIDs . . : 1                    |
|                                                                           |
| / CSS ID Partition Name   Number Usage Description                        |
| / 0      CFPKR101         1      CF    Prod sysplex CF0A                  |
| / 0      LPPKR102         2      OS    Prod sysplex SYSA                  |
| *************************** Bottom of data ****************************  |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-31 HCD: Define (CIB) Access List

6. Select both partitions to be accessible by the CIB CHPIDs.

Table 7-11 lists the CIB CHPIDs that are added.

Table 7-11 CIB CHPIDs that are added

Processor	CHPID	Mode	Description
CPCPKR1	CHPID 98	SHR	COUP xxxA-xxxB 0163
CPCPKR1	CHPID 98	SHR	COUP xxxA-xxxB 0163
CPCPKR2	CHPID B8	SHR	COUP xxxB-xxxA 0163
CPCPKR2	CHPID B9	SHR	COUP xxxB-xxxA 0163

7.7.7 Defining IQD CHPIDs

Now we add IQD CHPIDs (HiperSockets). Before adding IQD CHPIDs, consult your network specialists to determine the IDQC frame size that will be used.

To add IQD CHPIDs, perform the following steps:

1. Press F11 on the Channel Path List panel to add CHPIDs. See Figure 7-32.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Processor ID . . . . : CPCPKR2      CPC Poughkeepsie R2 Usage note        |
| Configuration mode . : LPAR                                               |
| Channel Subsystem ID : 0            Production sysplex                    |
|                                                                           |
| Channel path ID  . . . . F0    +            PCHID . . . ___               |
| Number of CHPIDs . . . . 1                                                |
| Channel path type  . . . IQD   +                                          |
| Operation mode . . . . . SPAN  +                                          |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +       |
| Description  . . . . . . NETW 3C00,0128 NONE       R2-ALL                 |
|                                                                           |
| Specify the following values only if connected to a switch:               |
| Dynamic entry switch ID  __  + (00 - FF)                                  |
| Entry switch ID  . . . . __  +                                            |
| Entry port . . . . . . . __  +                                            |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-32 HCD: Add (IQD) Channel Path

2. Specify information in these fields: Channel path ID (CHPID) to be added, Number of CHPIDs, Channel path type, Operation mode, and Description. Do not specify the PCHID.

   In this example, we define two IQD CHPID to be used for communication between the partition used for the z/OS SYSB system and the partition used for z/VM Linux both on the same processor, but on separate LCSSs, therefore the operation mode is SPAN.

   We use the Description field to specify that this is a Network CHPID including device 3C00,128, no feature code, and used for all OS partition on the CPCPKR2 processor.

   This is not a physical link; it is an internal link, and therefore no PCHID can be specified. Be sure to specify CHPIDs numbers that are not likely to be added later. Consider using a standard for CHPIDs for internal CHPIDs like using Fx CHPIDs.

3. Press Enter. The Specify Maximum Frame Size panel is displayed. See Figure 7-33 on page 113. This is for specifying the IDQC frame size to be used.

```
+----------- Specify Maximum Frame Size ------------+
|                                                   |
| Specify or revise the value below.                |
|                                                   |
| Maximum frame size                                |
| in KB  . . . . . . . 16  +                        |
|                                                   |
+---------------------------------------------------+
```

Figure 7-33 HCD: Specify Maximum Frame Size

4. Specify the Maximum frame size requested by your network staff.
5. Press Enter. The Define Access List panel is displayed. This is for specifying the partition that are to be able to access to CHPID. See Figure 7-34.

```
+--------------------------- Define Access List ----------------------------+
|                                                                Row 1 of 3 |
| Command ===> _________________________________________ Scroll ===> CSR    |
|                                                                           |
| Select one or more partitions for inclusion in the access list.          |
|                                                                           |
| Channel subsystem ID : 0      Production sysplex                          |
| Channel path ID  . . : F2     Channel path type  . : IQD                  |
| Operation mode . . . : SPAN   Number of CHPIDs . . : 1                    |
|                                                                           |
| / CSS ID Partition Name   Number Usage Description                        |
| _ 0      CFPKR203         3      CF    Prod sysplex CF0B                  |
| / 0      LPPKR204         4      OS    Prod sysplex SYSB                  |
| / 1      LPPKR212         2      OS    Prod z/VM Linux 12                 |
| **************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-34 HCD: Define (IQD) Access List

In this example, the CHPID is for HiperSockets communication between the SYSB system and the z/VM Linux system, therefore all OS partitions are to access the CHPID. Because SPAN was specified for operation mode, partitions for both LCSS 0 and LCSS 1 are listed on the Define Access List panel. No partitions were defined on LCSS 3 and LCSS 4, therefore no partitions for these LCSSs are listed.

In this example, we have only one OS partition in each LCSS, therefore all partitions able to use the OSC CHPID have been selected (IQD CHPIDs does not apply to CF partitions). If another OS partition had been available on the Define Access List but not selected, the Define Candidate List would have been displayed.

The Access list specifies partitions that are to have the CHPIDs online by default. The Candidate Access List specifies partitions where CHPIDs can be configured online but by default are offline.

Table 7-12 on page 114 lists the FC CHPID that is added.

Table 7-12 FC CHPID that is added

Processor	CHPID	Mode	Description
CPCPKR2	CHPID F0	SPAN	NETW 3C00,0128 NONE

We have now defined the operating system configurations, switches, two z10 processors, with 60 reserved partitions on each. Channels are defined but no control units are connected to them yet.

7.7.8 Adding more than one CHPID

In this section, we describe how to add more than one CHPID at a time.

By specifying a number higher than 1 in the Number of CHPIDs field on the Add Channel Path panel, you are able to add a number of consecutive CHPIDs. This technique enables you to add all channels on a slot or even more slots at one time. See Figure 7-35.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                            |
| Specify or revise the following values.                                    |
|                                                                            |
| Processor ID . . . . : CPCPKR1       CPC Poughkeepsie R1 Usage note         |
| Configuration mode . : LPAR                                                |
| Channel Subsystem ID : 0             Production sysplex                    |
|                                                                            |
| Channel path ID  . . . . 40    +           PCHID . . . ___                 |
| Number of CHPIDs . . . . 16                                                |
| Channel path type  . . . FC_   +                                           |
| Operation mode . . . . . SHR   +                                           |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________   +       |
| Description  . . . . . . FICON __________________________                  |
|                                                                            |
| Specify the following values only if connected to a switch:               |
| Dynamic entry switch ID  __  + (00 - FF)                                   |
| Entry switch ID  . . . . __  +                                             |
| Entry port . . . . . . . __  +                                             |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-35 HCD: Add (multiple) Channel Paths

Specify the first Channel path ID and the Number of CHPIDs to be added. CHPID numbers are consecutive and all fields specified apply to all CHPIDs added.

In this example, the Number of CHPIDs is 16, so 16 identical channels will be added. If the Description field that is specified applies to only one CHPID, you will have to update the other 15 CHPIDs after adding them.

7.7.9 Manually specifying PCHIDs

In this section, we describe how to manually specify PCHIDs when adding CHPIDs.

By specifying the PCHID manually on the Add Channel Path panel, PCHIDs are assigned. See Figure 7-36.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note        |
| Configuration mode . : LPAR                                               |
| Channel Subsystem ID : 0            Production sysplex                    |
|                                                                           |
| Channel path ID  . . . . 40    +            PCHID . . . 3E0               |
| Number of CHPIDs . . . . 4_                                               |
| Channel path type  . . . FC_   +                                          |
| Operation mode . . . . . SHR   +                                          |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +       |
| Description  . . . . . . FICON __________________________                 |
|                                                                           |
| Specify the following values only if connected to a switch:              |
| Dynamic entry switch ID  __  + (00 - FF)                                  |
| Entry switch ID  . . . . __  +                                            |
| Entry port . . . . . . . __  +                                            |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-36 HCD: Specify PCHIDs manually (Add Channel Path)

Specify the PCHID for the first CHPID to be added.

If the Number of CHPIDs to be added is 1, the PCHID will be assigned. Otherwise, the Update CHPID Settings panel is displayed, where you specify PCHIDs for all CHPIDs to be added. See Figure 7-37 on page 116.

```
+--------------- Update CHPID Settings ---------------+
|                                           Row 1 of 4 |
| Command ===> ___________________ Scroll ===> CSR     |
|                                                      |
| Specify or revise the following values.              |
|                                                      |
| Processor ID . . . . : CPCPKR1                       |
| Channel Subsystem ID : 0                             |
|                                                      |
|              DynEntry  --Entry +--                   |
| CHPID  PCHID Switch +  Switch Port                   |
| 40     3E0   __        __     __                     |
| 41     3E1   __        __     __                     |
| 42     3E2   __        __     __                     |
| 43     3E3   __        __     __                     |
| ***************** Bottom of data ****************** |
|                                                      |
+------------------------------------------------------+
```

Figure 7-37 HCD: Specify PCHIDs manually (Update CHPID Settings)

Specify the PCHIDs for the CHPIDs to be added.

In this example, we specify PCHID 3E1 to 3E3 for CHPIDs 41 to 43. We do not update CHPID 40 because this was specified on the Add Channel Path panel.

Again, this is for manually specifying the PCHIDs, not using the CHPID Mapping Tool (CMT). Specifying PCHIDs is optional, because they can be added later.

7.7.10 Connecting to switches during addition of the CHPID

In this section, we describe how to connect CHPIDs to switches as part of the CHPID add.

Before you connect CHPIDs to a switch, know which switch ports on your switches are on the same physical cards. Consult your hardware technicians. Knowing this physical information can help you prevent a single point of failure.

By specifying Dynamic Entry Switch ID, Entry switch ID, and Entry port on the Add Channel Path panel, you are able to connect to switches when adding CHPIDs. See Figure 7-38 on page 117.

```
+---------------------------- Add Channel Path -----------------------------+
|                                                                            |
| Specify or revise the following values.                                    |
|                                                                            |
| Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note         |
| Configuration mode . : LPAR                                                |
| Channel Subsystem ID : 0            Production sysplex                     |
|                                                                            |
| Channel path ID  . . . . 40    +            PCHID . . . 3E0                |
| Number of CHPIDs . . . . 4_                                                |
| Channel path type  . . . FC_   +                                           |
| Operation mode . . . . . SHR   +                                           |
| Managed  . . . . . . . . No   (Yes or No)   I/O Cluster ________  +        |
| Description  . . . . . . FICON___________________________                  |
|                                                                            |
| Specify the following values only if connected to a switch:                |
| Dynamic entry switch ID  11  + (00 - FF)                                   |
| Entry switch ID  . . . . 11  +                                             |
| Entry port . . . . . . . 06  +                                             |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-38 HCD: Connect to switch (Add Channel Path)

To connect to switches, perform the following steps:

1. Specify either of the following fields:
   - The Dynamic entry switch ID only;
   - The Dynamic entry switch ID, the Entry switch ID, and the Entry port.

   If the Number of CHPIDs (field) to be added is 1, the switch information will be assigned. Otherwise, the Update CHPID Settings panel is displayed, where you specify switch information for all CHPIDs to be added.

   If only the Dynamic entry switch field is specified, the Update CHPID Settings panel is *not* displayed,. See Figure 7-39 on page 118.

```
+--------------- Update CHPID Settings ----------------+
|                                            Row 1 of 4 |
| Command ===> ___________________ Scroll ===> CSR      |
|                                                       |
| Specify or revise the following values.               |
|                                                       |
| Processor ID . . . . : CPCPKR1                        |
| Channel Subsystem ID : 0                              |
|                                                       |
|              DynEntry  --Entry +--                    |
| CHPID  PCHID Switch +  Switch Port                    |
| E0     ___   11        11     06                      |
| E1     ___   12        12     16                      |
| E2     ___   11        11     06                      |
| E3     ___   12        12     16                      |
| ***************** Bottom of data ****************** |
|                                                       |
+-------------------------------------------------------+
```

Figure 7-39 HCD: Connect to switch (Update CHPID Settings)

2. Specify the Dynamic Entry Switch, the Entry switch and the Ports for the CHPIDs to be added.

   The Entry Switch is the switch connected to the CHPID. The Entry port is the port used for the CHPID connection. The Dynamic Entry Switch is the switch through which an Escon or FICON CHPID has a dynamic connection. If this is not a cascaded switch setup specify the switch number used for Entry Switch in the Dynamic Entry Switch column.

   The CHPIDs are connected to two separate switches (11 and 12) in order to avoid single point of failure. Port 06 and 16 are used on each switch. The switches used has 16 ports on each card, therefore port 06 and 16 are on two separate cards.

See *Hardware Configuration Definition User's Guide,* SG33-7988 for more details about specifying Dynamic Entry Switch (different from the Entry Switch), because this technique does not apply to this configuration example.

7.8 Defining DS8000 disk subsystem

In this section, we define a primary and a secondary DS8000 disk subsystem.

Before you begin, note the following information:

- Identify the number of ports installed in the disk subsystems. Know the port IDs and the ports that are going to be used for PPRC.
- Determine how many control units to define (one control unit corresponds to an SSID) the CUADD numbers (Logical Control Unit addresses, LCUs) used for the control unit and how many Base and Alias devices to define for each control unit. Consult your storage managers.

- Determine which switch ports on your switches are on the same physical cards. Consult your hardware technicians. Knowing the physical information of the switches can help you to avoid single point of failure.
- Determine how many CHPIDs are to be connected to the control units. This depends on availability and load issues. Consult your capacity managers.

See *DS8000 Architechture and Implementation,* SG24-6786 for details about DS8000 I/O configuration requirements and considerations.

In this example, our configuration includes four control units (SSIDs) for the primary disk subsystem and four control units (SSIDs) for the secondary disk subsystem. Each control unit will have 100 Base devices and 156 Alias devices:

- The first two control units are to be used by the SYSA and SYSB production sysplex systems.
- The third control unit is to be used by the SYS1 monoplex system.
- The forth control unit is to be used by the z/VM Linux system (z/VM disks).
- The sixteenth control unit on the secondary disk subsystem is to be used only by the z/VM Linux system (SCSI Linux disks).

We define devices to the operating system configurations and define esoterics.

7.8.1 Defining DS8000 control units

To define DS8000 control units, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed and the list is not empty, because control units for switches were added as part of defining the switches.
2. Press F11 to add a control unit.
3. Use the HCD prompt option to select data on a list as an alternative to specifying the data yourself. When placing the cursor on the Control Unit Type field and pressing the F4 key, the Available Control Unit Groups panel is displayed.

   A large number of control unit types are supported, and the Available Control Unit Groups panel categories them into groups according to type. See Figure 7-40.

```
+-------------- Available Control Unit Groups --------------+
|                                                           |
| Select one.                                               |
|                                                           |
| 2_  1.  All control units                                 |
|     2.  DASD control units                                |
|     3.  Tape control units                                |
|     4.  Terminal / terminal printer CUs                   |
|     5.  Unit record device control units                  |
|     6.  Telecommunication control units                   |
|     7.  MICR/OCR control units                            |
|     8.  Graphics system control units                     |
|     9.  Other control units                               |
|                                                           |
+-----------------------------------------------------------+
```

Figure 7-40 HCD: Available Control Unit Groups

4. In this example, we define a disk control unit, so select option **2, DASD control units**.
5. On the resulting panel, select **Control Unit Type 2107**.
6. Press Enter. The **Add Control Unit** panel is displayed, and the Control unit type is now specified. See Figure 7-41.

```
+------------------------- Add Control Unit ---------------------------+
|                                                                      |
| Specify or revise the following values.                              |
|                                                                      |
| Control unit number  . . . . D000  +                                 |
| Control unit type  . . . . . 2107_________   +                       |
|                                                                      |
| Serial number  . . . . . . . __________                              |
| Description  . . . . . . . . Disk D000,4096 SSID D000 PRI P__        |
|                                                                      |
| Connected to switches  . . . 11  11  12  12   _  __  __  __  +       |
| Ports  . . . . . . . . . . . 18  28  18  28  __  __  __  __  +       |
|                                                                      |
| If connected to a switch:                                            |
|                                                                      |
| Define more than eight ports . . 2   1.  Yes                         |
|                                      2.  No                          |
| Propose CHPID/link addresses and                                     |
| unit addresses . . . . . . . . . 2   1.  Yes                         |
|                                      2.  No                          |
|                                                                      |
+----------------------------------------------------------------------+
```

Figure 7-41 HCD: Add Control Unit, Primary DS8000

7. Specify information in these fields: Control unit number, Control unit type (was specified using the F4 prompt option), and e Description.

   Consider using a numbering scheme for control units. In this example, the control unit number (D000) is a combination of the SSID (D0) and first device number (00) on the control unit.

   In this example, the disk subsystems are connected using switches, so the Connected to Switches and Ports fields are used. The example includes four connections from the switches to the control unit, so the Define more than eight ports field is 2 (No). The Propose CHPID/link addresses option is 2 (No) because in our example, we manually enter the CHPID/Link address values. This option can help you by suggesting values for the fields we are about to enter on the next panel.

   The control unit is connected using two switches (11 and 12) in order to avoid single point of failure. A total of four connections are defined between the control unit and the switches, connected at port 18 and 28 on each switch. The switches used has 16 ports on each card, so port 18 and 28 are on two separate cards. The number of connections depend on availability and load issues.

   See 7.8.2, “Defining FCP control units” on page 125 for an example on how to define disk control units not connected using a switch.

   The physical port numbers used on the disk subsystem for the connections to the switches are not defined in HCD. However, be sure to document the ports that are used on the physical disk subsystems for example by specifying the subsystem ports using the Name fields on the Switch Port Lists.

8. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-42.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : D000     Control unit type . . . : 2107

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  5C.1118 5A.1128 44.1218 57.1228 _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  58.1118 56.1128 4D.1218 30.1228 _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-42 HCD: Add Primary DS8000 Control Unit (CHPIDS)

9. Specify Channel Path ID and Link Address for all processors / LCSSs that are to access the control unit.

   Note the following information about this example:

   – We define the first control unit to be used by the SYSA and SYSB sysplex systems. Partitions for the systems are located on LCSS 0 on each processor, therefore these are the LCSSs we connect.

   – We specify four Channel Path IDs, corresponding to the four connections from the switches to the control unit. You specify the CHPID, a dot, and then the switch and port to be used by the CHPID for accessing the control unit (the switches and ports we specified on the Add Control Unit panel). CHPID 5C and 5A were both connected to switch 11 when we added the CHPIDs, so they are to use connections from switch 11 to the control unit.

   – We use the same CHPIDs and Link Address for all primary control units to be defined.

10. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. See Figure 7-43 on page 122.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> ______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : D000     Control unit type . . . : 2107

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      0_   00.256 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      0_   00.256 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-43 HCD: Add Primary DS8000 Control Unit (CUADD and Unit Addresses)

11.Specify the hexadecimal CU ADD number, Unit Address, and Unit Range.

In this example, the CUADD number for the first disk control unit on this disk subsystem is 0. The Unit Address for the first device is 00 and a total of 256 devices will be defined on each disk control unit (100 Base devices and 156 Alias devices).

12.Scroll one page to the right to specify I/O Concurrency level for the control unit. See Figure 7-44.

```
Select Processor / CU     Row 1 of 8 More: <
Command ===> ______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : D000     Control unit type . . . : 2107

                            I/O Concurrency
/ Proc.CSSID Att Protocol + Level +
_ CPCPKR1.0      __         2
_ CPCPKR1.1      __         _
_ CPCPKR1.2      __         _
_ CPCPKR1.3      __         _
_ CPCPKR2.0      __         2
_ CPCPKR2.1      __         _
_ CPCPKR2.2      __         _
_ CPCPKR2.3      __         _
```

Figure 7-44 HCD: Add Primary DS8000 Control Unit (Concurrency Level)

13.Specify I/O Concurrency level.

In this example, we specify the value of 2 allowing the Channel Path to do multiple I/O requests to the control unit at a time.

14.Press Enter. The Control unit will be attached to the processors, LCSSs. The value of `Yes` is shown in the Att (Attached) column.

PPRC connections are not defined in HCD. If using switches for PPRC connections, be sure to document the PPRC links and the ports used on the physical disk subsystems for example by specifying the subsystem ports using the Name fields on the Switch Port Lists.

When defining the secondary DS8000 disk control units, the connections to the switches and the Link Addresses differ from the values used for the primary disk control units. Press F11 to add a secondary disk control unit. See Figure 7-45.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                        |
| Specify or revise the following values.                                |
|                                                                        |
| Control unit number  . . . . E000  +                                   |
| Control unit type  . . . . . 2107_________   +                         |
|                                                                        |
| Serial number  . . . . . . . __________                                |
| Description  . . . . . . . . Disk E000,4096 SSID E000 SEC P__          |
|                                                                        |
| Connected to switches  . . . 13  13  14  14  __  __  __  __  +         |
| Ports  . . . . . . . . . . . 18  28  18  28  __  __  __  __  +         |
|                                                                        |
| If connected to a switch:                                              |
|                                                                        |
| Define more than eight ports . . 2   1.  Yes                           |
|                                      2.  No                            |
| Propose CHPID/link addresses and                                       |
| unit addresses . . . . . . . . . 2   1.  Yes                           |
|                                      2.  No                            |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-45 HCD: Add Control Unit, Secondary DS8000

15.Specify the Control unit number, Control unit type and the Description.

The control unit is connected by using another set of switches (13 and 14) located in another machine room (or site). As with the primary disk subsystem, a total of four connections are defined between the control unit and the switches, connected at ports 18 and 28 on each switch. The switches that are used has 16 ports on each card, therefore ports 18 and 28 are on two separate cards. The number of connections depend on availability and load issues.

16.Press Enter. The Select Processor / CU panel is displayed. See Figure 7-46 on page 124.

```
 Select Processor / CU     Row 1 of 8 More:       >
 Command ===> _______________________________________________ Scroll ===> CSR

 Select processors to change CU/processor parameters, then press Enter.

 Control unit number . . : E000     Control unit type . . . : 2107

              ---------------Channel Path ID . Link Address + ---------------
 / Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
 _ CPCPKR1.0  5C.1318 5A.1328 44.1418 57.1428 _______ _______ _______ _______
 _ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.0  58.1318 56.1328 4D.1418 30.1428 _______ _______ _______ _______
 _ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-46 HCD: Add Secondary DS8000 Control Unit (CHPIDS)

17. Specify information in these fields: Channel Path ID and Link Address for all processors and LCSSs that are to access the control unit.

    In this example, we use the same CHPIDs for the primary and the secondary disk subsystems, another set of switches but the same port numbers as used on the switches for the primary disk subsystem.

    The CUADD values used for the primary subsystem corresponds to the values used for the secondary disk subsystems because this example include two identical disk subsystems (not counting the FCP control unit).

Table 7-13 lists the DS8000 disk control units that are added.

Table 7-13 DS8000 disk control units that are added

CU	Switch	Port	CUADD	Description
D000	Switch 11/12	Port 18/28	CUADD 0	Disk D000,4096 SSID D000 PRI P
D000	Switch 11/12	Port 18/28	CUADD 1	Disk D000,4096 SSID D100 PRI P
D200	Switch 11/12	Port 18/28	CUADD 2	Disk D000,4096 SSID D200 PRI D
D300	Switch 11/12	Port 18/28	CUADD 3	Disk D000,4096 SSID D300 PRI V
E000	Switch 13/14	Port 18/28	CUADD 0	Disk E000,4096 SSID E000 SEC P
E100	Switch 13/14	Port 18/28	CUADD 1	Disk E000,4096 SSID E100 SEC P
E200	Switch 13/14	Port 18/28	CUADD 2	Disk E000,4096 SSID E200 SEC D
E300	Switch 13/14	Port 18/28	CUADD 3	Disk E000,4096 SSID E300 SEC V

7.8.2 Defining FCP control units

Now, we define a single FCP control unit to be used to SCSI Linux devices. It will be connected to the z/VM Linux partition using a FCP CHPID. No switches are used.

To define FCP control units, perform the following steps:

1. Press F11 to add a control unit, as shown in Figure 7-47.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                        |
| Specify or revise the following values.                                |
|                                                                        |
| Control unit number  . . . . EF00  +                                   |
| Control unit type  . . . . . FCP          +                            |
|                                                                        |
| Serial number  . . . . . . . __________                                |
| Description  . . . . . . . . Disk EF00,0256 SSID EF00 PRI L__          |
|                                                                        |
| Connected to switches  . . . __ __ __ __ __ __ __ __  +                |
| Ports  . . . . . . . . . . . __ __ __ __ __ __ __ __  +                |
|                                                                        |
| If connected to a switch:                                              |
|                                                                        |
| Define more than eight ports . . 2   1.  Yes                           |
|                                      2.  No                            |
| Propose CHPID/link addresses and                                       |
| unit addresses . . . . . . . . . 2   1.  Yes                           |
|                                      2.  No                            |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-47 HCD: Add Control Unit, FCP DS8000

2. Specify the Control unit number and the Control unit type of FCP.

   In this example, the control unit EF00 is located on the disk subsystem that is used for secondary z/OS and z/VM disk devices. No switches are specified, because use of switches are not supported for FCP CHPIDs that are used for connecting to FCP control units.

3. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-48 on page 126.

```
 Select Processor / CU     Row 1 of 8 More:       >
 Command ===> _______________________________________________ Scroll ===> CSR

 Select processors to change CU/processor parameters, then press Enter.

 Control unit number . . : EF00     Control unit type . . . : FCP

              ---------------Channel Path ID . Link Address + ---------------
 / Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
 _ CPCPKR1.0  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.1  79      _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-48 HCD: Add FCP DS8000 Control Unit (CHPIDS)

4. Specify the Channel Path IDs to be connected to the FCP control unit. The Channel Path IDs must be of type FCP.

   In this example, we specify the single FCP CHPID that was defined earlier. The FCP CHPID was defined for the CPCPKR2 processor on LCSS 1 because this is where the z/VM Linux partition is located.

5. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit, as shown in Figure 7-49.

```
 Select Processor / CU     Row 1 of 8 More: <     >
 Command ===> _______________________________________________ Scroll ===> CSR

 Select processors to change CU/processor parameters, then press Enter.

 Control unit number . . : EF00     Control unit type . . . : FCP

                  CU   --------------Unit Address . Unit Range + -------------
 / Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
 _ CPCPKR1.0      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.1      __   00.254 ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-49 HCD: Add FCP DS8000 Control Unit (CUADD and Unit Addresses)

6. Specify the Unit Address and Unit Range. You cannot specify CUADD because it is not supported for FCP control units.

   In this example, the starting Unit Address is 00 and the Unit Range is 254. These are actually the only supported values for FCP control units.

7. Press Enter. The Control unit gets attached to the processors or LCSSs. The value of `Yes` is indicated in the Att (Attached) column.

Table 7-14 lists the DS8000 disk control unit that is added.

Table 7-14 Disk control unit that is added

CU	Switch	Port	CUADD	Description
EF00	None	None	None	Disk EF00,0254 SSID EF00 PRI L

7.8.3 Defining DS8000 devices

To define DS8000 devices, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Select the first DS8000 control unit to get to the I/O Device list panel.
3. Press F11 to add devices. See Figure 7-50.

```
+------------------------------ Add Device --------------------------------+
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Device number  . . . . . . . . D000  + (0000 - FFFF)                      |
| Number of devices  . . . . . . 100_                                       |
| Device type  . . . . . . . . . 3390B________  +                           |
|                                                                           |
| Serial number  . . . . . . . . __________                                 |
| Description  . . . . . . . . . ________________________________           |
|                                                                           |
| Volume serial number . . . . . ______  (for DASD)                         |
|                                                                           |
| Connected to CUs . . D000  ____  ____  ____  ____  ____  ____  ____  +    |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-50 HCD: Add DS8000 Primary Base

4. Specify the Device number, the Number of devices and the Device type.

   Consider using a numbering scheme for devices. In this example, the first device number matches the control unit number.

   We add 100 Device type 3390B (Base) devices starting with device D000. We do not need to specify the Connected to CU because this is the control unit we simply selected on the Control unit list panel. If we were to add devices for another control unit, we can update the Connected to CU field.

5. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-51 on page 128.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                Row 1 of 4 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                           |
| Select processors to change device/processor definitions, then press     |
| Enter.                                                                    |
|                                                                           |
| Device number  . . : D000       Number of devices  . : 100                |
| Device type  . . . : 3390B                                                |
|                                                                           |
|                                            Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null  |
| _ CPCPKR1.0   _    00   No        Yes     __         No             ___   |
| _ CPCPKR2.0   _    00   No        Yes     __         No             ___   |
| ***************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-51 HCD: Add DS8000 Primary Base (Device / Processor Definition)

6. Specify the starting UA (unit address) for the devices to be added. This is the unit address that is specified when adding the control unit.

   In this example, the UA is 00. The default UA is the last to bytes of the device number. The list of Processors or LCSSs include only the those that are connected to the control unit to which we are adding devices. The SS column is for specifying the subchannel set, and in this example we do not do that for Device type 3390B (Base) devices. The default is subchannel set 0.

7. Press Enter. Although the devices are defined, they are not yet connected to the operating system configuration; the Define Device to Operating System Configuration panel is now displayed. See Figure 7-52.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                           Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR   |
|                                                                      |
| Select OSs to connect or disconnect devices, then press Enter.       |
|                                                                      |
| Device number  . : D000          Number of devices  : 100            |
| Device type  . . : 3390B                                             |
|                                                                      |
| / Config. ID   Type     SS Description                   Defined     |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary              |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary            |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary              |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary            |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary                 |
| ************************** Bottom of data *************************** |
|                                                                      |
+----------------------------------------------------------------------+
```

Figure 7-52 HCD: Add DS8000 Primary Base (Define Device to OS Configuration)

8. Select the operating system configurations that are to include the devices added, by using the **S** line-command.

   In this example, we add devices for the SYSA and SYSB sysplex, therefore we select the OSSYSXPR and the OSSYSXSE operating system configurations.

   We define two operating system configurations:

   – In the OSSYSXPR configuration, the primary disks are defined as online; the secondary disks are defined as offline.

   – In the OSSYSXSE configuration, the secondary disks are defined as online; the primary disks are defined as offline.

   This approach allows us to choose whether to have the primary or the secondary disk subsystem devices online when a logical partition is loaded (through an IPL). The operating system configuration to be used by the logical partition during IPL is specified as part of the IODF statement in the LOADxx member used for the IPL.

9. Press Enter. The Define Device Parameters / Features panel for the first operating system configuration specified is displayed. See Figure 7-53.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                 Row 1 of 6 |
| Command ===> __________________________________________ Scroll ===> CSR    |
|                                                                             |
| Specify or revise the values below.                                        |
|                                                                             |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary           |
| Device number  . . : D400         Number of devices  : 100                 |
| Device type  . . . : 3390B                                                 |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +          R Description                                  |
| OFFLINE    No                 Device considered online or offline at IPL   |
| DYNAMIC    Yes                Device supports dynamic configuration        |
| LOCANY     Yes                UCB can reside in 31 bit storage             |
| WLMPAV     Yes                Device supports work load manager            |
| SHARED     Yes                Device shared with other systems             |
| SHAREDUP   No                 Shared when system physically partitioned    |
| ***************************** Bottom of data ****************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-53 HCD: Add DS8000 Primary Base (Define Online Device Parameters / Features)

10. Specify the requested parameters in the Value column.

    In this example, values specified are the defaults except the LOCANY parameter, which we update from `No` to `Yes`. The parameters have the following values:

    – OFFLINE: Value is `No` to specify, that devices are *not* to be offline during IPL. Devices with the value of `Yes` *cannot* be used during IPL, because they will be offline.

    – DYNAMIC: Value is `Yes`, the recommended value. If the value of `No` is specified, this device *cannot* be updated or deleted as part of dynamic I/O configuration update.

    – LOCANY: Value is `Yes` to specify, that the UCBs can reside in 31 bit storage. Be sure to specify the value of `Yes` for the LOCANY parameter.

    – WLMPAV: Value is `Yes` to specify, that the device can be managed by WLM.

11. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.

12. Because we define the esoterics later, press Enter again. The Define Device Parameters / Features panel for the second operation system configuration that is specified is displayed. See Figure 7-54.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                   Row 1 of 6 |
| Command ===> ___________________________________________ Scroll ===> CSR    |
|                                                                              |
| Specify or revise the values below.                                          |
|                                                                              |
| Configuration ID . : OSSYSXSE     OSconfig SYSAB sysplex Secondary           |
| Device number  . . : D000         Number of devices  : 100                   |
| Device type  . . . : 3390B                                                   |
|                                                                              |
| Parameter/                                                                   |
| Feature    Value +          R Description                                    |
| OFFLINE    Yes                Device considered online or offline at IPL     |
| DYNAMIC    Yes                Device supports dynamic configuration          |
| LOCANY     Yes                UCB can reside in 31 bit storage               |
| WLMPAV     Yes                Device supports work load manager              |
| SHARED     Yes                Device shared with other systems               |
| SHAREDUP   No                 Shared when system physically partitioned      |
| ***************************** Bottom of data ****************************** |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 7-54 HCD: Add DS8000 Primary Base (offline Define Device Parameters / Features)

13. Specify the requested parameters in the Value column.

    In this example, the OFFLINE parameter value is now `Yes`, because D000 is the primary disks and this is the OSSYSXSE operating system configuration for using the secondary disks.

    The reason for defining both the primary and the secondary disks in both operating system configurations is for referencing the devices as part of PPRC management, hardware verification activities, and more.

14. After adding the Device Type 3390B (Base) devices, we add the corresponding Device Type 3390A (Alias) devices. Select the first DS8000 control unit to view the I/O Device List panel. The 100 Device Type 3390B (Base) devices are listed.

15. Press F11 to add devices. See Figure 7-55 on page 131.

```
+-------------------------------- Add Device ---------------------------------+
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Device number  . . . . . . . . D064  + (0000 - FFFF)                        |
| Number of devices  . . . . . . 156_                                         |
| Device type  . . . . . . . . . 3390A________  +                             |
|                                                                             |
| Serial number  . . . . . . . . __________                                   |
| Description  . . . . . . . . . ________________________________             |
|                                                                             |
| Volume serial number . . . . . ______  (for DASD)                           |
|                                                                             |
| Connected to CUs . . D000  ____  ____  ____  ____  ____  ____  ____  +      |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-55 HCD: Add Device, DS8000 Primary Alias

16. Specify information in these fields: Device number, the Number of devices, and the Device type. Again, we do not have to specify the Connected to CU because this is the control unit we just selected on the Control Unit List panel.

    In this example, we add 156 Device type 3390A (alias) devices starting with device D064, because the 100 Device type 3390B (Base) devices we already added ends, including device D063. We cannot add more than 156 devices, because we specified 256 as the Unit range in the control unit, and the control unit does not support more than 256 devices.

17. Press Enter to open the Device / Processor Definition panel, as shown in Figure 7-56.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                              Row 1 of 4 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                            |
| Select processors to change device/processor definitions, then press      |
| Enter.                                                                     |
|                                                                            |
| Device number  . . : D064      Number of devices  . : 156                  |
| Device type  . . . : 3390A                                                 |
|                                                                            |
|                                         Preferred  Device Candidate List  |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null  |
| _ CPCPKR1.0   1    64   No        Yes     __         No             ___   |
| _ CPCPKR2.0   1    64   No        Yes     __         No             ___   |
| ***************************** Bottom of data ***************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-56 HCD: Add DS8000 Primary Alias (Device / Processor Definition)

18. Specify the SS subchannel set and the UA Unit Address.

    In this example, we place the 3390A devices in SS (subchannel set) 1. The UA is 64, because the starting unit address for the control unit is 00, and we just added 100 Device Type 3390 (Base) devices using the hexadecimal UA values of 00 to 63.

The purpose of exploiting subchannel set 1 is to support a larger number of devices. Although in this example, the starting 3390B and 3390A device addresses differ, they do not have to be, because separate subchannel sets are used. Various numbering schemes are possible. See *Hardware Configuration Definition Planning,* GA22-7525 for examples.

The subchannel set that was specified for the devices must match the subchannel set to be specified on the Specify Subchannel Set ID panel for the operating system configuration. Subchannel set 1 is not supported for z/VM.

After specifying the subchannel set ID, the devices are defined, but not yet connected to the operating system configurations. Therefore, the **Define Device to Operating System Configuration** panel is displayed. See Figure 7-57.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                            Row 1 of 5 |
| Command ===> ____________________________________ Scroll ===> CSR     |
|                                                                       |
| Select OSs to connect or disconnect devices, then press Enter.        |
|                                                                       |
| Device number  . : D064          Number of devices  : 156             |
| Device type  . . : 3390A                                              |
|                                                                       |
| / Config. ID   Type     SS Description                      Defined   |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary             |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary           |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary             |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary           |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary                |
| ************************** Bottom of data *************************** |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-57 HCD: Add DS8000 Primary Alias (Define Device to Operating System Configuration)

19. Select the operating system configuration that is to include the devices added, by using the **S** line-command.

    In this example, we add devices for the SYSA and SYSB sysplex, therefore we select the OSSYSXPR and the OSSYSXSE operating system configurations. This information must, of course, match the Device Type 3390B (Base) devices added.

20. Press Enter. The Specify Subchannel Set ID panel for the first operating system configuration specified is displayed. See Figure 7-58 on page 133.

```
+---------------------- Specify Subchannel Set ID ----------------------+
|                                                                       |
| Specify the ID of the subchannel set into which devices are placed,   |
| then press Enter.                                                     |
|                                                                       |
| Configuration ID . : OSSYSXPR       OSconfig SYSAB sysplex Primary    |
| Device number  . . : D064           Number of devices  : 156          |
| Device type  . . . : 3390A                                            |
|                                                                       |
| Subchannel Set ID    1  +                                             |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-58 HCD: Add DS8000 Primary Alias (Specify Subchannel Set ID)

21. Select the Subchannel Set ID to be used by this operation system configuration.

    In this example, the Subchannel Set ID is 1.

    The subchannel set specified for the operating system configuration must match the subchannel set specified for the device on the Device Processor / Definition panel. Subchannel set 1 is not supported for z/VM.

    The purpose of the subchannel set ID in the operating system configuration is for the support of two identical device numbers in the same operating system configuration: one device in subchannel set 0 and another with the same device number in subchannel set 1. A limited number of device types is supported for subchannel set 1 and includes 3390A (Alias devices), 3390S (Special devices, Open systems) and 3390D (Special devices, PPRC Secondary). See 11.6, “LOADxx members” on page 369 for information about required parameters in the LOADxx member when defining duplicate 3390D device numbers in subchannel set 1.

22. Press Enter. The Define Device Parameters / Features panel for the first operation system configuration specified is displayed. See Figure 7-59.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                  Row 1 of 1 |
| Command ===> __________________________________________ Scroll ===> CSR     |
|                                                                             |
| Specify or revise the values below.                                         |
|                                                                             |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary            |
| Device number  . . : D064         Number of devices  : 156                  |
| Device type  . . . : 3390A                                                  |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +          R Description                                   |
| WLMPAV     Yes                Device supports work load manager             |
| **************************** Bottom of data ***************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-59 HCD: Add DS8000 Primary Alias (Define Device Parameters / Features)

23. Specify the requested parameter for WLMPAV in the Value column.

In this example the value is `Yes`, because the Device Type 3390A (Alias) devices are to be managed by WLM. This value must match the specifications when configuring the physical hardware.

24. Press Enter. The Specify Subchannel Set ID panel for the second operating system configuration that is specified is displayed. Esoterics does not apply to 3390A devices, therefore the Assign/Unassign Device to Esoteric panel is not displayed.

Table 7-15 lists the DS8000 disk devices that are added.

Table 7-15 Disk devices that are added

Device	Type	CU	UA	OSconfigs
D000,100	3390B	D000	00	OSSYSXPR (Online), OSSYSXSE (Offline)
D064,156	3390A	D000	64	OSSYSXPR, OSSYSXSE
D100,100	3390B	D100	00	OSSYSXPR (Online), OSSYSXSE (Offline)
D164,156	3390A	D100	64	OSSYSXPR, OSSYSXSE
D200,100	3390B	D200	00	OSSYS1PR (Online), OSSYS1SE (Offline)
D264,156	3390A	D200	64	OSSYS1PR, OSSYS1SE
D300,100	3390B	D300	00	OSVMLIPR (Online)
D364,156	3390A	D300	64	OSVMLI
E000,100	3390B	E000	00	OSSYSXPR (Offline), OSSYSXSE (Online)
E064,156	3390A	E000	64	OSSYSXPR, OSSYSXSE
E100,100	3390B	E100	00	OSSYSXPR (Offline), OSSYSXSE (Online)
E164,156	3390A	E100	64	OSSYSXPR, OSSYSXSE
E200,100	3390B	E200	00	OSSYS1PR (Offline), OSSYS1SE (Online)
E264,156	3390A	E200	64	OSSYS1PR, OSSYS1SE
E300,100	3390B	E300	00	OSVMLIPR (Online)
E364,156	3390A	E300	64	OSVMLIPR

7.8.4 Defining FCP devices

To define FCP devices, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Select the first FCP control unit to view the I/O Device List panel.
3. Press F11 to add devices. See Figure 7-60 on page 135.

```
+-------------------------------- Add Device ---------------------------------+
|                                                                              |
| Specify or revise the following values.                                      |
|                                                                              |
| Device number  . . . . . . . . EF00  + (0000 - FFFF)                         |
| Number of devices  . . . . . . 254_                                          |
| Device type  . . . . . . . . . FCP__________  +                              |
|                                                                              |
| Serial number  . . . . . . . . __________                                    |
| Description  . . . . . . . . . ________________________________              |
|                                                                              |
| Volume serial number . . . . . ______  (for DASD)                            |
|                                                                              |
| Connected to CUs . . EE00  ____  ____  ____  ____  ____  ____  ____  +       |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 7-60 HCD: Add FCP Devices

4. Specify the Device number, the Number of devices and the Device type.

   In this example we add 254 Device type FCP devices starting with device EF00. “54 devices is the maximum because it was specified when defining the control unit.

5. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-61.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                Row 1 of 1 |
| Command ===> __________________________________________ Scroll ===> CSR    |
|                                                                            |
| Select processors to change device/processor definitions, then press      |
| Enter.                                                                     |
|                                                                            |
| Device number  . . : EF00       Number of devices  . : 254                 |
| Device type  . . . : FCP                                                   |
|                                                                            |
|                                         Preferred  Device Candidate List  |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit        Null |
| _ CPCPKR2.1   _    00   No        No      __         No              ___  |
| ***************************** Bottom of data ***************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-61 HCD: Add FCP devices (Device / Processor Definition)

6. Specify the UA for the devices to be added. This UA is the same unit address that was specified when adding the control unit. Subchannel set 1 is not supported for FCP devices.

7. Press Enter. Although the devices are defined, they are not yet connected to the operating system configuration, therefore the Define Device to Operating System Configuration panel is displayed. See Figure 7-62 on page 136.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                            Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR    |
|                                                                       |
| Select OSs to connect or disconnect devices, then press Enter.        |
|                                                                       |
| Device number  . : EE00          Number of devices  : 100             |
| Device type  . . : FCP                                                |
|                                                                       |
| / Config. ID   Type     SS Description                      Defined   |
| _ OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary             |
| _ OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary           |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary             |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary           |
| S OSVMLIPR     VM          OSconfig z/VM Linux Primary                |
| ************************** Bottom of data *************************** |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-62 HCD: Add FCP Device (Define Device to OS Configuration)

8. Select the operating system configurations that are to include the devices added, by using the **S** line-command. FCP devices are supported by operating system configurations type VM only.
9. Press Enter. The Define Device Parameters / Features panel, for the first operation system configuration that was specified, is displayed. See Figure 7-63.

```
+-------------------- Define Device Parameters / Features ---------------------+
|                                                                  Row 1 of 2 |
| Command ===> ___________________________________________ Scroll ===> CSR     |
|                                                                              |
| Specify or revise the values below.                                          |
|                                                                              |
| Configuration ID . : OSVMLIPR     OSconfig z/VM Linux Primary                |
| Device number  . . : EE00         Number of devices  : 100                   |
| Device type  . . . : FCP                                                     |
|                                                                              |
| Parameter/                                                                   |
| Feature    Value +          R Description                                    |
| OFFLINE    No                 Device considered online or offline at IPL     |
| UIRATE     DEFAULT            Hot I/O Recovery Rate                          |
| **************************** Bottom of data ****************************** |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 7-63 HCD: Add FCP Devices (Define Device Parameters / Features)

10. Specify the requested parameters in the Value column.

Because operating system configuration type VM does not include esoterics, the FCP device definition is complete.

Table 7-16 lists the FCP disk device that is added.

Table 7-16 FCP disk device that is added

Device	Type	CU	UA	OSconfigs
EF00,254	FCP	EF00	00	OSVMLIPR (Online)

7.8.5 Defining DS8000 EDT

After connecting devices to the operating system configurations, esoterics can be defined in the eligible device tables (EDTs).

Before you define esoterics, your storage management staff must inform you of the esoterics required for the configuration.

To define DS800 EDT, perform the following steps:

1. Select option **1, Operating system configurations** on the Define, Modify, or View Configuration panel. The Operating System Configuration List panel is displayed.
2. Select the operating system configuration by using the **S** line-command.
3. Select the EDT also by using the **S** line-command. Although the EDT *does* exit, because it was created as part of the operating system configuration, the EDT does not yet contain esoterics.
4. Press F11 to add an Esoteric, as shown in Figure 7-64.

```
+-------------------- Add Esoteric ---------------------+
|                                                        |
| Specify the following values.                          |
|                                                        |
| Esoteric name  . . . DASD____                          |
| VIO eligible . . . . No      (Yes or No)               |
| Token  . . . . . . . 1000                              |
|                                                        |
+--------------------------------------------------------+
```

Figure 7-64 HCD: Add DS8000 Base (Add Esoteric)

5. Specify the Esoteric name requested. Specify the VIO Eligible option and optionally a Token.

   In this example, we create an esoteric device group with the name of DASD. The VIO-eligible option is `No`, therefore devices in the group will not be eligible for VIO. We specify a token of 1000.

   Tokens prevent the order of esoterics from becoming alphabetical after IPL, thus avoiding access problems for data sets that are cataloged using esoterics. If a token is specified for one esoteric, you must also specify tokens for all other esoterics in the EDT OS configuration.

   Attention: For existing configurations, do not delete any esoteric names, unless your are absolutely sure it is not used. Talk to your storage manager. EDTs might be used in JCL and system SW parameters.

6. Although an esoteric name has now been added, no devices are connected to the esoteric name of DASD yet.Select the esoteric by using the **S** line-command. The Assign/Unassign Devices to Esoteric panel is displayed. See Figure 7-65.

```
+------------------ Assign/Unassign Devices to Esoteric ------------------+
|   Goto  Filter  Backup  Query  Help                                     |
| ----------------------------------------------------------------------  |
|                                                           Row 13 of 18 |
| Command ===> _______________________________________ Scroll ===> CSR   |
|                                                                        |
| Specify Yes to assign or No to unassign.                               |
|                                                                        |
| Configuration ID . : OSSYSXPR       OSconfig SYSAB sysplex Primary     |
| EDT.Esoteric . . . : 00.DASD        VIO eligible . : No                |
|                                                                        |
|                             Generic            Starting  Number of    |
| Devices       Device Type   Name      Assigned  Number    Devices      |
| D000,100      3390B         3390      Yes       ____      ____         |
| D100,100      3390B         3390      Yes       ____      ____         |
| E000,100      3390B         3390      Yes       ____      ____         |
| E100,100      3390B         3390      Yes       ____      ____         |
| *************************** Bottom of data ****************************|
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-65 HCD: Add DS8000 Base (Assign/Unassign Devices to Esoteric)

7. Specify `Yes` in the Assigned column in order to select devices for the specific esoteric name. If you need a subset for example device D010,16 specify `Yes` in Assigned column for device D000,100, D010 in Starting number and 16 in Number of Devices.

   In this example, we specify Yes to include all 3390B devices in the esoteric name on DASD.

8. The list of devices on the panel includes all devices connected to the operating system configuration selected. Press F3 to exit the panel.

Table 7-17 lists the esoterics that are added.

Table 7-17 Esoterics that are added

Esoteric	Devices included	Disk subsystem
DASD	D000,100 + D100,100	Primary
DASD	E000,100 + E100,100	Secondary

7.9 Defining tape libraries

In this section, we define a TS7700 tape library grid (Device type 3490) and an Automated Tape Library, ATL (Device type 3590).

Before you begin, note the following information:

- Identify the number of ports that are installed on the tape subsystems (know the port IDs).
- Determine how many control units to define, the CUADD numbers (logical control unit addresses, LCUs), the library-ID, the libport-IDs and the numbers of devices to be defined. Consult your storage managers.
- Determine which switch ports on your switches are on the same physical cards. Consult your hardware technicians. Knowing the physical information about the switches can help you to avoid single point of failure.
- Determine how many CHPIDs are to be connected to the control units. This depends on availability and load issues and the number of physical ports installed on the tape subsystems. Consult your capacity managers.

In this example, our configuration includes three control units in each TS7700 cluster. Each control unit will have 16 tape devices. Each control unit will be connected using four CHPIDs from each CPC sharing four ports on each TS7700 cluster:

- The first two control units are to be used by the SYSA and SYSB production sysplex systems.
- The third control unit is to be used by the SYS1 monoplex system.

See *TS7700 Tape Virtualization for System z Servers,* SG24-7312 for details about TS7700 I/O configuration requirements and considerations.

In our example, we define devices to the operating system configurations and define Esoterics.

7.9.1 Defining TS7700 tape library control units

To define TS7700 tape library control units, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The **Control Unit List** panel is displayed.
2. Press F11 to add a control unit. See Figure 7-66 on page 140.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Control unit number  . . . . B000  +                                  |
| Control unit type  . . . . . 3490________  +                          |
|                                                                       |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . ________________________________         |
|                                                                       |
| Connected to switches  . . . 11  11  12  12  __  __  __  __  +        |
| Ports  . . . . . . . . . . . 19  29  19  29  __  __  __  __  +        |
|                                                                       |
| If connected to a switch:                                             |
|                                                                       |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-66 HCD: Add TS7700 CL0 Control Unit

3. Define the first control unit for TS7700 cluster 0. Specify information in these fields; Control unit number, Control unit type, and Description.

   Consider using a numbering scheme for control units. In this example the control unit number matches the first device number on the control unit, and the second control unit byte matches the TS7700 cluster ID.

   In this example the TS7700 clusters are connected using switches, therefore the Connected to switches and Ports fields are used. The example includes four connections from the switches to the control unit.

   The control unit is connected using two switches (11 and 12) in order to avoid single point of failure. A total of four connections are defined between the control unit and the switches, connected at port 19 and 29 on each switch. The switches used has 16 ports on each card, therefore port 19 and 29 are on two separate cards. The number of connections depend on availability and load issues.

4. The physical port numbers used on the TS7700 clusters for the connections to the switches are not defined in HCD. However, be sure to document the ports used on the TS7700 clusters for example by specifying the cluster port IDs using the Name fields on the Switch Ports lists.

5. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-67 on page 141.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : B000     Control unit type . . . : 3490

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  5C.1119 5A.1129 44.1219 57.1229 _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  4D.1119 30.1129 58.1219 56.1229 _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-67 HCD: Add TS7700 CL0 Control Unit (CHPIDS)

6. Specify Channel Path ID and Link Address for all processors / LCSSs that are to access the control unit.

   Note the following information about this example:

   – we define the first control unit to be used by the SYSA and SYSB sysplex systems. Partitions for the systems are located on LCSS 0 on each processor, therefore these are the LCSSs we will connect.

   – we specify four Channel Path IDs, corresponding to the four connections from the switches to the control unit. You specify the CHPID, a dot, and then the switch and port to be used by the CHPID for accessing the control unit (the switches and ports we specified on the Add Control Unit panel). CHPID 5C and 5A were both connected to switch 11 when we added the CHPIDs, therefore they are to use connections from switch 11 to the control unit.

   – we use the same CHPIDs and Link Address for all primary control units to be defined. We use the same CHPIDs as for DS8300, but port numbers differ because they represent connections to TS7700 control units.

7. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. See Figure 7-68 on page 142.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : B000     Control unit type . . . : 3490

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      0    00.016 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      0    00.016 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-68 HCD: Add TS7700 CL0 Control Unit (CUADD and Unit Addresses)

8. Specify the hexadecimal CUADD number, Unit Address, and Unit Range.

   In this example, the CUADD number for the first TS7700 control unit on the TS7700 cluster is 0. The Unit Address for the first device is 00 and a total of 16 devices will be defined on each TS7700 control unit.

9. Scroll one page to the right to specify the I/O Concurrency level of 2.

10. Press Enter. The control unit becomes attached to the processors/LCSSs. The value of Yes are listed in the Att (Attached) column.

11. We define the first control unit for TS7700 cluster 1, connected to the other set of switches. Press F11 to add a control unit. See Figure 7-69 on page 143.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Control unit number  . . . . B100  +                                  |
| Control unit type  . . . . . 3490________   +                         |
|                                                                       |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . ________________________________         |
|                                                                       |
| Connected to switches  . . . 13  13  14  14  __  __  __  __  +        |
| Ports  . . . . . . . . . . . 19  29  19  29  __  __  __  __  +        |
|                                                                       |
| If connected to a switch:                                             |
|                                                                       |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-69 HCD: Add TS7700 CL1 Control Unit

12. Specify information in these fields: Control unit number, Control unit type, and Description.

    The control unit is connected by using two switches (13 and 14). The control unit is connected at port 19 and 29 on each switch, as with the control unit for cluster 0.

13. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-70.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : B100     Control unit type . . . : 3490

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  5C.1319 5A.1329 44.1419 57.1429 _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  4D.1319 30.1329 58.1419 56.1429 _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-70 HCD: Add TS7700 CL1 Control Unit (CHPIDS)

14. Specify Channel Path ID and Link Address for all processors / LCSSs that are to access the control unit.

    Again the control unit is to be used by the SYSA and SYSB sysplex systems. Partitions for the systems are located on LCSS 0 on each processor, therefore these are the LCSSs we will connect.

    In this example, CHPIDs that are specified for the cluster 1 control unit are identical to those specified for the cluster 0 control unit. However, the first two bytes of the *Link Address* differ because they represent the switches that are connected to the control unit. CHPID 5C and 5A are both connected to switch 11 but will access switch 13 using the inter-switch links (ISLs).

15. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. The values to be used are identical to the Cluster 0 control unit. Scroll one page to the right to specify the I/O Concurrency level of 2 and press Enter to attach the control unit.

Table 7-18 lists the TS7700 tape control units that are added.

Table 7-18 TS7700 tape control units that are added

CU	Switch	Port	CUADD	Description
B000	Switch 11/12	Port 19/29	CUADD 0	Tape B000,0064 VTSPKS1 CLI0 P
B010	Switch 11/12	Port 19/29	CUADD 1	Tape B010,0064 VTSPKS1 CLI0 P
B020	Switch 11/12	Port 19/29	CUADD 2	Tape B020,0064 VTSPKS1 CLI0 P
B030	Switch 11/12	Port 19/29	CUADD 3	Tape B030,0064 VTSPKS1 CLI0 D
B100	Switch 13/14	Port 19/29	CUADD 0	Tape B100,0064 VTSPKS1 CLI1 P
B110	Switch 13/14	Port 19/29	CUADD 1	Tape B110,0064 VTSPKS1 CLI1 P
B120	Switch 13/14	Port 19/29	CUADD 2	Tape B120,0064 VTSPKS1 CLI1 P
B130	Switch 13/14	Port 19/29	CUADD 3	Tape B130,0064 VTSPKS1 CLI1 D

7.9.2 Defining TS7700 tape library devices

To define TS7700 tape library devices, perform the following steps:

1. Select option **5, I/O Devices** on the Define, Modify, or View Configuration panel. You are now on the I/O Device List panel. Now, press F11 to add devices. See Figure 7-71.

```
+------------------------------- Add Device --------------------------------+
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Device number  . . . . . . . . B000  + (0000 - FFFF)                      |
| Number of devices  . . . . . . 16__                                       |
| Device type  . . . . . . . . . 3490 _______    +                          |
|                                                                           |
| Serial number  . . . . . . . . __________                                 |
| Description  . . . . . . . . . ________________________________           |
|                                                                           |
| Volume serial number . . . . . ______  (for DASD)                         |
|                                                                           |
| Connected to CUs . . B000  ____  ____  ____  ____  ____  ____  ____  +    |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-71 HCD: Add TS7700 Device

2. Specify the Device number, the Number of devices, the Device type and the Connected to CUs.

   Consider using a numbering scheme for devices. In this example, the first device number matches the control unit number.

   We add 16 Device type 3490 devices starting with device B000. 3490 is the only device type supported for TS7700 and 16 is the maximum number of devices on a single TS7700 control unit.

3. Press Enter to open the **Device / Processor Definition** panel. See Figure 7-72.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                Row 1 of 3 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                           |
| Select processors to change device/processor definitions, then press      |
| Enter.                                                                    |
|                                                                           |
| Device number  . . : B000      Number of devices  . : 16                  |
| Device type  . . . : 3490                                                 |
|                                                                           |
|                                          Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null  |
| _ CPCPKR1.0   0    00   No        Yes     __         No             ___   |
| _ CPCPKR2.0   0    00   No        Yes     __         No             ___   |
| **************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-72 HCD: Add TS7700 Device (Device / Processor Definition)

4. Specify the starting UA (Unit Address) for the devices to be added. This is the Unit Address that is specified when adding the control unit.

   In this example, the SS (subchannel set) is 0 (subchannel set 1 is not supported for 3490 devices) and the UA is 00. The default UA is the last to bytes of the device number. The list of Processors / LCSSs includes only those that are connected to the control unit to which we are adding devices.

5. Press Enter. Although the devices are defined, they are not yet connected to the operating system configurations, therefore the Define Device to Operating System Configuration panel is displayed. See Figure 7-73.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                            Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR    |
|                                                                       |
| Select OSs to connect or disconnect devices, then press Enter.        |
|                                                                       |
| Device number  . : B000          Number of devices  : 16              |
| Device type  . . : 3490                                               |
|                                                                       |
| / Config. ID   Type      SS Description                    Defined    |
| S OSSYSXPR     MVS          OSconfig SYSAB sysplex Primary            |
| S OSSYSXSE     MVS          OSconfig SYSAB sysplex Secondary          |
| _ OSSYS1PR     MVS          OSconfig SYS1 monoplex Primary            |
| _ OSSYS1SE     MVS          OSconfig SYS1 monoplex Secondary          |
| _ OSVMLIPR     VM           OSconfig z/VM Linux Primary               |
| ************************** Bottom of data *************************** |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-73 HCD: Add TS7700 Device (Define Device to OS Configuration)

6. Select the operating system configurations that are to include the devices that were added; use the **S** line-command.

   In this example, we add devices for the SYSA and SYSB sysplex, therefore we select the OSSYSXPR and the OSSYSXSE operating system configurations.

7. Press Enter. The Define Device Parameters / Features panel for the first operation system configuration specified is displayed. See Figure 7-74 on page 147.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                 Row 1 of 10 |
| Command ===> __________________________________________ Scroll ===> CSR    |
|                                                                             |
| Specify or revise the values below.                                        |
|                                                                             |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary           |
| Device number  . . : B000         Number of devices  : 16                  |
| Device type  . . . : 3490                                                  |
|                                                                             |
| Parameter/                                                                 |
| Feature    Value +         R Description                                   |
| OFFLINE    Yes               Device considered online or offline at IPL    |
| DYNAMIC    Yes               Device supports dynamic configuration         |
| LOCANY     No                UCB can reside in 31 bit storage              |
| LIBRARY    Yes               Device supports auto tape library             |
| AUTOSWITCH NO                Device is automatically switchable            |
| LIBRARY-ID F0174___________  5 digit library serial number                 |
| LIBPORT-ID 01______________  2 digit library string ID (port number)       |
| MTL        NO                Device supports manual tape library           |
| SHARABLE   Yes               Device is Sharable between systems            |
| COMPACT    Yes               Compaction                                    |
| **************************** Bottom of data ***************************** |
+-----------------------------------------------------------------------------+
```

Figure 7-74 HCD: Add TS7700 Device (Define Device Parameters / Features)

8. Specify the requested parameters in the Value column.

   In this example all values have been updated except: DYNAMIC, LOCANY, AUTOSWITCH, MTL, and SHARABLE. The parameters have the following values:

   – OFFLINE: Value is Yes to specify, that devices are to be offline during IPL.

   – DYNAMIC: Value is Yes, and is the recommended value here. If the value of No is specified, this device *cannot* be updated or deleted as part of dynamic I/O configuration update.

   – LIBRARY: Value is Yes to specify that this tape is system-managed.

   – AUTOSWITCH: Value is No. Autoswitch can also be set using a system command.

   – LIBRARY-ID: This parameter is provided to you by the IBM support representative.

   – LIBPORT-ID: This parameter must be specified as documented in the *TS7700 Tape Virtualization for System z Servers,* SG24-7312 manual. In this two cluster example the LIBPORT-ID for control unit B100 devices will be 41.

9. Press Enter. The **Assign/Unassign Device to Esoteric pa**nel is displayed.

10. We define esoterics later, so press Enter again. The Define Device Parameters / Features panel is displayed for the second operating system configuration that is specified.

Table 7-19 lists TS7700 devices that are added.

Table 7-19 TS7700 devices that are added

Device	Type	CU	UA	OSconfigs
B000,16	3490	B000	00	OSSYSXPR (Offline), OSSYSXSE (Offline)
B010,16	3490	B010	00	OSSYSXPR (Offline), OSSYSXSE (Offline)
B020,16	3490	B020	00	OSSYSXPR (Offline), OSSYSXSE (Offline)
B030,16	3490	B030	00	OSSYS1PR (Offline), OSSYS1SE (Offline)
B100,16	3490	B100	00	OSSYSXPR (Online), OSSYSXSE (Offline)
B110,16	3490	B110	00	OSSYSXPR (Offline), OSSYSXSE (Offline)
B120,16	3490	B120	00	OSSYSXPR (Offline), OSSYSXSE (Online)
B130,16	3490	B130	00	OSSYS1PR (Offline), OSSYS1SE (Offline)

In this example our configuration includes a single control unit and 16 devices all shared between the SYSA and SYSB sysplex and the SYS1 monoplex.

7.9.3 Defining ATL control units

To define Automated Tape Library (ATL) control units and devices, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit. See Figure 7-75 on page 149.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                       |
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Control unit number  . . . . B800  +                                  |
| Control unit type  . . . . . 3590_________   +                        |
|                                                                       |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . ________________________________         |
|                                                                       |
| Connected to switches  . . . 11  12  __  __  __  __  __  __  +        |
| Ports  . . . . . . . . . . . 17  17  __  __  __  __  __  __  +        |
|                                                                       |
| If connected to a switch:                                             |
|                                                                       |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-75 HCD: Add ATL Control Unit

3. Specify the Control unit number, Control unit type and the Description.

   Consider using a numbering scheme for control units. In this example, the control unit number matches the first device number on the control unit.

   Also in this example, the ATL control unit is connected using switches, therefore the Connected to switches and Ports fields are used. The example includes two connections from the switches to the control unit.

   The control unit is connected using two switches (11 and 12) in order to avoid single point of failure. A total of two connections are defined between the control unit and the switches, connected at port 17 on both switches.

   The physical port numbers used on the ATL for the connections to the switches are not defined in HCD. However, be sure to document the ports used on the ATL for example by specifying the cluster port IDs using the Name fields on the Switch Ports lists.

4. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-76 on page 150.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : B800     Control unit type . . . : 3590

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  5C.1117 44.1217 _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  5C.1117 44.1217 _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  58.1117 4D.1217 _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-76 HCD: Add ATL Control Unit (CHPIDS)

5. Specify Channel Path ID and Link Address for all processors / LCSSs that are to access the control unit.

   Note the following information about this example:

   – We define a single control unit to be used by the SYSA and SYSB sysplex systems and the SYS1 monoplex system. Partitions for the systems are located on LCSS 0 on each processor and on LCSS 1 on the CPCPKR1 processor.

   – We specify two Channel Path IDs, corresponding to the two connections from the switches to the control unit. You specify the CHPID, a dot, and then the switch and port to be used by the CHPID for accessing the control unit (the switches and ports we specified on the Add Control Unit panel).

   – We use the same CHPIDs as for DS8300, but port numbers are different because they represent connections to ATL control units. The CHPIDs specified for the CPCPKR1 processor are connected to switch 11 and 12; the CHPIDs specified for the CPCPKR2 processor are connected to switch 13 and 14.

6. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. See Figure 7-77 on page 151.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : B800     Control unit type . . . : 3590

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0  Yes 0    00.016 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      0    00.016 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      0    00.016 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-77 HCD: Add ATL Control Unit (CUADD and Unit Addresses)

7. Specify the hexadecimal CUADD number, Unit Address and Unit Range.

   In this example, the CUADD number is 0, the Unit Address for the first device is 00 and a total of 16 devices are defined.

8. Scroll one page to the right to specify the I/O Concurrency level of 2.
9. Press Enter. The control unit will be attached to the processors/LCSSs. The value of Yes will appear in the Att (Attached) column.

Table 7-20 lists the ATL tape control unit that is added.

Table 7-20 ATL tape control unit that is added

CU	Switch	Port	CUADD	Description
B800	Switch 11/12	Port 17	CUADD 0	Tape B800,0016 ATLPKS1

7.9.4 Defining ATL devices

To define ATL devices, perform the following steps:

1. Select option **5, I/O Devices** on the Define, Modify, or View Configuration panel. The I/O Device List panel is displayed.
2. Press F11 to add devices. See Figure 7-78 on page 152.

```
+-------------------------------- Add Device ---------------------------------+
|                                                                             |
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Device number  . . . . . . . . B800  + (0000 - FFFF)                        |
| Number of devices  . . . . . . 16__                                         |
| Device type  . . . . . . . . . 3590_________   +                            |
|                                                                             |
| Serial number  . . . . . . . . __________                                   |
| Description  . . . . . . . . . ________________________________             |
|                                                                             |
| Volume serial number . . . . . ______  (for DASD)                           |
|                                                                             |
| Connected to CUs . . B800  ____  ____  ____  ____  ____  ____  ____  +      |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-78 HCD: Add ATL Device

3. Specify information in these fields: Device number, Number of devices, Device type, and Connected to CUs.

   Consider using a numbering scheme for devices. In this example, the first device number matches the control unit number.

   Also in this example, we add 16 Device type 3590 devices starting with device B800. We define 16 devices even though only 4 devices are to be installed physically. This enables us to install more physical devices without a need for updating the I/O configuration. The disadvantage is to have devices defined unable to be varied online.

4. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-79.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                Row 1 of 1 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                           |
| Select processors to change device/processor definitions, then press      |
| Enter.                                                                    |
|                                                                           |
| Device number  . . : B800      Number of devices  . : 16                  |
| Device type  . . . : 3590                                                 |
|                                                                           |
|                                          Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null |
| _ CPCPKR1.0   _    00   No        Yes     __         No             ___  |
| _ CPCPKR1.1   _    00   No        Yes     __         No             ___  |
| _ CPCPKR2.0   _    00   No        Yes     __         No             ___  |
| ***************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-79 HCD: Add ATL Device (Device / Processor Definition)

5. Specify the starting UA (Unit Address) for the devices to be added. This is the UA that was specified when we added the control unit.

   In this example, the SS (subchannel set) is 0 (subchannel set 1 is not supported for 3590 devices) and the UA is 00. The default UA is the last bytes of the device number. The list of Processors / LCSSs includes only those that are connected to the control unit to which we are adding devices.

6. Press Enter. Although the devices are defined, they are not yet connected to the operating system configurations, therefore the Define Device to Operating System Configuration panel is displayed. See Figure 7-80.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                            Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR    |
|                                                                        |
| Select OSs to connect or disconnect devices, then press Enter.         |
|                                                                        |
| Device number  . : B800          Number of devices  : 16              |
| Device type  . . : 3590                                                |
|                                                                        |
| / Config. ID   Type     SS Description                      Defined   |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary             |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary           |
| S OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary             |
| S OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary           |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary               |
| ************************** Bottom of data *************************** |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-80 HCD: Add ATL Device (Define Device to OS Configuration)

7. Select the operating system configurations that are to include the devices we added, by using the **S** line-command.

   In this example, we add devices for both the SYSA and SYSB sysplex systems and the SYS1 monoplex system, therefore four operating system configurations are selected.

8. Press Enter. The Define Device Parameters / Features panel for the first operating system configuration that is specified is displayed. See Figure 7-81 on page 154.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                Row 1 of 10 |
| Command ===> ___________________________________________ Scroll ===> CSR   |
|                                                                            |
| Specify or revise the values below.                                        |
|                                                                            |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary            |
| Device number  . . : B800         Number of devices  : 16                   |
| Device type  . . . : 3590                                                  |
|                                                                            |
| Parameter/                                                                 |
| Feature    Value +          R Description                                  |
| OFFLINE    Yes                Device considered online or offline at IPL  |
| DYNAMIC    Yes                Device supports dynamic configuration       |
| LOCANY     Yes                UCB can reside in 31 bit storage            |
| LIBRARY    Yes                Device supports auto tape library           |
| AUTOSWITCH NO                 Device is automatically switchable          |
| LIBRARY-ID 17288___________   5 digit library serial number               |
| LIBPORT-ID 01______________   2 digit library string ID (port number)     |
| MTL        NO                 Device supports manual tape library         |
| SHARABLE   Yes                Device is Sharable between systems          |
| COMPACT    Yes                Compaction                                  |
| **************************** Bottom of data ***************************** |
+----------------------------------------------------------------------------+
```

Figure 7-81 HCD: Add ATL Device (Define Device Parameters / Features)

9. Specify the requested parameters in the Value column.

   In this example, all parameter values are updated except: OFFLINE, DYNAMIC, AUTOSWITCH and MTL. The parameters have the following values:

   – OFFLINE: Value is Yes to specify, that devices are to be offline during IPL.
   – DYNAMIC: Value is Yes, the recommended value. If the value of No is specified, this device *cannot* be updated or deleted as part of dynamic I/O configuration update.
   – LIBRARY: Value is Yes to specify, that this is system-managed tape.
   – AUTOSWITCH: Value is No. Autoswitch can also be set using a system command.
   – LIBRARY-ID: Values is provided to you by the IBM support representative.
   – LIBPORT-ID: Value is not required for an ATL, however if specified it must match the value that is reported by the hardware.
   – MTL: Value of No is the default. If Yes is specified, both LIBRARY-ID and LIBPORT-ID must be specified too. This parameter is mutually exclusive with the LIBRARY parameter.

10. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.
11. We define the esoterics later, therefore press Enter again. The Define Device Parameters / Features panel for the second OS configuration that is specified is displayed.

Table 7-21 on page 155 lists the ATL devices that are added.

Table 7-21 ATL devices that are added

Device	Type	CU	UA	OSconfigs
B800,16	3590	B800	00	OSSYSXPR (Offline), OSSYSXSE (Offline)
B800,16	3590	B800	00	OSSYS1PR (Offline), OSSYS1SE (Offline)

7.9.5 Defining EDT for tape TS7700 and ATL devices

Now we define EDT parameters for TS7700 and ATL devices.

After connecting devices to the operating system configurations, esoterics can be defined in the EDTs.

Before you define esoterics, your storage management specialists must inform you of the Esoterics required for your configuration.

In this example, we will define the TAPE esoteric to include all tape devices (ATL and TS7700), the ATLPK01 Esoteric to include the ATL and the VTSPK00 Esoteric to include the TS7700. We also define the VTSPK01 to include TS7700 cluster 0 and VTSPK02 to include TS7700 cluster 1.

First we define the esoterics, then we assign devices to the defined esoterics.

To define EDT for tape TS7700 and ATL devices, perform the following steps:

1. Select option **1, Operating system configurations** on the Define, Modify, or View Configuration panel. The Operating System Configuration List panel is displayed. See Figure 7-82.

```
 Operating System Configuration List             Row 1 of 5
 Command ===> ____________________________________________ Scroll ===> CSR

 Select one or more operating system configurations, then press Enter. To
 add, use F11.

 / Config. ID   Type     Description
 _ OSSYSXPR     MVS      OSconfig SYSAB sysplex Primary
 _ OSSYSXSE     MVS      OSconfig SYSAB sysplex Secondary
 _ OSSYS1PR     MVS      OSconfig SYS1 monoplex Primary
 _ OSSYS1SE     MVS      OSconfig SYS1 monoplex Secondary
 _ OSVMLIPR     VM       OSconfig z/VM Linux Primary
******************************* Bottom of data ********************************
```

Figure 7-82 HCD: Add TS7700 and ATL EDT (Define Device to OS Configuration)

2. Select the operating system configurations by using the forward slash (/) line-command. The **Actions on selected operating systems** panel is displayed. See Figure 7-83 on page 156.

```
+----------- Actions on selected operating systems -----------+
|                                                             |
| Select by number or action code and press Enter.            |
|                                                             |
| 5_  1.  Add like  . . . . . . . . . . . . . . (a)           |
|     2.  Repeat (copy) OS configurations . . (r)            |
|     3.  Change  . . . . . . . . . . . . . . (c)            |
|     4.  Delete  . . . . . . . . . . . . . . (d)            |
|     5.  Work with EDTs  . . . . . . . . . . (s)            |
|     6.  Work with consoles  . . . . . . . . (n)            |
|     7.  Work with attached devices  . . . . (u)            |
|     8.  View generics by name . . . . . . . (g)            |
|     9.  View generics by preference value . (p)            |
|                                                             |
+-------------------------------------------------------------+
```

Figure 7-83 HCD: Add TS7700 and ATL EDT (Actions on selected operating systems)

3. Select option **5, Work with EDTs** to view a list of EDTs for the operating system configuration selected. See Figure 7-84.

```
+------------------------------- EDT List --------------------------------+
|   Goto  Backup  Query  Help                                            |
| ---------------------------------------------------------------------- |
|                                                             Row 1 of 1 |
| Command ===> _______________________________________ Scroll ===> CSR   |
|                                                                        |
| Select one or more EDTs, then press Enter. To add, use F11.            |
|                                                                        |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary       |
|                                                                        |
| / EDT Last Update By       Description                                 |
| / 00  2009-10-13  PREBENE  Default                                     |
| *************************** Bottom of data **************************** |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-84 HCD: Add TS7700 and ATL EDT (EDT List)

4. Select the EDT by using the forward slash (/). The Actions on selected EDTs panel is displayed. The EDT does exit, because it was created as part of the operating system configurations. Only one EDT has been defined for this operating system configuration. See Figure 7-85 on page 157.

```
+------------------ Actions on selected EDTs -------------------+
|                                                               |
|                                                               |
| Select by number or action code and press Enter.              |
|                                                               |
| 4_  1.  Repeat (copy) EDTs  . . . . . . . . (r)               |
|     2.  Change  . . . . . . . . . . . . . . (c)               |
|     3.  Delete  . . . . . . . . . . . . . . (d)               |
|     4.  Work with esoterics . . . . . . . . (s)               |
|     5.  Work with generics by name  . . . . (g)               |
|     6.  Work with generics by pref. value . (p)               |
|                                                               |
|                                                               |
|                                                               |
+---------------------------------------------------------------+
```

Figure 7-85 HCD: Add TS7700 and ATL EDT (Actions on selected EDTs)

5. Select option **4, Work with esoterics** to view the Esoteric List panel. See Figure 7-86.

```
+----------------------------- Esoteric List -----------------------------+
|   Goto  Filter  Backup  Query  Help                                     |
| ----------------------------------------------------------------------  |
|                                                            Row 1 of 1   |
| Command ===> _______________________________________ Scroll ===> CSR    |
|                                                                         |
| Select one or more esoterics, then press Enter. To add, use F11.       |
|                                                                         |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary        |
| EDT identifier . . : 00           Default                               |
|                                                                         |
| / +-oteric  VIO    Token  State                                         |
| _ DASD      No     1000                                                 |
| *************************** Bottom of data **************************** |
|                                                                         |
+-------------------------------------------------------------------------+
```

Figure 7-86 HCD: Add TS7700 and ATL EDT (Esoteric List)

6. Currently the DASD esoteric is the only one defined. Press PF11 to add an esoteric. See Figure 7-87 on page 158.

```
+--------------------- Add Esoteric ---------------------+
|                                                        |
|                                                        |
| Specify the following values.                          |
|                                                        |
| Esoteric name  . . . TAPE____                          |
| VIO eligible . . . . No      (Yes or No)               |
| Token  . . . . . . . 2000                              |
|                                                        |
|                                                        |
|                                                        |
|                                                        |
+--------------------------------------------------------+
```

Figure 7-87 HCD: Add TS7700 and ATL EDT (Add Esoteric)

7. Specify the Esoteric name. Specify the VIO eligible option and optionally a Token.

   In this example, we create an Esoteric device group with the name of TAPE to include the ATL and TS7700 devices. The VIO-eligible option is No, therefore devices in the group are not eligible for VIO. A token of 2000 is specified.

   Tokens prevent the order of esoterics from becoming alphabetic after IPL, thus avoiding access problems for data sets that are cataloged using esoterics. If a token is specified for one esoteric, you must also specify tokens for all other esoterics in the EDT OS configuration.

   If tokens are not specified a CBDA333I message will be displayed during build of production IODF to inform you that no tokens has been specified for the EDT.

   > **Attention:** For existing configurations, do not delete any esoteric names, unless your are absolutely sure it is not used. Talk to your storage manager. EDTs might be used in JCL and system SW parameters.

   Although an esoteric name has now been added, no devices are connected to the esoteric name of TAPE yet. See Figure 7-88 on page 159.

```
+----------------------------- Esoteric List -----------------------------+
|   Goto  Filter  Backup  Query  Help                                     |
| ----------------------------------------------------------------------  |
|                                                              Row 1 of 2 |
| Command ===> _______________________________________ Scroll ===> CSR   |
|                                                                         |
| Select one or more esoterics, then press Enter. To add, use F11.       |
|                                                                         |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary       |
| EDT identifier . . : 00           Default                               |
|                                                                         |
| / Esoteric  VIO    Token  State                                         |
| _ DASD      No     ____                                                |
| / TAPE      No     ____   No device defined                            |
| *************************** Bottom of data **************************** |
|                                                                         |
+-------------------------------------------------------------------------+
```

Figure 7-88 HCD: Add TS7700 and ATL EDT (Esoteric List, no devices)

8. Select the TAPE esoteric by using the forward slash (/) line-command. The Actions on selected esoterics panel is displayed. See Figure 7-89.

```
+--------------- Actions on selected esoterics ---------------+
|                                                             |
| Select by number or action code and press Enter.           |
|                                                             |
| 4_  1.  Repeat (copy) esoterics . . . . . . (r)             |
|     2.  Change  . . . . . . . . . . . . . . (c)             |
|     3.  Delete  . . . . . . . . . . . . . . (d)             |
|     4.  Assign devices  . . . . . . . . . . (s)             |
|     5.  View assigned devices . . . . . . . (v)             |
|                                                             |
+-------------------------------------------------------------+
```

Figure 7-89 HCD: Add TS7700 and ATL EDT (Actions on selected esoterics)

9. Select option **4, Assign devices**. The Assign/Unassign Devices to Esoteric panel is displayed. See Figure 7-90 on page 160.

```
+------------------- Assign/Unassign Devices to Esoteric -------------------+
|   Goto  Filter  Backup  Query  Help                                       |
| ------------------------------------------------------------------------- |
|                                                            Row 11 of 14  |
| Command ===> ________________________________________ Scroll ===> CSR    |
|                                                                           |
| Specify Yes to assign or No to unassign.                                  |
|                                                                           |
| Configuration ID . : OSSYSXPR       OSconfig SYSAB sysplex Primary        |
| EDT.Esoteric . . . : 00.TAPE        VIO eligible . : No                   |
|                                                                           |
|                             Generic              Starting  Number of     |
| Devices       Device Type    Name      Assigned  Number    Devices       |
| B000,48       3490           3490      Yes       ____      ____          |
| B100,48       3490           3490      Yes       ____      ____          |
| B800,16       3590           3590-1    Yes       ____      ____          |
| D000,100      3390B          3390      No        ____      ____          |
| D100,100      3390B          3390      No        ____      ____          |
| E000,100      3390B          3390      No        ____      ____          |
| E100,100      3390B          3390      No        ____      ____          |
| ************************** Bottom of data *************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-90 HCD: Add TS7700 and ATL EDT (Assign/Unassign Devices to Esoteric)

10. Specify `Yes` in the Assigned column in order to select devices for esoteric name in question. If you need a subset for example device B010,16, specify `Yes` in the Assigned column for device B000,48, B010 in Starting Number and 16 in Number of Devices columns.

    In this example, we specify `Yes` to include all 3490 (TS7700) and 3590-1 (ATL) devices in the Esoteric name on TAPE.

    The list of devices on the panel includes all devices that are connected to the operating system configurations selected.

11. Use the F3 key to exit the panel.

Table 7-22 on page 161 lists the esoterics that are added.

Table 7-22 Esoterics that are added

Esoteric	Devices included	OSconfig	Tape subsystem
TAPE	B000,48+B100,48+B800,16	OSSYSXPR+SE	ATL and TS7700 CL0+CL1
TAPE	B030,16+B130,16+B800,16	OSSYS1PR+SE	ATL and TS7700 CL0+CL1
ATLPK01	B800,16	OSSYSXPR+SE	ATL
ATLPK01	B800,16	OSSYS1PR+SE	ATL
VTSPK00	B000,48+B100,48	OSSYSXPR+SE	TS7700 CL0+CL1
VTSPK00	B030,16+B100,16	OSSYS1PR+SE	TS7700 CL0+CL1
VTSPK01	B000,48	OSSYSXPR+SE	TS7700 CL0
VTSPK01	B000,16	OSSYS1PR+SE	TS7700 CL0
VTSPK02	B100,48	OSSYSXPR+SE	TS7700 CL1
VTSPK02	B100,16	OSSYS1PR+SE	TS7700 CL1

7.10 Defining OSC consoles

In this section, we define the OSC console control units and devices.

Before you begin, decide how many devices are needed for consoles. Consider using a standard naming convention for console device addresses.

In this example, our configuration includes a production sysplex with one OS system on each processor, a monoplex OS system on one processor, and a z/VM Linux system on the other. We use unique console device numbers.

We define devices to the operating system configurations. Esoterics are not relevant to console devices, but we must specify devices in the Operating System Configuration NIP Console list.

7.10.1 Defining OSC console control units

To define OSC console control units, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit. See Figure 7-91 on page 162.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Control unit number  . . . . F000  +                                  |
| Control unit type  . . . . . OSC__________   +                        |
|                                                                       |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . ________________________________         |
|                                                                       |
| Connected to switches  . . . __ __ __ __ __ __ __ __  +               |
| Ports  . . . . . . . . . . . __ __ __ __ __ __ __ __  +               |
|                                                                       |
| If connected to a switch:                                             |
|                                                                       |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-91 HCD: Add OSC Control Unit

3. Specify the Control unit number and the Control unit type.

   We define a single control unit for each processor including two times 16 devices for the SYSA and SYSB sysplex (16 devices for each processor), 16 devices for the SYS1 monoplex, and 16 devices for the z/VM Linux system.

4. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-92.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : F010     Control unit type . . . : OSC

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  1A_____ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  1A_____ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-92 HCD: Add OSC Control Unit (CHPIDs)

5. Specify the Channel Path ID to be connected to the OSC control unit. The Channel Path ID must be of type OSC.

   In this example, the OSC CHPID is spanned, therefore it is specified for both LCSS 0 and LCSS 1. No Link Address is specified for OSC CHPIDs. An alternative is one control unit for all OSC consoles on separate processors.

6. Scroll one page to the right to specify Unit Address and Unit Range for the control unit. See Figure 7-93.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : F010     Control unit type . . . : OSC

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      __   00.254 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   00.254 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-93 HCD: Add OSC Control Unit (CUADD and Unit Addresses)

7. Specify the Unit Address and Unit Range. You cannot specify CUADD because it is not supported for OSC control units.

   In this example, the starting Unit Address is 00 and the Unit Range is 254. These are the only supported values for OSC control units.

8. Scroll to the right to specify the I/O Concurrency level. See Figure 7-94.

```
Select Processor / CU    Row 1 of 11 More: <
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : F010     Control unit type . . . : OSC

                            I/O Concurrency
/ Proc.CSSID Att Protocol + Level +
_ CPCPKR1.0      __         2
_ CPCPKR1.1      __         2
_ CPCPKR1.2      __         _
_ CPCPKR1.3      __         _
_ CPCPKR2.0      __         _
_ CPCPKR2.1      __         _
```

Figure 7-94 HCD: Add OSC Control Unit (Concurrency Level)

9. Specify the I/O Concurrency Level of 2.
10. Press Enter. The Control unit will be attached to the processors/LCSSs. The value of Yes is indicated in the Att (Attached) column.

Table 7-23 lists the OSC console control that units are added.

Table 7-23 OSC console control that units are added

CU	Processor	CUADD	Description
F000	CPCPKR1	None	Cons F000,0032 PKR1
F100	CPCPKR2	None	Cons F100,0032 PKR2

7.10.2 Defining OSC console devices

To define OSC console devices, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Select the first OSC control unit to display the I/O Device list panel.
3. Press F11 to add devices. See Figure 7-95.

```
+-------------------------------- Add Device ---------------------------------+
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Device number  . . . . . . . . F000  + (0000 - FFFF)                        |
| Number of devices  . . . . . . 16__                                         |
| Device type  . . . . . . . . . 3270-X_______  +                             |
|                                                                             |
| Serial number  . . . . . . . . __________                                   |
| Description  . . . . . . . . . ________________________________             |
|                                                                             |
| Volume serial number . . . . . ______  (for DASD)                           |
|                                                                             |
| Connected to CUs . . F000  ____  ____  ____  ____  ____  ____  ____  +      |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-95 HCD: Add OSC Devices

4. Specify information in these fields: Device number, Number of devices, and Device type.

   Consider using a numbering scheme for devices. In this example, the first device number matches the control unit number.

   We add 32 devices starting with device F000, and the device type is 3270-x for consoles. We do not need to specify the Connected to CU because this is the control unit we just selected on the Control Unit List panel.
5. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-96 on page 165.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                               Row 1 of 1 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                           |
| Select processors to change device/processor definitions, then press     |
| Enter.                                                                    |
|                                                                           |
| Device number  . . : F010       Number of devices  . : 32                 |
| Device type  . . . : 3270-X                                               |
|                                                                           |
|                                                Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null  |
| _ CPCPKR1.0   _    00   No        No      __         No             ___   |
| _ CPCPKR1.1   _    00   No        No      __         No             ___   |
| **************************** Bottom of data **************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-96 HCD: Add OSC Devices (Device / Processor Definition)

6. Specify the starting UA for the devices to be added. This is the unit address specified when adding the control unit.
7. Press Enter. Although the devices are defined, they are not yet connected to the operating system configurations, therefore, the Define Device to Operating System Configuration panel is displayed. See Figure 7-97.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                          Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR   |
|                                                                      |
| Select OSs to connect or disconnect devices, then press Enter.       |
|                                                                      |
| Device number  . : F010          Number of devices  : 32             |
| Device type  . . : 3270-X                                            |
|                                                                      |
| / Config. ID   Type     SS Description                     Defined   |
| _ OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary            |
| _ OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary          |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary            |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary          |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary               |
| ************************** Bottom of data *************************** |
|                                                                      |
+----------------------------------------------------------------------+
```

Figure 7-97 HCD: Add OSC Devices (Define Device to OS Configuration)

We defined a total of 32 devices. 16 devices are to be used for the SYSA system and 16 devices are to be used for the SYS1 system both on the CPCPKR1 processor. Because we do not want all 32 devices to be defined in the operating system configurations, we do not select any, but press Enter.

8. The I/O Device list panel is displayed for the OSC control unit, therefore only F000,32 is in the list. Select the devices by using the **S** line-command to view a list of single devices. The I/O Device List panel is again displayed. See Figure 7-98.

```
I/O Device List         Row 1 of 32 More:
Command ===> ___________________________________________ Scroll ===> CSR

Select one or more devices, then press Enter. To add, use F11.

Control unit number  : F000     Control unit type  . : OSC

  ----------Device------ --#--- --------Control Unit Numbers + --------
/ Number   Type +        CSS OS 1--- 2--- 3--- 4--- 5--- 6--- 7--- 8---
( F000     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F001     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F002     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F003     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F004     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F005     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F006     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F007     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F008     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F009     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F00A     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F00B     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F00C     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F00D     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
_ F00E     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
) F00F     3270-X        2      F000 ____ ____ ____ ____ ____ ____ ____
```

Figure 7-98 HCD: Add OSC Devices (I/O Device List)

9. Select the first 16 devices by using the opening and closing parentheses group line-commands:

   ( )

10. After grouping the devices by using the opening and closing parentheses, press Enter. A selection panel is displayed. Select option **4, OS Group Change**. The Define Device to Operating System Configuration panel is displayed.

    In this example the OS column is empty, because the devices have not yet been defined to any operating system configurations.

11. Now we can add the 16 selected devices to the operating system configurations. Select the OSSYSPR and OSSYSSE operating system configurations by using the **S** line-command. The Define Device Parameters / Features panel is displayed. See Figure 7-99 on page 167.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                Row 1 of 22 |
| Command ===> ___________________________________________ Scroll ===> CSR   |
|                                                                            |
| Specify or revise the values below.                                        |
|                                                                            |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary           |
| Device number  . . : F000         Number of devices  : 16                  |
| Device type  . . . : 3270-X                                                |
|                                                                            |
| Parameter/                                                                 |
| Feature    Value +         R Description                                   |
| OFFLINE    No                Device considered online or offline at IPL    |
| DYNAMIC    Yes               Device has been defined to be dynamic         |
| LOCANY     No                UCB can reside in 31 bit storage              |
| ASCACHAR   No                ASCII A Character Generator                   |
| ASCBCHAR   No                ASCII B Character Generator                   |
| DOCHAR     Yes               United States English Character Generator     |
| FRCHAR     No                French Character Generator                    |
| GRCHAR     No                German Character Generator                    |
| KACHAR     No                Katakana Character Generator                  |
| UKCHAR     No                United Kingdom English Character Generator    |
| AUDALRM    No                Audible Alarm                                 |
+----------------------------------------------------------------------------+
```

Figure 7-99 HCD: Add OSC Devices (Define z/OS Device Parameters / Features)

12. Specify the requested parameters in the Value column.

    In this example parameters specified are the defaults.

13. Press Enter. The Define Device Parameters / Features panel is displayed for the second operating system configuration that is specified. See Figure 7-100 on page 168.

14. Press Enter to accept the values. The Change Device Group / Operating System Configuration panel is displayed, and the Defined column has changed to Yes for the two operating system configurations that are specified.

    When defining device F120,16 to OSVMLIPR operating system configurations, the parameters differ because the operating system configurations type is VM.

```
+----------------- Define Device Group Parameters / Features -----------------+
|                                                                  Row 1 of 5 |
| Command ===> ___________________________________________ Scroll ===> CSR    |
|                                                                             |
| Specify or revise the values below.                                         |
|                                                                             |
| Configuration ID . : OSVMLIN      OSconfig for VM/Linux                     |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +          R Description                                   |
| OFFLINE    No                 Device considered online or offline at IPL    |
| UIRATE     DEFAULT            Hot I/O Recovery Rate                         |
| EMUL3270   No                 Device is TTY terminal connected to 7171      |
| E3270HLD   No                 Connection is to remain after logoff          |
| OPRDR      No                 Operator Identification Card Reader           |
| **************************** Bottom of data ******************************  |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-100 HCD: Add OSC Devices (Define z/VM Device Parameters / Features)

In this example parameters specified for z/VM are the defaults.

Table 7-24 lists the OSC Console devices that are added.

Table 7-24 OSC Console devices that are added

Device	Processor	System	Control unit
F000,16	CPCPKR1	SYSA	F000
F010,16	CPCPKR1	SYS1	F000
F100,16	CPCPKR2	SYSB	F100
F110,16	CPCPKR2	z/VM Linux	F100

After adding the OSC Console devices to the operating system configurations, we must specify the devices to be used for NIP.

7.10.3 Defining OSC Console to NIP in OS configuration

To define OSC Console to NIP in OS configuration, perform the following steps:

1. Select option **1, Operating system configurations** on the Define, Modify, or View Configuration panel. The Operating System Configuration List panel is displayed.
2. Select the operating system configurations using the forward slash (**/**) line-command, to view a list of valid options. The “Actions on selected operating systems” panel is displayed. See Figure 7-101 on page 169.

```
+----------- Actions on selected operating systems -----------+
|                                                             |
| Select by number or action code and press Enter.            |
|                                                             |
| 6_  1.  Add like  . . . . . . . . . . . . . . (a)           |
|     2.  Repeat (copy) OS configurations . . (r)             |
|     3.  Change  . . . . . . . . . . . . . . (c)             |
|     4.  Delete  . . . . . . . . . . . . . . (d)             |
|     5.  Work with EDTs  . . . . . . . . . . (s)             |
|     6.  Work with consoles  . . . . . . . . (n)             |
|     7.  Work with attached devices  . . . . (u)             |
|     8.  View generics by name . . . . . . . (g)             |
|     9.  View generics by preference value . (p)             |
|                                                             |
+-------------------------------------------------------------+
```

Figure 7-101 HCD: Define to NIP (Actions on selected operating systems)

3. Select option **6, Work with consoles**. The NIP Console List panel is displayed, and the list is empty, because no device has been selected for NIP consoles yet.
4. Press F11 to add NIP Console. See Figure 7-102.

```
+-------------- Add NIP Console ---------------+
|                                              |
| Specify the following values.                |
|                                              |
| Device number of console . . . . . . F000    |
|                                              |
| Order number . . . . . . . . . . . . 1       |
|                                              |
+----------------------------------------------+
```

Figure 7-102 HCD: Define to NIP (Add NIP Console)

5. Specify the device of the first NIP console for the operating system configurations selected. You can specify only devices that were previously added to the operating system configurations.

   The Order number field indicates the order in which the devices specified will be selected for NIP consoles. If the first device is unavailable, the device with order number 2 is indicated, and so on.

   In this example we specify the first device defined for OSC consoles and the order number of 1. If you specify any other number for the first device, the order number of 1 is used. We add two devices from each OSC control unit to the NIP Console List. In this example, two separate control units are used for the SYSA and SYSB systems, because they are located on two separate processors.

The NIP Console List now includes four devices in operating system configurations OSSYSXPR and OSSYSXSE for the SYSA and SYSB systems. See Figure 7-103 on page 170.

```
+--------------------------- NIP Console List ----------------------------+
|   Goto  Backup  Query  Help                                             |
| ----------------------------------------------------------------------  |
|                                                              Row 1 of 4 |
| Command ===> _______________________________________ Scroll ===> CSR    |
|                                                                         |
| Select one or more consoles, then press Enter. To add, use F11.         |
|                                                                         |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary        |
|                                                                         |
|   Order   Device                                                        |
| / Number  Number  Device Type                                           |
| _   1     F000    3270-X                                                |
| _   2     F001    3270-X                                                |
| _   3     F100    3270-X                                                |
| _   4     F101    3270-X                                                |
| *************************** Bottom of data **************************** |
|                                                                         |
+-------------------------------------------------------------------------+
```

Figure 7-103 HCD: Define to NIP (NIP Console List)

During IPL of the SYSA system, device F000 is selected for NIP because this is the first available device on the CPCPKR1 processor. During IPL of the SYSB system, device F100 is selected for NIP because this is the first available device on the CPCPKR2 processor (device F000 and F001 is not connected to the CPCPKR2 processor).

Table 7-25 lists the OSC Console devices that are defined for NIP.

Table 7-25 OSC Console devices that are defined for NIP

Device	**OSconfig**	**Order**
F000,2	OSSYSXPR+OSSYSXSE	1+2
F100,2	OSSYSXPR+OSSYSXSE	3+4
F010,2	OSSYS1PR+OSSYS1SE	1+2
F110,2	OSVMLIPR	1+2

7.11 Defining Network resources

In this section, we define network resources including OSA, OSN and IQD (HiperSockets). The definitions include control units and devices.

Before you begin, identity the number of devices that are required for the control units. Consult your network specialists.

In this example our configuration includes an OSA control unit for each processor, and OSN control unit for the CPCPKR1 processor and an IDQ (HiperSockets) control unit for the CPCPKR2 processor.

We define devices to the operating system configurations. Esoterics are not relevant to network devices.

7.11.1 Defining OSA control units

To define OSA control units, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit, as shown in Figure 7-104.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                        |
| Specify or revise the following values.                               |
|                                                                        |
| Control unit number  . . . . 3000  +                                  |
| Control unit type  . . . . . OSA          +                           |
|                                                                        |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . ________________________________         |
|                                                                        |
| Connected to switches  . . . __  __  __  __  __  __  __  __  +        |
| Ports  . . . . . . . . . . . __  __  __  __  __  __  __  __  +        |
|                                                                        |
| If connected to a switch:                                             |
|                                                                        |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                        |
+-----------------------------------------------------------------------+
```

Figure 7-104 HCD: Add OSA Control Unit

3. Specify the Control Unit number and the Control unit type.

   The Control unit type is OSA for both type OSD and OSE CHPIDs.

   In this example, we define a single control unit for each processor including 16 devices for each control unit.
4. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-105 on page 172.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 3000     Control unit type . . . : OSA

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  1E_____ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  1E_____ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-105 HCD: Add OSA Control Unit (CHPIDs)

5. Specify the Channel Path ID to be connected to the OSA control unit. The Channel Path ID must be of type OSD or OSE.

   In this example, the OSD CHPID is spanned, therefore it is specified for both LCSS 0 and LCSS 1. No Link Address is specified for OSD CHPIDs.

6. Scroll one page to the right to specify Unit Address and Unit Range for the control unit. See Figure 7-106.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 3000     Control unit type . . . : OSA

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      __   00.255 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   00.255 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-106 HCD: Add OSA Control Unit (Unit Addresses)

7. Specify CUADD number, Unit Address and Unit Range. CUADD number is valid for OSD CHPIDs only.

   In his example the CUADD number is not specified (but can be because the CHPID used is type OSD). The starting Unit Address is 00 and the Unit Range is 255. These are the only supported values for OSA control units.

8. Scroll to the right to specify the I/O Concurrency level of 2.
9. Press Enter. The control unit will be attached to the processors/LCSSs. The value of Yes is indicated in the Att (Attached) column.

Table 7-26 lists the OSA control units that are added.

Table 7-26 OSA control units that are added

CU	Processor	CUADD	Description
3000	CPCPKR1	None	OSA 3000,0016 GBE PKR1
3100	CPCPKR2	None	OSA 3000,0016 GBE PKR2

7.11.2 Defining OSA devices

To define OSA devices, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Select the first OSA control unit to open the I/O Device list panel.

   An OSA control unit is connected to two separate device types. First we create a number of OSA devices and then a single OSAD device.
3. Press F11 to add devices, as shown in Figure 7-107.

```
+------------------------------- Add Device ---------------------------------+
|                                                                            |
| Specify or revise the following values.                                    |
|                                                                            |
| Device number  . . . . . . . . 3000  + (0000 - FFFF)                       |
| Number of devices  . . . . . . 15__                                        |
| Device type  . . . . . . . . . OSA__________   +                           |
|                                                                            |
| Serial number  . . . . . . . . __________                                  |
| Description  . . . . . . . . . ________________________________            |
|                                                                            |
| Volume serial number . . . . . ______  (for DASD)                          |
|                                                                            |
| Connected to CUs . . 3000  ____  ____  ____  ____  ____  ____  ____  +     |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-107 HCD: Add OSA Devices

4. Specify information in these fields: Device number, Number of devices, and Device type.

   Consider using a numbering scheme for devices. In this example, the first device number matches the control unit number.

   We add 15 devices starting with device 3000, and the device type is OSA. We do not have to specify the Connected to CU because this is the control unit we just selected on the Control Unit List panel.
5. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-108 on page 174.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                Row 1 of 2 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                           |
| Select processors to change device/processor definitions, then press      |
| Enter.                                                                    |
|                                                                           |
| Device number  . . : 3000       Number of devices  . : 15                 |
| Device type  . . . : OSA                                                  |
|                                                                           |
|                                         Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null |
| _ CPCPKR1.0   _    00   No        No      __         No             ___  |
| _ CPCPKR1.1   _    00   No        No      __         No             ___  |
| ***************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-108 HCD: Add OSA Devices (Device / Processor Definition)

6. Specify the starting UA for the devices to be added. This is the unit address specified when adding the control unit.
7. Press Enter. Although the devices are defined, they are not yet connected to the operating system configurations, therefore now the **Define Device to Operating System Configuration** panel is displayed. See Figure 7-109.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                           Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR   |
|                                                                      |
| Select OSs to connect or disconnect devices, then press Enter.       |
|                                                                      |
| Device number  . : 3000          Number of devices  : 15             |
| Device type  . . : OSA                                               |
|                                                                      |
| / Config. ID   Type     SS Description                      Defined |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary           |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary         |
| S OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary           |
| S OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary         |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary              |
| ************************** Bottom of data *************************** |
|                                                                      |
+----------------------------------------------------------------------+
```

Figure 7-109 HCD: Add OSA Devices (Define Device to OS Configuration)

8. Use the **S** line-command to select the operating system configurations that are to include the devices added.

   In this example, we add devices for both the sysplex and the monoplex, but not the z/VM Linux system, because this is located on the other processor (not connected to the control unit).

9. Press Enter. The Define Device Parameters / Features panel is displayed. See Figure 7-110.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                               Row 1 of 3 |
| Command ===> ___________________________________________ Scroll ===> CSR   |
|                                                                             |
| Specify or revise the values below.                                         |
|                                                                             |
| Configuration ID . : OSSYSXPR     OSconfig for SYSA & SYSB sysplex          |
| Device number  . . : 3000         Number of devices  : 15                   |
| Device type  . . . : OSA                                                    |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +         R Description                                    |
| OFFLINE    No                Device considered online or offline at IPL    |
| DYNAMIC    Yes               Device has been defined to be dynamic         |
| LOCANY     Yes               UCB can reside in 31 bit storage              |
| **************************** Bottom of data ***************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-110 HCD: Add OSA Devices (Define Device Parameters / Features)

10. Specify the requested parameters in the Value column.

    In this example, the LOCANY parameter has been updated from the default value of No to Yes, enabling the UCBs to reside in 31 bit storage.

11. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.

12. Esoterics are not relevant for OSA devices, therefore press Enter again. The Define Device Parameters / Features panel is displayed for the second operating system configuration specified, because several operating system configurations were selected.

13. Now, the OSA devices have been defined, we define the single OSAD device. Press F11 to open the Add Device panel. See Figure 7-111.

```
+-------------------------------- Add Device ---------------------------------+
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Device number  . . . . . . . . 300F  + (0000 - FFFF)                        |
| Number of devices  . . . . . . 1___                                         |
| Device type  . . . . . . . . . OSAD_________   +                            |
|                                                                             |
| Serial number  . . . . . . . . __________                                   |
| Description  . . . . . . . . . ________________________________             |
|                                                                             |
| Volume serial number . . . . . ______  (for DASD)                           |
|                                                                             |
| Connected to CUs . . 3000  ____  ____  ____  ____  ____  ____  ____  +      |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-111 HCD: Add OSAD Device for OSD

14. Specify the Device number, the Number of devices and the Device type.

The device number that is specified is the last device number specified for the control unit. The number of devices must be 1 and the device type must be OSAD.

In this example, our control unit includes 16 devices starting at device 3000, therefore the last device for the control unit is 300F. Again, we do not have to specify the Connected to CU because this is the control unit we just selected on the Control Unit List panel.

The OSAD device is used for managing the OSA with the OSASF task. The OSAD device is optional for CHPID type OSD. If the CHPID used had been a type OSE CHPID, the OSAD device would have been required.

15. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-112.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                 Row 1 of 2 |
| Command ===> ___________________________________________ Scroll ===> CSR   |
|                                                                            |
| Select processors to change device/processor definitions, then press       |
| Enter.                                                                     |
|                                                                            |
| Device number  . . : 300F      Number of devices  . : 1                    |
| Device type  . . . : OSAD                                                  |
|                                                                            |
|                                          Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null  |
| _ CPCPKR1.0   _    FE   No        No      __         No             ___   |
| _ CPCPKR1.1   _    FE   No        No      __         No             ___   |
| ***************************** Bottom of data ***************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-112 HCD: Add OSAD Device for OSD (Device / Processor Definition)

16. Specify the UA for the device to be added. The unit address for an OSAD device must be FE.

When we defined the control unit, the unit range was specified as 255, corresponding to the hexadecimal value of FE.

17. Press Enter. Although the device is defined, it is not yet connected to the operating system configurations, therefore the Define Device to Operating System Configuration panel is displayed. See Figure 7-113 on page 177.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                            Row 1 of 5 |
| Command ===> ____________________________________ Scroll ===> CSR     |
|                                                                       |
| Select OSs to connect or disconnect devices, then press Enter.        |
|                                                                       |
| Device number  . : 300F          Number of devices  : 1               |
| Device type  . . : OSAD                                               |
|                                                                       |
| / Config. ID   Type     SS Description                      Defined   |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary             |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary           |
| S OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary             |
| S OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary           |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary                |
| ************************** Bottom of data *************************** |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-113 HCD: Add OSAD Device for OSD (Define Device Parameters / Features)

18. Use the **S** line-command to select the operating system configurations that are to include the device added. This must be the same operating system configurations as selected for the OSA devices.

    In this example, we add a device for both the sysplex and the monoplex, but not the z/VM Linux system, because this is located on the other processor (not connected to the control unit).

19. Press Enter. The Define Device Parameters / Features panel is displayed. See Figure 7-114.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                  Row 1 of 3 |
| Command ===> ___________________________________________ Scroll ===> CSR     |
|                                                                             |
| Specify or revise the values below.                                         |
|                                                                             |
| Configuration ID . : OSSYSXPR     OSconfig for SYSA & SYSB sysplex          |
| Device number  . . : 300F         Number of devices  : 1                    |
| Device type  . . . : OSAD                                                   |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +         R Description                                    |
| OFFLINE    No                Device considered online or offline at IPL     |
| DYNAMIC    Yes               Device has been defined to be dynamic          |
| LOCANY     Yes               UCB can reside in 31 bit storage               |
| ***************************** Bottom of data ****************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-114 HCD: Add OSAD Device for OSD (Define Device Parameters / Features)

20. Specify the requested parameters in the Value column.

In this example the LOCANY parameter has been updated from the default value of No to Yes, enabling the UCBs to reside in 31 bit storage.

21. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.
22. Esoterics are not relevant for OSAD devices, therefore press Enter again. The Define Device Parameters / Features panel is displayed for the second operating system configuration specified, because several operating system configurations were selected.

Now the OSA devices has been defined, including the single OSAD device.

Table 7-27 lists the OSA devices that are added.

Table 7-27 OSA devices that are added

Device	Type	CU	UA	OSconfigs
3000,15	OSA	3000	00	OSSYSXPR+SE, OSSYS1PR+SE
300F,1	OSAD	3000	FE	OSSYSXPR+SE, OSSYS1PR+SE
3100,15	OSA	3100	00	OSSYSXPR+SE, OSSYS1PR+SE
310F,1	OSAD	3100	FE	OSSYSXPR+SE, OSSYS1PR+SE

7.11.3 Defining OSN control units

To define OSN control units, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit. See Figure 7-115.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                        |
| Specify or revise the following values.                                |
|                                                                        |
| Control unit number  . . . . 3800  +                                   |
| Control unit type  . . . . . OSN__________  +                          |
|                                                                        |
| Serial number  . . . . . . . __________                                |
| Description  . . . . . . . . ________________________________          |
|                                                                        |
| Connected to switches  . . . __ __ __ __ __ __ __ __  +                |
| Ports  . . . . . . . . . . . __ __ __ __ __ __ __ __  +                |
|                                                                        |
| If connected to a switch:                                              |
|                                                                        |
| Define more than eight ports . . 2   1.  Yes                           |
|                                      2.  No                            |
| Propose CHPID/link addresses and                                       |
| unit addresses . . . . . . . . . 2   1.  Yes                           |
|                                      2.  No                            |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-115 HCD: Add OSN Control Unit

3. Specify the Control Unit number and the Control unit type.

   The OSN control unit is used for communication with external network using SNA protocols, a functionality earlier provided by the 374x control units connected using Escon.

   In this example, we define a single control unit for the CPCPKR2 processor including 16 devices.

4. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-116.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 3800     Control unit type . . . : OSN

              ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  16_____ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-116 HCD: Add OSN Control Unit (CHPIDs)

5. Specify the Channel Path ID to be connected to the OSN control unit. The Channel Path ID must be of type OSN.

   In this example, the OSN CHPID operation mode is SHR, however only defined to the partition for the SYSA system. Because the operation mode is SHR and not DED, more partitions can be added to the access list dynamically. No Link Address is specified for OSN CHPIDs.

6. Scroll one page to the right to specify Unit Address and Unit Range for the control unit, as shown in Figure 7-117 on page 180.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 3800     Control unit type . . . : OSN

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      __   00.255 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-117 HCD: Add OSN Control Unit (Unit Addresses)

7. Specify Unit Address and Unit Range. CUADD number is not valid for OSN CHPIDs.

   In this example, the starting Unit Address is 00 and the Unit Range is 255. These are the only supported values for OSN control units.

8. Scroll to the right to specify the I/O Concurrency level of 2.

9. Press Enter. The control unit is attached to the processors/LCSSs. The value of Yes is indicated in the Att (Attached) column.

Table 7-28 lists the OSA control unit that is added.

Table 7-28 OSA control unit that is added

CU	Processor	CUADD	Description
3800	CPCPKR1	None	NETW 3800,0016 3366 PKR102

7.11.4 Defining OSN devices

To define OSN devices, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.

2. Select the first OSA control unit. The I/O Device list panel is displayed.

   The OSN Control unit supports device types OSN, 3745 and OSAD. However device type 3745 is not included in this example. First we will define a number of OSN devices and then a single OSAD device. Now, press F11 to add devices, as shown in Figure 7-118 on page 181.

```
+-------------------------------- Add Device ---------------------------------+
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Device number  . . . . . . . . 3800  + (0000 - FFFF)                        |
| Number of devices  . . . . . . 15                                           |
| Device type  . . . . . . . . . OSN          +                               |
|                                                                             |
| Serial number  . . . . . . . . __________                                   |
| Description  . . . . . . . . . ________________________________             |
|                                                                             |
| Volume serial number . . . . . ______  (for DASD)                           |
|                                                                             |
| Connected to CUs . . 3800  ____  ____  ____  ____  ____  ____  ____  +      |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-118   HCD: Add OSN Devices

3. Specify the Device number, the Number of devices, and the Device type.

   Consider using a numbering scheme for devices. In this example, the first device number matches the control unit number.

   We add 15 devices starting with device 3800, and the device type is OSN. We do not have to specify information in the Connected to CU field because this is the control unit we just selected on the Control Unit List panel. See Figure 7-119.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                 Row 1 of 1 |
| Command ===> __________________________________________ Scroll ===> CSR    |
|                                                                            |
| Select processors to change device/processor definitions, then press       |
| Enter.                                                                     |
|                                                                            |
| Device number  . . : 3800      Number of devices  . : 15                   |
| Device type  . . . : OSN                                                   |
|                                                                            |
|                                          Preferred  Device Candidate List  |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null   |
| _ CPCPKR1.0   _    00   No        No      __         No             ___    |
| **************************** Bottom of data ****************************   |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-119   HCD: Add OSN Devices (Device / Processor Definition)

4. Specify the starting UA for the devices to be added. This value is the unit address specified when adding the control unit.

5. Press Enter. Although the devices are defined, they are not yet connected to the operating system configurations, therefore the Define Device to Operating System Configuration panel is displayed. See Figure 7-120 on page 182.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                          Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR   |
|                                                                      |
| Select OSs to connect or disconnect devices, then press Enter.       |
|                                                                      |
| Device number  . : 3000          Number of devices  : 15             |
| Device type  . . : OSA                                               |
|                                                                      |
| / Config. ID   Type     SS Description                     Defined   |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary            |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary          |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary            |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary          |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary               |
| ************************** Bottom of data ************************** |
|                                                                      |
+----------------------------------------------------------------------+
```

Figure 7-120 HCD: Add OSN Devices (Define Device to OS Configuration)

6. Use the **S** line-command to select the operating system configurations that are to include the devices added.

   In this example, we add devices for the SYSA and SYSB sysplex systems only, because the SYS1 monoplex cannot access the CHPID.

7. Press Enter. The Define Device Parameters / Features panel is displayed. See Figure 7-121.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                Row 1 of 3 |
| Command ===> __________________________________________ Scroll ===> CSR    |
|                                                                            |
| Specify or revise the values below.                                        |
|                                                                            |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary           |
| Device number  . . : 3800         Number of devices  : 15                  |
| Device type  . . . : OSN                                                   |
|                                                                            |
| Parameter/                                                                 |
| Feature    Value +          R Description                                  |
| OFFLINE    No                 Device considered online or offline at IPL  |
| DYNAMIC    Yes                Device has been defined to be dynamic       |
| LOCANY     Yes                UCB can reside in 31 bit storage            |
| ***************************** Bottom of data ****************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-121 HCD: Add OSN Devices (Define Device Parameters / Features)

8. Specify the requested parameters in the Value column.

   The OFFLINE parameter has been updated from the default value of Yes to No. The DYNAMIC parameter is Yes, enabling the UCBs to reside in 31 bit storage.

9. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.
10. Esoterics are not relevant for OSA devices, therefore press Enter again. The Define Device Parameters / Features panel for the second operating system configuration specified is displayed, because several operating system configurations were selected.
11. Now, the OSN devices have been defined and we can define the single OSAD device. Press F11 to open the Add Device panel. See Figure 7-122.

```
+------------------------------- Add Device --------------------------------+
|                                                                            |
| Specify or revise the following values.                                    |
|                                                                            |
| Device number  . . . . . . . . 380F  + (0000 - FFFF)                       |
| Number of devices  . . . . . . 1                                           |
| Device type  . . . . . . . . . OSAD         +                              |
|                                                                            |
| Serial number  . . . . . . . . __________                                  |
| Description  . . . . . . . . . ________________________________            |
|                                                                            |
| Volume serial number . . . . . ______  (for DASD)                          |
|                                                                            |
| Connected to CUs . . 3800  ____  ____  ____  ____  ____  ____  ____  +     |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-122 HCD: Add OSAD Device for OSN

12. Specify the Device number, the Number of devices, and the Device type.

    The device number we specify is the last device number specified for the control unit. The number of devices must be 1 and the device type must be OSAD.

    In this example, our control unit includes 16 devices starting at device 3800, therefore the last device for the control unit is 380F. Again, we do not have to specify the Connected to CU because this is the control unit we just selected on the Control Unit List panel.

    The OSAD device is used for managing the OSA using the OSASF task. The OSAD device is optional for the CHPID type OSN.
13. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-123 on page 184.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                Row 1 of 1 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                            |
| Select processors to change device/processor definitions, then press      |
| Enter.                                                                     |
|                                                                            |
| Device number  . . : 380F       Number of devices  . : 1                  |
| Device type  . . . : OSAD                                                  |
|                                                                            |
|                                         Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null |
| _ CPCPKR1.0   _    FE   No        No      __         No             ___  |
| ***************************** Bottom of data **************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-123 HCD: Add OSAD Device for OSN (Device / Processor Definition)

14. Specify the UA for the device that is being added. The unit address for an OSAD device must be FE.

    When we defined the control unit, the Unit range field was specified as 255, corresponding to the hexadecimal value of FE.

15. Press Enter. Although the device is defined, it is not yet connected to the operating system configurations, therefore the Define Device to Operating System Configuration panel is displayed. See Figure 7-124.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                            Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR    |
|                                                                        |
| Select OSs to connect or disconnect devices, then press Enter.        |
|                                                                        |
| Device number  . : 380F          Number of devices  : 1               |
| Device type  . . : OSAD                                                |
|                                                                        |
| / Config. ID   Type     SS Description                      Defined   |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary              |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary            |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary              |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary            |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary                 |
| ************************** Bottom of data *************************** |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-124 HCD: Add OSAD Device for OSN (Define Device to OS Configuration)

16. Use the **S** line-command to select the operating system configurations that are to include the devices added.

    We add devices for the SYSA and SYSB sysplex systems only, because the SYS1 monoplex cannot access the CHPID.

17. Press Enter. The Define Device Parameters / Features panel is displayed. See Figure 7-125.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                  Row 1 of 3 |
| Command ===> ___________________________________________ Scroll ===> CSR     |
|                                                                             |
| Specify or revise the values below.                                         |
|                                                                             |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary            |
| Device number  . . : 380F         Number of devices  : 1                    |
| Device type  . . . : OSAD                                                   |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +          R Description                                  |
| OFFLINE    No                 Device considered online or offline at IPL   |
| DYNAMIC    Yes                Device has been defined to be dynamic        |
| LOCANY     Yes                UCB can reside in 31 bit storage             |
| **************************** Bottom of data ***************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-125 HCD: Define OSAD Device for OSN (Define Parameters / Features)

18. Specify the requested parameters in the Value column.

    The LOCANY parameter has been updated from the default value of No to Yes, enabling the UCBs to reside in 31 bit storage.

19. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.

20. Esoterics are not relevant for OSAD devices, therefore press Enter again. The Define Device Parameters / Features panel for the second operating system configuration specified is displayed, because several operating system configurations were selected.

Now, the OSN devices are defined, including the single OSAD device.

Table 7-29 lists the OSN and OSAD devices that are added.

Table 7-29 OSN and OSAD devices that are added

Device	Type	CU	UA	OSconfigs
3800,15	OSN	3800	00	OSSYSXPR+SE
380F,1	OSAD	3800	FE	OSSYSXPR+SE

7.11.5 Defining IQD control units

To define IQD control units, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.

2. Press F11 to add a control unit, as shown in Figure 7-126 on page 186.

   The control unit type of IQD is for HiperSockets (networking on a singe processor) and in our example, is used for communication between z/OS SYSB and VM/Linux.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                        |
| Specify or revise the following values.                                |
|                                                                        |
| Control unit number  . . . . 3C00  +                                   |
| Control unit type  . . . . . IQD__________   +                         |
|                                                                        |
| Serial number  . . . . . . . __________                                |
| Description  . . . . . . . . ________________________________          |
|                                                                        |
| Connected to switches  . . . __ __ __ __ __ __ __ __  +                |
| Ports  . . . . . . . . . . . __ __ __ __ __ __ __ __  +                |
|                                                                        |
| If connected to a switch:                                              |
|                                                                        |
| Define more than eight ports . . 2   1.  Yes                           |
|                                      2.  No                            |
| Propose CHPID/link addresses and                                       |
| unit addresses . . . . . . . . . 2   1.  Yes                           |
|                                      2.  No                            |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-126 HCD: Add IQD Control Unit

3. Specify the Control unit number and the Control unit type.

   The IQD control unit is used for communication between z/OS partitions and Linux on System z partitions.

   In this example, we define a single control unit for the CPCPKR2 processor for communication between the SYSB system and the z/VM Linux system including 128 devices.

4. Press Enter. The Select Processor / CU panel is displayed. See Figure 7-127.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 3C00     Control unit type . . . : IQD

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  F0_____ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  F0_____ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-127 HCD: Add IQD Control Unit (CHPIDs)

5. Specify the Channel Path ID to be connected to the IQD control unit. The Channel Path ID must be of type IQD.

   In this example, the IQD CHPID is spanned, therefore it is specified for both LCSS 0 and LCSS 1. No Link Address is specified for IQD CHPIDs.

6. Scroll one page to the right to specify Unit Address and Unit Range for the control unit. See Figure 7-128.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 3C00     Control unit type . . . : IQD

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      __   00.256 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   00.256 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-128 HCD: Add IQD Control Unit (Unit Addresses)

7. Specify CUADD number, Unit Address and Unit Range.

   In his example, the CUADD number is not specified (but can be because the CHPID used is type IQD). The starting Unit Address is 00 and the Unit Range is 256. These are the only supported values for IQD control units.

8. Scroll to the right to specify the I/O Concurrency level of 2.

9. Press Enter. The control unit will be attached to the processors/LCSSs. The value of Yes is indicated in the Att (Attached) column.

Table 7-30 lists the OSA control unit that is added.

Table 7-30 OSA control unit that is added

CU	Processor	CUADD	Description
3C00	CPCPKR2	None	NETW 3C00,0128 NONE R2-ALL

7.11.6 Defining IQD devices

To define IQD devices, perform the following steps:

1. Select option **5, I/O Devices** on the Define, Modify, or View Configuration panel. The I/O Device List panel is displayed.

2. Press F11 to add a devices. See Figure 7-129 on page 188.

```
+------------------------------- Add Device ---------------------------------+
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Device number  . . . . . . . . 3C00  + (0000 - FFFF)                        |
| Number of devices  . . . . . . 128_                                         |
| Device type  . . . . . . . . . IQD_________   +                             |
|                                                                             |
| Serial number  . . . . . . . . __________                                   |
| Description  . . . . . . . . . ________________________________             |
|                                                                             |
| Volume serial number . . . . . ______  (for DASD)                           |
|                                                                             |
| Connected to CUs . . 3C00  ____  ____  ____  ____  ____  ____  ____  +      |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-129   HCD: Add IQD Devices

3. Specify the Device number, the Number of devices and the Device type.

   Consider using a numbering scheme for devices. In this example, the first device number matches the control unit number.

   We add 128 devices starting with device 3C00, and the device type must be IQD. The maximum number of devices that are supported for a IQD control unit is 256. We specify the Connected to CUs because these devices are added in the I/O Device List panel. See Figure 7-130.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                  Row 1 of 2 |
| Command ===> __________________________________________ Scroll ===> CSR    |
|                                                                             |
| Select processors to change device/processor definitions, then press       |
| Enter.                                                                      |
|                                                                             |
| Device number  . . : 3C00      Number of devices  . : 128                  |
| Device type  . . . : IQD                                                    |
|                                                                             |
|                                            Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null   |
| _ CPCPKR2.0   _    00   No        No      __         No             ___    |
| _ CPCPKR2.1   _    00   No        No      __         No             ___    |
| ***************************** Bottom of data ***************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-130   HCD: Add IQD Devices (Device / Processor Definition)

4. Specify the starting UA for the devices to be added. This is the unit address specified when adding the control unit.

   In this example, the UA is 00; both LCSS 0 and LCSS 1 are listed, because the CHPID operation mode is SPAN.

5. Press Enter. Although the devices are defined, they are not yet connected to the operating system configurations, therefore the Define Device to Operating System Configuration panel is displayed. See Figure 7-131.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                           Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR   |
|                                                                      |
| Select OSs to connect or disconnect devices, then press Enter.       |
|                                                                      |
| Device number  . : 3C00          Number of devices  : 128            |
| Device type  . . : IQD                                               |
|                                                                      |
| / Config. ID   Type     SS Description                      Defined  |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary            |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary          |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary            |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary          |
| S OSVMLIPR     VM          OSconfig z/VM Linux Primary               |
| ************************** Bottom of data *************************** |
|                                                                      |
+----------------------------------------------------------------------+
```

Figure 7-131 HCD: Add IQD Devices (Define Device to OS Configuration)

6. Use the **S** line-command to select the operating system configurations that are to include the devices added.

   We add devices for the SYSA and SYSB sysplex systems and the z/VM Linux system only. The SYS1 monoplex system cannot access the CHPID because it is located on another processor.

7. Press Enter. The Define Device Parameters / Features panel is displayed. See Figure 7-132.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                 Row 1 of 3 |
| Command ===> ___________________________________________ Scroll ===> CSR   |
|                                                                            |
| Specify or revise the values below.                                        |
|                                                                            |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary           |
| Device number  . . : 3C00         Number of devices  : 128                 |
| Device type  . . . : IQD                                                   |
|                                                                            |
| Parameter/                                                                 |
| Feature    Value +         R Description                                   |
| OFFLINE    No                Device considered online or offline at IPL    |
| DYNAMIC    Yes               Device has been defined to be dynamic         |
| LOCANY     Yes               UCB can reside in 31 bit storage              |
| ***************************** Bottom of data ****************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-132 HCD: Add IQD Devices (Define z/OS Device Parameters / Features)

8. Specify the requested parameters in the Value column.

   In this example the all parameters are the defaults.

9. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.

10. Esoterics are not relevant for IQD devices, therefore press Enter again. The Define Device Parameters / Features panel for the second operating system configuration specified is displayed, because several operating system configurations was selected. See Figure 7-133,

    When defining device 3C00,128 to OSVMLIPR operating system configurations, the parameters differ because the operating system configurations type is VM.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                  Row 1 of 2 |
| Command ===> _________________________________________ Scroll ===> CSR      |
|                                                                             |
| Specify or revise the values below.                                         |
|                                                                             |
| Configuration ID . : OSVMLIN      OSconfig for VM/Linux                     |
| Device number  . . : 3C00         Number of devices  : 128                  |
| Device type  . . . : IQD                                                    |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +          R Description                                   |
| OFFLINE    No                 Device considered online or offline at IPL    |
| UIRATE     DEFAULT            Hot I/O Recovery Rate                         |
| **************************** Bottom of data ******************************* |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-133 HCD: Add IQD Devices (Define z/VM Device Parameters / Features)

11. Specify the requested parameters in the Value column.

    In this example all the parameters are the defaults.

Now, the IQD devices has been defined.

Table 7-31 lists the IQD device that is added.

Table 7-31 IQD device that is added

Device	Type	CU	UA	OSconfigs
3C00,128	IQD	NONE	00	OSSYSXPR+SE and OSVPLIPR

7.12 Defining FCTC connections

In this section, we define FICON channel-to-channel (FCTC) connections between the SYSA system and SYS1 system, both on the CPCPKR1 processor. We also define FCTC connections between the SYSA system on the CPCPKR1 processor and the SYSB system on the CPCPKR2 processor, using the ISL links between the switches.

Before you begin, consult z/OS and network specialists to identify the number of devices required.

Know the multiple image facility ID (MIFID) of the partitions that are to have FCTC connections. The MIFID is the LCSS ID that is prefixed by the partition number (for example is 11 for the SYS1 system in the LPPKR111 partition on the CPCPKR1processor).

Table 7-32 lists the values that are used in this example.

Table 7-32 Values that are used in this example

Processor	LCSS	Partition	MIFID	System
CPCPKR1	0	LPPKR102	02	SYSA
CPCPKR1	1	LPPKR111	11	SYS1
CPCPKR2	0	LPPKR204	04	SYSB

You must also know the switch ID and switch entry port that are used for the CHPIDs that are to be used for the FCTC connections. Table 7-33 lists the values that are used in this example. The communication path is represented by the -> symbol.

Table 7-33 values that are used in this example

Processor	CHPID	Switch	Port	Description
CPCPKR1	5C	11	02	Used for SYSA -> SYSB and SYS1
CPCPKR1	44	12	02	Used for SYSA -> SYSB and SYS1
CPCPKR1	5A	11	12	Used for SYS1 -> SYSA
CPCPKR1	57	12	12	Used for SYS1 -> SYSA
CPCPKR2	30	13	12	Used for SYSB -> SYSA
CPCPKR2	56	14	12	Used for SYSB -> SYSA

CHPIDs are spanned because they are used for disk and tape also. However, in this example, they do not have to be spanned, because we use one CHPID for each system/LCSS on the processor.

We define the devices to the operating system configurations. Esoterics are not relevant for FCTC devices.

In this example, two sets of FCTC devices are defined by using separate switches to avoid single point of failure. All FCTC devices in the example are connected by using a switch. This approach, although not a requirement, is a good idea because the View CTC Connection option in HCD does not support non-switched FCTC devices. Two separate FCTC channels are used for each connection, which is not a requirement either.

First, we define the FCTC control unit and devices for the SYSA system.

7.12.1 Defining FCTC control units: SYSA to SYS1

To define FCTC control units, SYSA to SYS1, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit. See Figure 7-134 on page 192.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Control unit number  . . . . 4000  +                                  |
| Control unit type  . . . . . FCTC_________  +                         |
|                                                                       |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . FCTC 4000,0008 SW11      PKS1___         |
|                                                                       |
| Connected to switches  . . . 11  __ __ __ __ __ __ __  +              |
| Ports  . . . . . . . . . . . 12  __ __ __ __ __ __ __  +              |
|                                                                       |
| If connected to a switch:                                             |
|                                                                       |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-134 HCD: Add FCTC Control Unit SYSA->SYS1

3. Specify information in these fields: Control unit number, Control unit type, Connected to switches, Ports, and Description.

   In this example, we define an FCTC control unit for the SYSA system on CHPID 5C, that will be connected to a FCTC control unit for the SYS1 system on CHPID 5A.

   Consider using a numbering scheme for control units. In this example, the control unit number and the starting device address will have postfix 0 on uneven switch IDs and postfix 8 on even switch IDs.

   This is the first FCTC control unit for the SYSA system. We define FCTC connections using switch 11 and 12, therefore the “Connected to switches” field is 11. Another FCTC control unit will be defined for switch 12. Port 12 is specified because this is the port connected to the CHPID for the system we want to connect to (CHPID 5A). See Figure 7-135 on page 193.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4000     Control unit type . . . : FCTC

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  5C.1112 _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-135 HCD: Add FCTC Control Unit SYSA->SYS1 (CHPIDs)

4. Specify Channel Path ID and Link Address for the SYSA system on CPCPKR1 LCSS 0.

   We use CHPID 5C for the SYSA system. The link address is switch 11 port 12 because this is where the CHPID 5A for the SYS1 system is connected.

5. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. See Figure 7-136.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4000     Control unit type . . . : FCTC

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      11   00.008 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-136 HCD: Add FCTC Control Unit SYSA->SYS1 (CUADD and Unit Addresses)

6. Specify the hexadecimal CUADD number, Unit Address, and Unit Range.

   In this example, we define an FCTC control unit to connect to the SYS1 system. We specify the MIFID of the SYS1 system (the system we are going to connect to) in the CUADD field. The Unit Address for the SYSA devices (this control unit) must be identical to the Unit Address for the SYS1 devices (control unit to be defined later). In this example the Unit Address is 00. We define 8 devices for each FCTC control unit, and the Unit Range is 008.

7. Scroll one page to the right to specify Concurrency level 2 for this control unit.
8. Press Enter. The control unit will be attached to the processor. The value of Yes is indicated in the Att (Attached) column.

7.12.2 Defining FCTC devices: SYSA to SYS1

To define FCTC devices, SYSA to SYS1, perform the following steps:

1. Select option **5, I/O Devices** on the Define, Modify, or View Configuration panel. The I/O Device List panel is displayed.
2. Press F11 to add devices. See Figure 7-137.

```
+-------------------------------- Add Device ---------------------------------+
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Device number  . . . . . . . . 4000  + (0000 - FFFF)                        |
| Number of devices  . . . . . . 8___                                         |
| Device type  . . . . . . . . . FCTC_________  +                             |
|                                                                             |
| Serial number  . . . . . . . . __________                                   |
| Description  . . . . . . . . . ________________________________             |
|                                                                             |
| Volume serial number . . . . . ______  (for DASD)                           |
|                                                                             |
| Connected to CUs . . 4000  ____  ____  ____  ____  ____  ____  ____  +      |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-137 HCD: Add FCTC Devices SYSA->SYS1

3. Specify information in these fields: Device number, Number of devices, Device type and Connected to CUs.

   Consider using a numbering scheme for devices. A scheme is particularly important for FCTC devices, because devices might be defined in z/OS or network parameters. A numbering scheme can reduce the risk of specifying the wrong devices, for example specifying two devices using switch 11 instead of one device using switch 11 and another using switch 12.

   Here, we add 8 devices starting with device 4000. Device type must be FCTC. The control unit number matches the starting device number (this is not always possible if more systems on a CHPID are to connect to a single system).

4. Press Enter to open the Device / Processor Definition panel. See Figure 7-138 on page 195.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                                Row 1 of 1 |
| Command ===> _________________________________________ Scroll ===> CSR    |
|                                                                           |
| Select processors to change device/processor definitions, then press     |
| Enter.                                                                    |
|                                                                           |
| Device number  . . : 4000       Number of devices  . : 8                 |
| Device type  . . . : FCTC                                                 |
|                                                                           |
|                                          Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit       Null  |
| _ CPCPKR1.0   _    00   No        Yes     __         Yes            ___   |
| **************************** Bottom of data ****************************  |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-138 HCD: Add FCTC Devices SYSA->SYS1 (Device / Processor Definition)

5. Specify the UA of the devices to be added. This is the unit address that is specified when adding the control unit. Specify `Yes` for the “Device Candidate List Explicit” field.

   You can use the explicit device candidate list to distribute device unit addresses that are associated with the device addresses among the processor images/partitions. If you want each image/partition that you select to have access to the addresses of all devices in the list, specify `No` for the explicit device candidate list option.

6. For FCTC devices, the Explicit Device Candidate List is used to specify the owner (system) of the device addresses. Press Enter to open the Define Device Candidate List panel. See Figure 7-139.

```
+----------------- Define Device Candidate List ------------------+
|                                                     Row 1 of 2 |
| Command ===> _______________________________ Scroll ===> CSR   |
|                                                                 |
| Select one or more partitions to allow them to access the      |
| device group, or ENTER to continue without selection.          |
|                                                                 |
| Processor ID . . : CPCPKR1   CPC Poughkeepsie R1 Usage note     |
|                                                                 |
| / Partition Name   Description                      Reachable  |
| _ CFPKR101         Prod sysplex CF0A                No         |
| / LPPKR102         Prod sysplex SYSA                Yes        |
| ********************** Bottom of data *********************** |
|                                                                 |
+-----------------------------------------------------------------+
```

Figure 7-139 HCD: Add FCTC Devices SYSA->SYS1 (Define Device Candidate List)

7. Select the Partition Name of the system that the devices are defined for.

   We define devices for the SYSA system to connect to the SYS1 system, therefore the LPPKR102 partition is selected, because this is the partition used for the SYSA system.

   The list of partitions includes the partitions for the CHPID specified when adding the control unit. In this example, CHPID was specified for the CPCPKR1 processor LCSS 0.

The Reachable column is No if the CHPID that is used for the control unit cannot access the partition. Because the CFPKR101 partition is not in the access list for the CHPID 5C that is used for the FCTC control unit, the Reachable column indicates `No`.

8. Press Enter. The devices are defined however not yet connected to the operating system configurations, therefore the Define device to Operating System Configuration panel is displayed. See Figure 7-140.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                          Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR   |
|                                                                      |
| Select OSs to connect or disconnect devices, then press Enter.       |
|                                                                      |
| Device number  . : 4000          Number of devices  : 8              |
| Device type  . . : FCTC                                              |
|                                                                      |
| / Config. ID   Type     SS Description                      Defined  |
| S OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary            |
| S OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary          |
| _ OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary            |
| _ OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary          |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary               |
| ************************** Bottom of data ************************** |
|                                                                      |
+----------------------------------------------------------------------+
```

Figure 7-140 HCD: Add FCTC Devices SYSA->SYS1 (Define Device to OS Configuration)

9. Select the operating system configurations that are to include the devices added, by using the **S** line-command.

   We add devices for the SYSA system, therefore we select the OSSYSXPR and OSSYSXSE operating system configurations.

10. Press Enter. The Define Device Parameters / Features panel for the first operating system configuration specified is displayed. See Figure 7-141 on page 197.

```
+-------------------- Define Device Parameters / Features --------------------+
|                                                                 Row 1 of 3 |
| Command ===> __________________________________________ Scroll ===> CSR    |
|                                                                            |
| Specify or revise the values below.                                        |
|                                                                            |
| Configuration ID . : OSSYSXPR     OSconfig SYSAB sysplex Primary           |
| Device number  . . : 4000         Number of devices  : 8                   |
| Device type  . . . : FCTC                                                  |
|                                                                            |
| Parameter/                                                                 |
| Feature    Value +         R Description                                   |
| OFFLINE    No                Device considered online or offline at IPL    |
| DYNAMIC    Yes               Device has been defined to be dynamic         |
| LOCANY     Yes               UCB can reside in 31 bit storage              |
| **************************** Bottom of data **************************** |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-141 HCD: Add FCTC Devices SYSA->SYS1 (Define Device Parameters / Features)

11. Specify the requested values in the Value column.

    In this example, defaults are used for OFFLINE and DYNAMIC, and LOCANY is updated from No to Yes.

12. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.
13. Esoterics are not relevant for FCTC devices, therefore press Enter again. The Define Device Parameters / Features panel for the second operating system configuration specified is displayed, because two operating system configurations was selected.

Now we define the corresponding control unit and devices for the SYS1 system.

7.12.3 Defining FCTC control units: SYS1 to SYSA

To define FCTC control units, SYS1 to SYSA, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit. See Figure 7-142.

```
+------------------------- Add Control Unit --------------------------+
|                                                                     |
| Specify or revise the following values.                             |
|                                                                     |
| Control unit number  . . . . 4010  +                                |
| Control unit type  . . . . . FCTC_________  +                       |
|                                                                     |
| Serial number  . . . . . . . __________                             |
| Description  . . . . . . . . ________________________________       |
|                                                                     |
| Connected to switches  . . . 11  __ __ __ __ __ __ __  +            |
| Ports  . . . . . . . . . . . 02  __ __ __ __ __ __ __  +            |
|                                                                     |
| If connected to a switch:                                           |
|                                                                     |
| Define more than eight ports . . 2   1.  Yes                        |
|                                      2.  No                         |
| Propose CHPID/link addresses and                                    |
| unit addresses . . . . . . . . . 2   1.  Yes                        |
|                                      2.  No                         |
|                                                                     |
+---------------------------------------------------------------------+
```

Figure 7-142 HCD: Add FCTC Control Unit SYS1->SYSA

3. Specify information in these fields: Control unit number, Control unit type, Connected to switches, Ports, and Description.

   We define an FCTC control unit for the SYS1 system on CHPID 5A that will be connected to an FCTC control unit for the SYSA system on CHPID 5C.

   This is the first FCTC control unit for the SYS1 system. We define FCTC connections using switch 11 and 12, therefore the Connected to switches field is 11. Another FCTC control unit will be defined for switch 12. Port 02 is specified because this is the port connected to the CHPID for the system we want to connect to (CHPID 5C). See Figure 7-143 on page 199.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> ______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4010     Control unit type . . . : FCTC

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  5A.1102 _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-143 HCD: Add FCTC Control Unit SYS1->SYSA (CHPIDs)

4. Specify Channel Path ID and Link Address for the SYS1 system on CPCPKR1 LCSS 1.

   In this example, we use CHPID 5A for the SYS1 system. The link address is switch 11 port 02 because this is where the CHPID 5C for the SYSA system is connected.

5. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. See Figure 7-144.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> ______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4010     Control unit type . . . : FCTC

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      _2   00.008 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-144 HCD: Add FCTC Control Unit SYS1->SYSA (CUADD and Unit Addresses)

6. Specify the hexadecimal CUADD number, Unit Address, and Unit Range.

   In this example, we define an FCTC control unit to connect to the SYSA system. We specify the MIFID of the SYSA system (the system we are going to connect to) in the CUADD field. The Unit Address for the SYS1 devices (this control unit) must be identical to the Unit Address for the SYSA devices (control unit to be defined later). The Unit Address is 00. We define 8 devices for each FCTC control unit, and the Unit Range is 008.

7. Scroll one page to the right to specify Concurrency level 2 for this control unit.
8. Press Enter. The control unit will be attached to the processor. The value of Yes is indicated in the Att (Attached) column.

7.12.4 Defining FCTC devices: SYS1 to SYSA

To define FCTC devices: SYS1 to SYSA, perform the following steps:

1. Select option **5, I/O Devices** on the Define, Modify, or View Configuration panel. The I/O Device List panel is displayed.
2. Press F11 to add devices. See Figure 7-145.

```
+------------------------------- Add Device ---------------------------------+
|                                                                            |
| Specify or revise the following values.                                    |
|                                                                            |
| Device number  . . . . . . . . 4010  + (0000 - FFFF)                       |
| Number of devices  . . . . . . 8___                                        |
| Device type  . . . . . . . . . FCTC_________   +                           |
|                                                                            |
| Serial number  . . . . . . . . __________                                  |
| Description  . . . . . . . . . ________________________________            |
|                                                                            |
| Volume serial number . . . . . ______  (for DASD)                          |
|                                                                            |
| Connected to CUs . . 4010  ____  ____  ____  ____  ____  ____  ____   +    |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 7-145 HCD: Add FCTC Devices SYS1->SYSA

3. Specify information in these fields: Device number, Number of devices, Device type, and Connected to CUs.

   We add 8 devices starting with device 4010. Device type must be FCTC. The control unit number matches the starting device number (this is not always possible if more systems on a CHPID are to connect to a single system).
4. Press Enter. The Device / Processor Definition panel is displayed. See Figure 7-146 on page 201.

```
+---------------------- Device / Processor Definition -----------------------+
|                                                               Row 1 of 1 |
| Command ===> __________________________________________ Scroll ===> CSR   |
|                                                                           |
| Select processors to change device/processor definitions, then press      |
| Enter.                                                                    |
|                                                                           |
| Device number  . . : 4010       Number of devices  . : 8                  |
| Device type  . . . : FCTC                                                 |
|                                                                           |
|                                               Preferred  Device Candidate List |
| / Proc.CSSID  SS+  UA+  Time-Out  STADET  CHPID +    Explicit        Null |
| _ CPCPKR1.1   _    00   No        Yes     __         Yes             ___  |
| ***************************** Bottom of data ***************************** |
|                                                                           |
+---------------------------------------------------------------------------+
```

Figure 7-146 HCD: Add FCTC Devices SYS1->SYSA (Device / Processor Definition)

5. Specify the UA of the devices to be added. This is the unit address that is specified when adding the control unit. Specify `Yes` in the Device Candidate List Explicit field.

   For FCTC devices the Explicit Device Candidate List field indicates the owner (system) of the device addresses.

6. Press Enter. The Define Device Candidate List panel is displayed. See Figure 7-147.

```
+----------------- Define Device Candidate List ------------------+
|                                                    Row 1 of 1 |
| Command ===> _______________________________ Scroll ===> CSR   |
|                                                                 |
| Select one or more partitions to allow them to access the      |
| device group, or ENTER to continue without selection.          |
|                                                                 |
| Processor ID . . : CPCPKR1   CPC Poughkeepsie R1 Usage note    |
|                                                                 |
| / Partition Name   Description                     Reachable   |
| / LPPKR111         Development monoplex SYS1       Yes         |
| *********************** Bottom of data *********************** |
|                                                                 |
+-----------------------------------------------------------------+
```

Figure 7-147 HCD: Add FCTC Devices SYS1->SYSA (Define Device Candidate List)

7. Select the Partition name of the system for which the devices are defined.

   We define devices for the SYS1 system to connect to the SYSA system, therefore the LPPKR111 partition is selected, because this is the partition used for the SYS1 system.

8. Press Enter. Although devices are defined, they are not yet connected to the operating system configurations, therefore the Define device to Operating System Configuration panel is displayed. See Figure 7-148 on page 202.

```
+----------- Define Device to Operating System Configuration -----------+
|                                                            Row 1 of 5 |
| Command ===> _____________________________________ Scroll ===> CSR   |
|                                                                        |
| Select OSs to connect or disconnect devices, then press Enter.        |
|                                                                        |
| Device number  . : 4010          Number of devices  : 8               |
| Device type  . . : FCTC                                               |
|                                                                        |
| / Config. ID   Type     SS Description                      Defined   |
| _ OSSYSXPR     MVS         OSconfig SYSAB sysplex Primary              |
| _ OSSYSXSE     MVS         OSconfig SYSAB sysplex Secondary            |
| S OSSYS1PR     MVS         OSconfig SYS1 monoplex Primary              |
| S OSSYS1SE     MVS         OSconfig SYS1 monoplex Secondary            |
| _ OSVMLIPR     VM          OSconfig z/VM Linux Primary                 |
| ************************** Bottom of data *************************** |
|                                                                        |
+------------------------------------------------------------------------+
```

Figure 7-148 HCD: Add FCTC Devices SYS1->SYSA (Define Device to OS Configuration)

9. Use the **S** line-command to select the operating system configurations that are to include the devices added.

   I We add devices for the SYS1 system, therefore we select the OSSYS1PR and OSSYS1SE operating system configurations.

10. Press Enter. The Define Device Parameters / Features panel for the first operating system configuration specified is displayed. See Figure 7-149.

```
+----------------- Define Device Group Parameters / Features -----------------+
|                                                                  Row 1 of 3 |
| Command ===> ___________________________________________ Scroll ===> CSR    |
|                                                                              |
| Specify or revise the values below.                                         |
|                                                                              |
| Configuration ID . : OSSYS1      OSconfig for SYS1 monoplex                 |
|                                                                              |
| Parameter/                                                                   |
| Feature    Value +         R Description                                    |
| OFFLINE    No                Device considered online or offline at IPL     |
| DYNAMIC    Yes               Device has been defined to be dynamic          |
| LOCANY     Yes               UCB can reside in 31 bit storage               |
| ***************************** Bottom of data ****************************** |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 7-149 HCD: Add FCTC Devices SYS1->SYSA (Define Device Parameters / Features)

11. Specify the requested values in the Value column.

    In this example, defaults are used for OFFLINE and DYNAMIC parameters, and LOCANY parameter is updated from No to Yes.

12. Press Enter. The Assign/Unassign Device to Esoteric panel is displayed.
13. Esoterics are not relevant for FCTC devices, therefore press Enter again. The Define Device Parameters / Features panel for the second operating system configuration specified is displayed, because two operating system configurations was selected.

7.12.5 Defining FCTC control units: SYSA to SYSB

Now we define the FCTC control units for connection between the SYSA system and the SYSB system using the ISL links. The example includes the control units only, because the device definitions do not differ from those we just defined.

To define FCTC control units, SYSA to SYSB, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit. See Figure 7-150.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Control unit number  . . . . 4020  +                                  |
| Control unit type  . . . . . FCTC_________  +                         |
|                                                                       |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . FCTC 4020,0008 SW13      PKS1___         |
|                                                                       |
| Connected to switches  . . . 13  __ __ __ __ __ __ __  +              |
| Ports  . . . . . . . . . . . 12  __ __ __ __ __ __ __  +              |
|                                                                       |
| If connected to a switch:                                             |
|                                                                       |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-150 HCD: Add FCTC Control Unit (SYSA->SYSB)

3. Specify information in these fields: Control unit number, Control unit type, Connected to switches, Ports, and Description.

   We define an FCTC control unit for the SYSA system on CHPID 5C switch 11 that will be connected to an FCTC control unit for the SYSB system on CHPID 30 switch 13.

   When you define an FCTC control unit for a connection using ISLs, the control unit is attached at another switch, rather than the one connected to the CHPID used for the control unit. The CHPID used for this control unit is 5C connected to switch 11, but the control unit is connected to switch 13.

   We define FCTC connections using switch 11 and 12, therefore the Connected to switches field is 11. Another FCTC control unit will be defined for switch 12. Port 12 is specified because this is the port connected to the CHPID for the system we want to connect to (CHPID 5A). See Figure 7-151.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4020     Control unit type . . . : FCTC

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  5C.1312 _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-151 HCD: Add FCTC Control Unit SYSA->SYSB (CHPIDs)

4. Specify Channel Path ID and Link Address for the SYSA system on CPCPKR1 LCSS 0.

   We use CHPID 5C for the SYSA system. The link address is switch 13 port 12 because this is where the CHPID 30 for the SYSB system is connected.

5. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. See Figure 7-152.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4000     Control unit type . . . : FCTC

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      _4   00.008 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-152 HCD: Add FCTC Control Unit SYSA->SYSB (CUADD and Unit Addresses)

6. Specify the hexadecimal CUADD number, Unit Address, and Unit Range.

   We define an FCTC control unit to connect to the SYSB system. We specify the MIFID of the SYSB system (the system we will connect to) in the CUADD field. The Unit Address value for the SYSA devices (this control unit) must be identical to the Unit Address for the

SYSB devices (control unit to be defined later). In this example, the Unit Address field is 00. We define 8 devices for each FCTC control unit, and the Unit Range is 008.

7. Scroll one page to the right to specify Concurrency level 2 for this control unit.
8. Press Enter. The control unit will be attached to the processor. The value of Yes is indicated in the Att (Attached) column.

The example does not include adding devices, because they do not differ from the those added for the SYSA system to SYS1 system connection. Now we define the corresponding control unit and devices for the SYSB system.

7.12.6 Defining FCTC control units: SYSB to SYSA

To define FCTC control units, SYSB to SYSA, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Press F11 to add a control unit. See Figure 7-153.

```
+-------------------------- Add Control Unit ---------------------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Control unit number  . . . . 4030  +                                  |
| Control unit type  . . . . . FCTC_________  +                         |
|                                                                       |
| Serial number  . . . . . . . __________                               |
| Description  . . . . . . . . FCTC 4030,0008 SW11      PKS1___         |
|                                                                       |
| Connected to switches  . . . 11  __  __  __  __  __  __  __  +        |
| Ports  . . . . . . . . . . . 02  __  __  __  __  __  __  __  +        |
|                                                                       |
| If connected to a switch:                                             |
|                                                                       |
| Define more than eight ports . . 2   1.  Yes                          |
|                                      2.  No                           |
| Propose CHPID/link addresses and                                      |
| unit addresses . . . . . . . . . 2   1.  Yes                          |
|                                      2.  No                           |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 7-153 HCD: Add FCTC Control Unit SYSB->SYSA

3. Specify information in these fields: Control unit number, Control unit type, Connected to switches, Ports, and Description.

   We define an FCTC control unit for the SYSB system on CHPID 30 switch 13, that will be connected to a FCTC control unit for the SYSA system on CHPID 5C switch 11. See Figure 7-154 on page 206.

```
Select Processor / CU     Row 1 of 8 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4030     Control unit type . . . : FCTC

             ---------------Channel Path ID . Link Address + ---------------
/ Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
_ CPCPKR1.0  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.0  30.1102 _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
_ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-154 HCD: Add FCTC Control Unit SYSB->SYSA (CHPIDs)

4. Specify Channel Path ID and Link Address for the SYSB system on CPCPKR2 LCSS 0.

   We use CHPID 30 for the SYSB system. The link address is switch 11 port 02 because this is where the CHPID 5C for the SYSA system is connected.

5. Scroll one page to the right to specify CUADD and Unit Addresses for the control unit. See Figure 7-155.

```
Select Processor / CU     Row 1 of 8 More: <     >
Command ===> _______________________________________________ Scroll ===> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 4000     Control unit type . . . : FCTC

                 CU   --------------Unit Address . Unit Range + -------------
/ Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
_ CPCPKR1.0      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.0      _2   00.008 ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
_ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
```

Figure 7-155 HCD: Add FCTC Control Unit SYSB->SYSA (CUADD and Unit Addresses)

6. Specify the hexadecimal CUADD number, Unit Address, and Unit Range.

   We define a FCTC control unit to connect to the SYSA system. We specify the MIFID of the SYSA system (the system we are going to connect to) in the CUADD field. The Unit Address field for the SYSB devices (this control unit) must be identical to the Unit Address for the SYSA devices (control unit to be defined later). In this example, the Unit Address is 00. We define 8 devices for each FCTC control unit, and the Unit Range is 008.

7. Scroll one page to the right to specify Concurrency level 2 for this control unit.
8. Press Enter. The control unit will be attached to the processor. The value of Yes is indicated in the Att (Attached) column.

The example did not include adding devices, because they do not differ from the ones added for the SYS1 system to SYSA system connection.

Table 7-34 lists the FCTC devices that are added.

Table 7-34 FCTC devices that are added

Device	CU	CUADD	UA	Switch	Description
4000,8	4000	11	00	11	SYSA devices for connecting to SYS1
4010,8	4010	02	00	11	SYS1 devices for connecting to SYSA
4008,8	4008	11	00	12	SYSA devices for connecting to SYS1
4018,8	4018	02	00	12	SYS1 devices for connecting to SYSA
4020,8	4020	04	00	13	SYSA devices for connecting to SYSB
4030,8	4030	02	00	13	SYSB devices for connecting to SYSA
4028,8	4028	04	00	14	SYS devices for connecting to SYSB
4038,8	4038	02	00	14	SYSB devices for connecting to SYSA

7.12.7 Verifying FCTC connections

To verify FCTC connections, perform the following steps:

1. Select option **3, Processors** on the Define, Modify, or View Configuration panel. The Processor List panel is displayed.
2. Verification of CTC connections can be done on processor, partition, CHPID, control unit or level. It is not supported on the LCSS level. Use the **K** line-command to open the CTC Connection List panel. You may select more than one processor or partition at a time. See Figure 7-156.

```
CTC Connection List                                      Row 1 of 8 More:      >
Command ===> _______________________________________________ Scroll ===> CSR

Select CTC connections to view CTC Messages, then press Enter.

  -----------CTC or FC side---------- ---------CNC/FCV or FC side--------
/ Proc.CSSID Part.    Device  CH CU   Proc.CSSID Part.    Device  CH CU   Msg.
_ CPCPKR1.0  LPPKR102 4000    5C 4000 CPCPKR1.1  LPPKR111 4010    5A 4010
_ CPCPKR1.0  LPPKR102 4008    44 4008 CPCPKR1.1  LPPKR111 4018    57 4018
_ CPCPKR1.0  LPPKR102 4020    5C 4020 CPCPKR2.0  LPPKR204 4030    30 4030
_ CPCPKR1.0  LPPKR102 4028    44 4028 CPCPKR2.0  LPPKR204 4038    56 4038
_ CPCPKR1.1  LPPKR111 4010    5A 4010 CPCPKR1.0  LPPKR102 4000    5C 4000
_ CPCPKR1.1  LPPKR111 4018    57 4018 CPCPKR1.0  LPPKR102 4008    44 4008
_ CPCPKR2.0  LPPKR204 4030    30 4030 CPCPKR1.0  LPPKR102 4020    5C 4020
_ CPCPKR2.0  LPPKR204 4038    56 4038 CPCPKR1.0  LPPKR102 4028    44 4028
```

Figure 7-156 HCD: CTC Connection List (Connections OK)

3. Use the CTC Connection List panel to view all CTC connections. One line in the list represents one connection. FCTC connections work both ways like Peer links, therefore CTC and CNC side does not apply in the example. FCTC connections are displayed twice representing connections in each direction.

   In this example, the processor level is used. The starting device for each control unit is displayed even if a specific device is specified (device level).
4. Scroll to the right to see more details about devices, CHPIDs, and control unit that are specified in the list.

Figure 7-157 includes an example of a failing FCTC connection.

```
CTC Connection List                                      Row 1 of 4 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select CTC connections to view CTC Messages, then press Enter.

  -----------CTC or FC side---------- ---------CNC/FCV or FC side--------
/ Proc.CSSID Part.    Device  CH CU   Proc.CSSID Part.    Device  CH CU   Msg.
_ CPCPKR1.1  LPPKR111 4900    5C 4900                                     G754
_ CPCPKR1.1  LPPKR111 4908    44 4908                                     G754
_                                     CPCPKR1.1  LPPKR111 4900    5C 4900 G754
_                                     CPCPKR1.1  LPPKR111 4908    44 4908 G754
```

Figure 7-157 HCD: CTC Connection List (Connections not OK)

If a connection is not defined correctly, information in one side will be missing and a message (Msg.) is specified. Use the forward slash (**/**) line-command to view the message text; and then use the **E** line-command to display the message explanation (details).

7.13 Defining coupling facility links

In this section, we connect the coupling facility partitions to the z/OS SYSA and SYSB partition, and we connect the coupling facility partitions to each other.

Before you begin, review the CFReport to identify the type of coupling facility links to be used between the processors. In this example we use CIB (InfiniBand) for coupling facility links between the processors. The links are also used for Server Timer Protocol (STP).

Connecting coupling facility links does not include manually adding control units and devices because they (both of type CFP) are added automatically by HCD. Furthermore the devices are not added to OS configurations.

In this example, we use ICP links for connection between the z/OS and the coupling facility partitions on the same processor. ICP links are internal.

To connect coupling facility links, perform the following steps:

1. Select option **3, Processors** on the Define, Modify, or View Configuration panel. The Processor List panel opens.
2. Select the **CPCPKR1** processor and the **LCSS 0** channel subsystem, because all sysplex partitions are added in the LCCS 0 channel subsystem. The Channel Path List panel opens.

3. When defining the CHPIDs, we added CHPID 98 and 99 of type CIB and F8 and F9 as ICP. Scroll down to the CIB or ICP CHPIDs. See Figure 7-158.

```
Channel Path List     Row 26 of 29 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Select one or more channel paths, then press Enter. To add use F11.

Processor ID . . . . : CPCPKR1      CPC Poughkeepsie R1 Usage note
Configuration mode . : LPAR
Channel Subsystem ID : 0            Production sysplex

                    DynEntry Entry +
/ CHPID Type+ Mode+ Switch + Sw Port Con Mngd Description
_ 98    CIB   SHR   __       __ __    N   No  ________________________________
_ 99    CIB   SHR   __       __ __    N   No  ________________________________
_ F8    ICP   SHR   __       __ __    N   No  ________________________________
_ F9    ICP   SHR   __       __ __    N   No  ________________________________
```

Figure 7-158 HCD: Connect CFlinks (Channel Path List)

If the coupling facility links are not yet connected, an “N” is listed in the Con (Connected) column.

4. Use the forward slash (/) line-command for one of the coupling facility CHPIDs. Which one does not matter, because the CF Channel Path Connectivity List panel that is displayed later always includes all coupling facility CHPIDs.

   The panel in Figure 7-159 is displayed.

```
+------------- Actions on selected channel paths -------------+
|                                                              |
| Select by number or action code and press Enter.             |
|                                                              |
| 3_  1.  Add like . . . . . . . . . . . . . . (a)             |
|     2.  Change . . . . . . . . . . . . . . . (c)             |
|     3.  Connect CF channel paths . . . . . . (f)             |
|     4.  Aggregate channel paths  . . . . . . (g)             |
|     5.  Delete . . . . . . . . . . . . . . . (d)             |
|     6.  Work with attached control units . . (s)             |
|     7.  View channel path definition . . . . (v)             |
|     8.  View connected switches  . . . . . . (w)             |
|     9.  View related CTC connections . . . . (k)             |
|     10. View graphically . . . . . . . . . . (h)             |
|                                                              |
+--------------------------------------------------------------+
```

Figure 7-159 HCD: Connect CFlinks (Actions on selected channel path)

5. Select option **3, Connect CF channel path**. This option can also be used later for disconnecting CF channel paths.

   The CF Channel Path Connectivity List panel is displayed and includes all coupling facility CHPIDs. See Figure 7-160 on page 210.

```
CF Channel Path Connectivity List              Row 1 of 4
Command ===> ___________________________________________ Scroll ===> CSR

Select one or more channel paths, then press Enter.

Source processor ID . . . . . : CPCPKR1   CPC Poughkeepsie R1 Usage note
Source channel subsystem ID . : 0         Production sysplex
Source partition name . . . . : *

  -------Source--------   -----------Destination--------   -CU-
/ CHPID  Type  Mode Occ   Proc.CSSID   CHPID  Type  Mode   Type
_ 98     CIB   SHR  N
_ 99     CIB   SHR  N
/ F8     ICP   SHR  N
_ F9     ICP   SHR  N
```

Figure 7-160 HCD: Connect CFlinks (CF Channel Path Connectivity List, no connections)

6. Use the forward slash (/) line-command to view a list of available action codes. See Figure 7-161.

```
+----------- Actions on selected CF channel paths ------------+
|                                                              |
| Select by number or action code and press Enter.            |
|                                                              |
| 1_  1.  Connect to CF channel path . . . . . . . (p)         |
|     2.  Disconnect . . . . . . . . . . . . . . . (n)         |
|     3.  View source channel path definition  . . (v)         |
|     4.  View destination channel path definition (t)         |
|     5.  View CF control unit and devices . . . . (s)         |
|                                                              |
+--------------------------------------------------------------+
```

Figure 7-161 HCD: Connect CFlinks (Actions on selected CF channel path)

7. Select option **1, Connect to CF Channel path**.

   The Connect to CF Channel Path panel is displayed. See Figure 7-162 on page 211.

```
+---------------- Connect to CF Channel Path -----------------+
|                                                             |
| Specify the following values.                               |
|                                                             |
| Source processor ID  . . . . . : CPCPKR1                    |
| Source channel subsystem ID  . : 0                          |
| Source channel path ID . . . . : F8                         |
| Source channel path type . . . : ICP                        |
|                                                             |
| Destination processor ID . . . . . . CPCPKR1   +            |
| Destination channel subsystem ID . . 0   +                  |
| Destination channel path ID  . . . . F9  +                  |
|                                                             |
| Timing-only link . . . . . . . . . . No                     |
|                                                             |
+-------------------------------------------------------------+
```

Figure 7-162 HCD: Connect CFlinks type ICP (Connect to CF Channel Path)

The source fields include values for the CHPID that is selected on the CF Channel Path Connectivity list panel.

8. Specify values for these fields: Destination processor ID, Channel subsystem ID, and Channel path ID.

   In this example, an ICP CHPID was selected. This selection is used for internal coupling facility links on a processor, therefore the Source and Destination processor ID fields must be the same.

   The ICP CHPIDs are not spanned because all the sysplex partitions are defined in LCSS 0, therefore Destination channel subsystem ID must be 0. We defined two ICP CHPIDs on each processor. Therefore, in this example, when the connection source channel path ID is F8, the only available destination channel path ID is F9. Likewise, in reverse, when the connection source channel path ID is F9, the only available destination channel path ID is F8.

   The Source and Destination channel path IDs must be of the same CHPID type (in this case ICP), because ICP is a peer link type.

   We discuss the Timing-only link option when we connect the CIB coupling facility links, start at step 11 on page 212.

9. Press Enter to define the link. The Add CF Control Unit and Devices panel is displayed. See Figure 7-163 on page 212.

```
+----------------- Add CF Control Unit and Devices ------------------+
|                                                                    |
|                                                                    |
| Confirm or revise the CF control unit number and device numbers    |
| for the CF control unit and devices to be defined.                 |
|                                                                    |
| Processor ID . . . . . . . : CPCPKR1                               |
| Channel subsystem ID . . . : 0                                     |
| Channel path ID  . . . . . : F8        Operation mode . . : SHR    |
| Channel path type  . . . . : ICP                                   |
|                                                                    |
| Control unit number  . . . . FFFE  +                               |
|                                                                    |
| Device number  . . . . . . . FFF9                                  |
| Number of devices  . . . . : 7                                     |
|                                                                    |
|                                                                    |
|                                                                    |
|                                                                    |
+--------------------------------------------------------------------+
```

Figure 7-163 HCD: Connect CFlinks type ICP (Add CF Control Unit and Devices)

Although you are able update the Control unit number and the Device number, we do not recommend it. Use a numbering scheme for internal CHPIDs; for example, Fx CHPIDs, the Fxxx control units, and devices can be used for coupling facility, consoles, and more.

10. Press Enter twice, because a control unit and corresponding devices are added for both the Destination and the Source CHPIDs. We must connect the ICP links on the CPCPKR2 processor too.

11. Now we connect CIB links. In the CF Channel Path Connectivity List panel, select the CIB CHPID 98 by using the **P** line-command. See Figure 7-164.

```
+---------------- Connect to CF Channel Path -----------------+
|                                                              |
| Specify the following values.                                |
|                                                              |
| Source processor ID  . . . . . : CPCPKR1                     |
| Source channel subsystem ID  . : 0                           |
| Source channel path ID . . . . : 98                          |
| Source channel path type . . . : CIB                         |
|                                                              |
| Destination processor ID . . . . . . CPCPKR2   +             |
| Destination channel subsystem ID . . 0   +                   |
| Destination channel path ID  . . . . B8  +                   |
|                                                              |
| Timing-only link . . . . . . . . . . No                      |
|                                                              |
+--------------------------------------------------------------+
```

Figure 7-164 HCD: Connect CFlinks type CIB (Connect to CF Channel Path)

The source fields include values for the CHPID selected on the CF Channel Path Connectivity List panel.

12. Specify values in these fields, as shown in Figure 7-164 on page 212: Destination processor ID, Destination channel subsystem ID, and Destination channel path ID.

 In this example, a CIB CHPID was selected and is used for external coupling facility links between processors; therefore, the Source and Destination processor IDs are not the same in this example. The CIB CHPIDs are not spanned because all sysplex partitions are defined in LCSS 0, therefore the Destination channel subsystem ID field must be 0. We defined two CIB CHPIDs on each processor, therefore two separate CHPIDs can be selected. In the Destination channel path ID field, we select B8. The Source and Destination channel path ID fields must be of the same CHPID type (in this case CIB), because CIB is a peer link type.

 The Timing-only link option is used for specifying if the links are to be used for STP only (Yes) or for coupling facility link or both coupling facility Link and STP (No). You must use the same option for all links between two processors.

13. Press Enter to define the link. The Add CF Control Unit and Devices panel is displayed. See Figure 7-165.

```
+----------------- Add CF Control Unit and Devices ------------------+
|                                                                    |
| Confirm or revise the CF control unit number and device numbers    |
| for the CF control unit and devices to be defined.                 |
|                                                                    |
| Processor ID . . . . . . . : CPCPKR1                               |
| Channel subsystem ID . . . : 0                                     |
| Channel path ID  . . . . . : 98         Operation mode . . : SHR   |
| Channel path type  . . . . : CIB                                   |
|                                                                    |
| Control unit number  . . . . FFFE  +                               |
|                                                                    |
| Device number  . . . . . . . FFF9                                  |
| Number of devices  . . . . : 7                                     |
|                                                                    |
+--------------------------------------------------------------------+
```

Figure 7-165 HCD: Connect CFlinks type CIB (Add CF Control Unit and Devices)

 Although you are able to update the Control unit number and the Device number, we do not recommend it. Instead, use a numbering scheme for internal CHPIDs; for example Fx CHPIDs, the Fxxx control units, and devices can be used for coupling facility, consoles, and more.

14. Press Enter twice, because a control unit and corresponding devices are added for both the Destination and the Source CHPIDs, in this case on two separate processors.

 Coupling facility Channel path 98 type CIB on the CPCPKR1 processor is now connected to Coupling facility Channel path B8 type CIB on the CPCPKR2 processor. We also connect Channel path 99 type CIB on CPCPKR1 to Channel path B9 type CIB on CPCPKR2.

 Now, all coupling facility links are connected. See Figure 7-166 on page 214.

```
CF Channel Path Connectivity List             Row 1 of 4
Command ===> ___________________________________________ Scroll ===> CSR

Select one or more channel paths, then press Enter.

Source processor ID . . . . . : CPCPKR1   CPC Poughkeepsie R1 Usage note
Source channel subsystem ID . : 0         Production sysplex
Source partition name . . . . : *

  -------Source--------   -----------Destination--------   -CU-
/ CHPID  Type  Mode Occ   Proc.CSSID   CHPID  Type  Mode   Type
_ 98     CIB   SHR  N     CPCPKR2.0    B8     CIB   SHR    CFP
_ 99     CIB   SHR  N     CPCPKR2.0    B9     CIB   SHR    CFP
_ F8     ICP   SHR  N     CPCPKR1.0    F9     ICP   SHR    CFP
_ F9     ICP   SHR  N     CPCPKR1.0    F8     ICP   SHR    CFP
```

Figure 7-166 HCD: Connect CFlinks (CF Channel Path Connectivity List, connections successful)

The CF Channel Path Connectivity panel now displays all coupling facility connections related to the CPCPKR1 processor, because we entered the list by selecting a CHPID on the CPCPKR1 processor.

15. Press F3 to return to the Channel Path List panel. A “Y” is displayed in the Con (connected) column, because the coupling facility links are now connected.

Table 7-35 lists the CF connections that are now established. The Path column indicates the communication path (in this case, the <-> symbol represents bidirectional path).

Table 7-35 CF connections that are now established

Processor	CHPID	Type	Path	Processor	CHPID	Type
CPCPKR1	98	ICP	<->	CPCPKR1	99	ICP
CPCPKR2	F8	ICP	<->	CPCPKR2	F9	ICP
CPCPKR1	98	CIB	<->	CPCPKR2	B8	CIB
CPCPKR1	98	CIB	<->	CPCPKR2	B9	CIB

7.14 Connecting switches

When we defined the switches, including control units and devices, no processors and CHPIDs were defined yet, therefore at that time we were unable to connect the switch control units to CHPIDs and switch devices to operating system configurations. However, we can do that now.

The purpose of the switch devices is to enable the switch to report data to z/OS.

In this example, we define the switch devices to the SYS1 system only, because we do not want the switch to report data to all systems in the I/O configuration.

7.14.1 Connecting switches to CHPIDs

To connect switches to CHPIDs, perform the following steps:

1. Select option **4, Control Units** on the Define, Modify, or View Configuration panel. The Control Unit List panel is displayed.
2. Locate the control units for switches and use the **C** line-command to change the control units.
3. Press Enter on the Change Control Unit Definition panel, because we do not have to change the control unit connection to the switch; we only have to add a CHPID connection. The Select Processor / CU panel is displayed. See Figure 7-167.

```
 Select Processor / CU    Row 1 of 12 More:       >
 Command ===> _______________________________________________ Scroll ===> CSR

 Select processors to change CU/processor parameters, then press Enter.

 Control unit number . . : 0011     Control unit type . . . : 2032

              ---------------Channel Path ID . Link Address + ---------------
 / Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6------ 7------ 8------
 _ CPCPKR1.0  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.1  5C.11FE _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.2  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR1.3  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.0  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.1  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.2  _______ _______ _______ _______ _______ _______ _______ _______
 _ CPCPKR2.3  _______ _______ _______ _______ _______ _______ _______ _______
```

Figure 7-167 HCD: Connect Switch (CHPID)

4. Specify Channel Path ID and Link Address for the SYS1 system on CPCPKR1 LCSS 1.

   In this example, we use CHPID 5C for the SYS1 system. The link address is switch 11 port FE because this is the port that is connected to the control unit and is used by the switch for reporting.
5. Scroll one page to the right to specify the Unit Addresses for the control unit. See Figure 7-168 on page 216.

```
 Select Processor / CU    Row 1 of 12 More: <     >
 Command ===> _______________________________________________ Scroll ===> CSR

 Select processors to change CU/processor parameters, then press Enter.

 Control unit number . . : 0011     Control unit type . . . : 2032

                  CU   --------------Unit Address . Unit Range + -------------
 / Proc.CSSID Att ADD+ 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
 _ CPCPKR1.0      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR1.1      __   00     ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR1.2      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR1.3      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.0      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.1      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.2      __   ______ ______ ______ ______ ______ ______ ______ ______
 _ CPCPKR2.3      __   ______ ______ ______ ______ ______ ______ ______ ______
******************************* Bottom of data *******************************
```

Figure 7-168 HCD: Connect Switch (Unit Address)

6. Specify the Unit Address and Unit Range. CUADD is not supported for switch control units.

   In this example, we specify Unit Address 00. This is actually the only unit address supported. No Unit Range is specified, because the default of 001 is sufficient. Only one device is on the switch control unit.

7. Scroll to the right to specify a Concurrency level of 2.
8. Press Enter. The control unit will be attached to the processor. The value of Yes is indicated in the Att (Attached) column.

7.14.2 Connecting switches to operating system configurations

To connect switches to OS configurations, perform the following steps:

1. Select option **5, I/O Devices** on the Define, Modify, or View Configuration panel. The I/O Device list panel is displayed. The panel includes groups of devices.
2. Use the **S** line-command on the first device in the list to convert the list to single devices (not groups).
3. Select the four switch devices **0011** to **0014** by using the open and close parentheses line block commands and select option **4, OS Group Change**. The Change Device Group / Operating System Configuration panel is displayed. See Figure 7-169 on page 217.

```
+----------- Change Device Group / Operating System Configuration ------------+
|                                                                  Row 1 of 5 |
| Command ===> __________________________________________ Scroll ===> CSR     |
|                                                                             |
| Select OSs to connect or disconnect devices, then press Enter.              |
|                                                                             |
| / Config. ID   OS Type  Description                      Defined            |
| _ OSSYSXPR     MVS      OSconfig SYSAB sysplex Primary                      |
| _ OSSYSXSE     MVS      OSconfig SYSAB sysplex Secondary                    |
| S OSSYS1PR     MVS      OSconfig SYS1 monoplex Primary                      |
| S OSSYS1SE     MVS      OSconfig SYS1 monoplex Secondary                    |
| _ OSVMLIPR     VM       OSconfig z/VM Linux Primary                         |
| ***************************** Bottom of data ****************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-169 HCD: Connect Switch (Change Device Group / Operating System Configuration)

4. Select the operating system configurations to which the devices are to be connected.

   We select the operating system configurations for the SYS1 system OSSYS1PR and OSSYS1SE.

5. Press Enter. The Define Device Group Parameters / Features panel is displayed. See Figure 7-170.

```
+----------------- Define Device Group Parameters / Features -----------------+
|                                                                  Row 1 of 3 |
| Command ===> __________________________________________ Scroll ===> CSR     |
|                                                                             |
| Specify or revise the values below.                                         |
|                                                                             |
| Configuration ID . : OSSYS1PR     OSconfig SYS1 monoplex Primary            |
|                                                                             |
| Parameter/                                                                  |
| Feature    Value +         R Description                                    |
| OFFLINE    No                Device considered online or offline at IPL    |
| DYNAMIC    Yes               Device supports dynamic configuration         |
| LOCANY     Yes               UCB can reside in 31 bit storage              |
| ***************************** Bottom of data ****************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 7-170 HCD: Connect Switch (Define Device Group Parameters / Features)

6. Specify the requested values in the Value column.

   In this example, defaults are used for DYNAMIC parameter. The OFFLINE parameter is updated from Yes to No; LOCANY is updated from No to Yes.

7. Press Enter. The Define Device Group Parameters / Features panel for the second operating system configuration specified is displayed, because two operating system configurations was selected. No panel for specifying esoterics is displayed, because we used the OS Group Change option for this activity.

7.15 ETR and STP Sysplex Timer

The external timer reference (ETR) and the Sysplex Timer Protocol (STP) are not defined in HCD. However, the STP uses coupling facility (CF) links for communication between processors. The links can be either dedicated to STP or used for both STP and CF links.

You cannot define CF links for STP only between two processors if you have CF links for coupling facilities that connect the same processors; this is verified on the processor level (not only on the LCSS level). If you attempt to define links, a message is displayed. See Figure 7-171.

```
+------------------------------------------------------------------------+
| Mixture of STP and CF links not allowed between processor CPCPKR1 and |
| processor CPCPKR2.                                                     |
+------------------------------------------------------------------------+
```

Figure 7-171 HCD: Mixture of STP and CF links not allowed

If used for STP only, the control units of type STP are added automatically by HCD. No devices will be defined. The CU type for CF links is displayed on the CF Channel Path Connectivity List panel.

For more information about STP planning and implementation see *Server Time Protocol Planning Guide*, SG24-7280 and *Server Time Protocol Implementation Guide*, SG24-7281.

8

Configuration with HCM

In this chapter, we discuss several features of the Hardware Configuration Manager (HCM) to enhance the configuration process.

HCM offers a client/server interface to HCD on the workstation. The client-side GUI can be helpful to use.

If this is something that your site requires, or if you prefer to build and maintain the IODFs using this interface, the HCM can be a useful tool.

> **Note:** HCM does not replace HCD, but instead is used in conjunction with HCD and its selected IODF. However, HCM can be used in a stand alone function after a production IODF is built and the configuration files (`IODF##.HCM` or `IODF##.HCR`) are created on your HCM workstation.

This chapter does not explain how to use all aspects of HCM but does discuss the components for getting started. The chapter also introduces hardware-specific features that are not available in HCD. See 3.2, “Hardware Configuration Manager (HCM)” on page 32 for an introduction to HCM and how to install it.

This chapter discusses the following topics:

- Working with IODFs
- Changing view attributes and setting filters
- HCM configuration examples
- Defining additional hardware features
- The IODF reporting and compare interface
- Interface with the CHPID Mapping Tool (CMT)
- Checking and repairing the IODF and HCM data file

8.1 Working with IODFs

These examples commence with the presumption that we already have the HCM dispatcher (CBDQDISP) running and the agent job (CBDQAJSK) set up on the system being used to build the configuration. See 3.2, “Hardware Configuration Manager (HCM)” on page 32

8.1.1 Importing an existing work IODF into HCM

This section discusses how to import an existing IODF into HCM. We can then view and modify the configuration and the specific hardware information not found in HCD.

To import an existing work IODF into HCM, perform the following steps:

1. Select **File** → **IODFs** as shown in Figure 8-1.

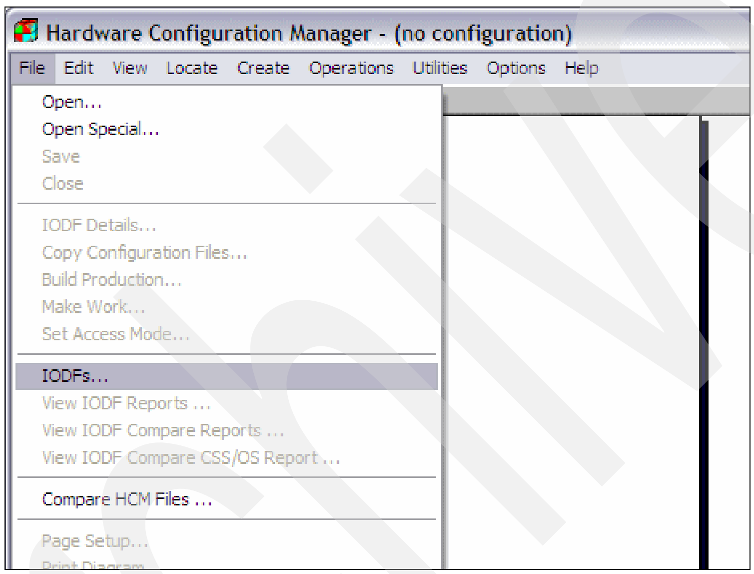


Figure 8-1 HCM: Importing IODF

2. Enter the high-level qualifier (HLQ) for your IODF data sets in the entry box and click **OK**.

   A list of all IODFs catalogued under that high-level qualifier is displayed.

3. Select the *work* IODF that you want to import and then click **Load,** as shown in Figure 8-2 on page 221.

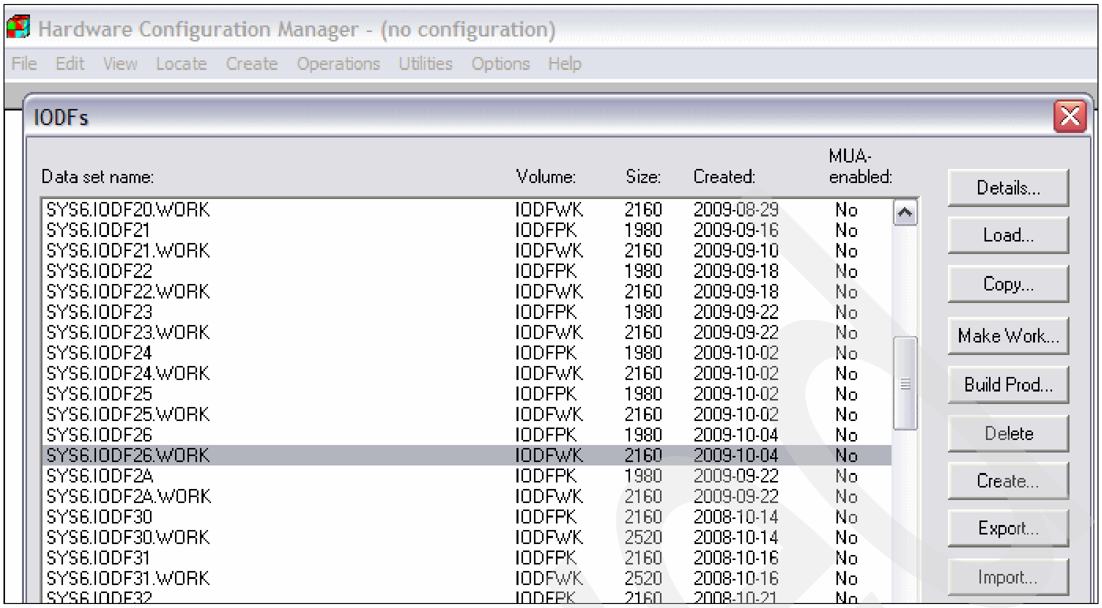


Figure 8-2 HCM: Loading the IODF to be imported

4. Enter the file name for the HCM file to use. In this example, we use the `IODF26.hcm` file. See Figure 8-3.

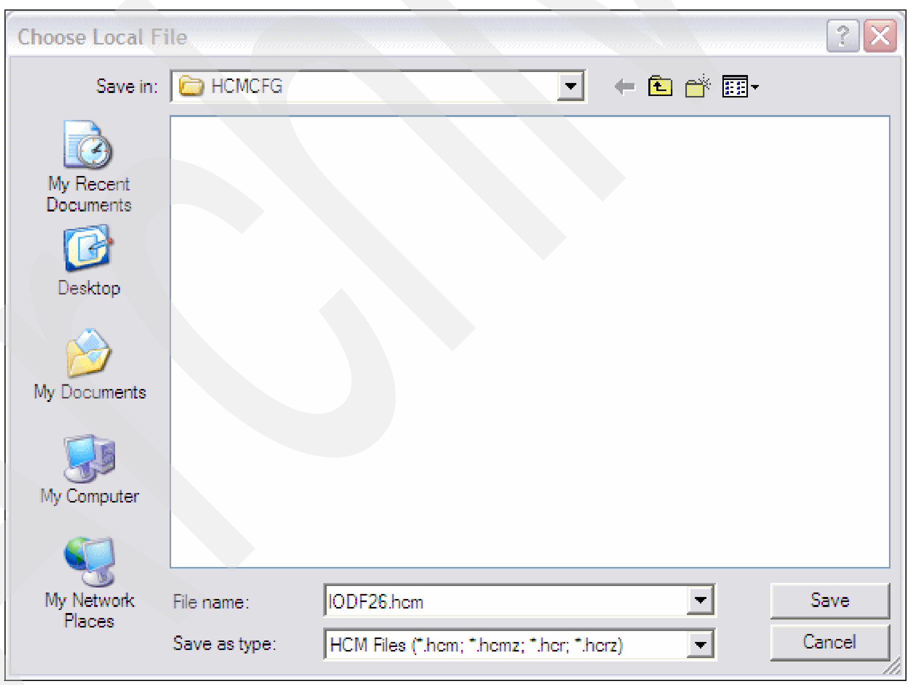


Figure 8-3 HCM: Saving the Imported IODF

5. Click **Save** to initiate the import process. This process can take several minutes, depending on the size of the IODF you are importing.

   After the import has completed, the default initial display of DASD is shown by HCM. Refer Figure 8-4 on page 222.

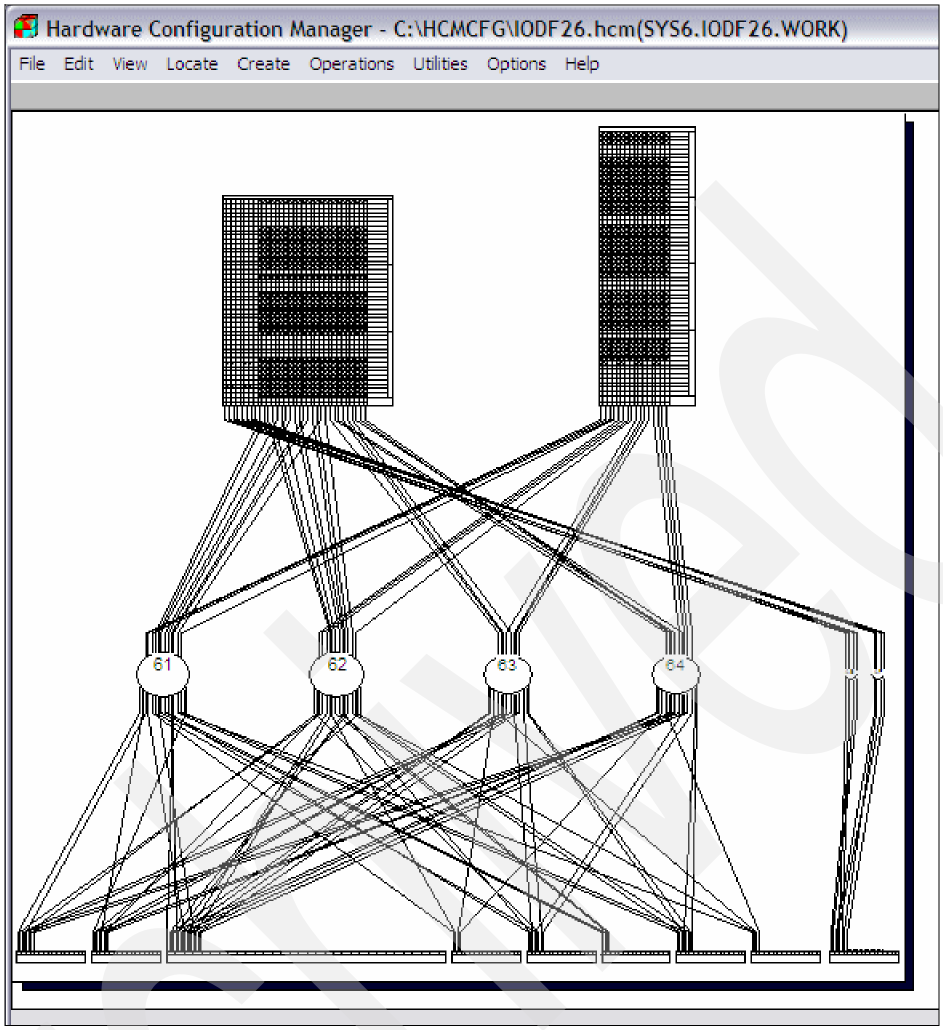


Figure 8-4 HCM: Initial display after import

6. Select **View** → **Filter Diagram** to change the view attributes, customizing what HCM displays. This step eliminates hardware we do not want to see and makes the display more practical. See Figure 8-5 on page 223.

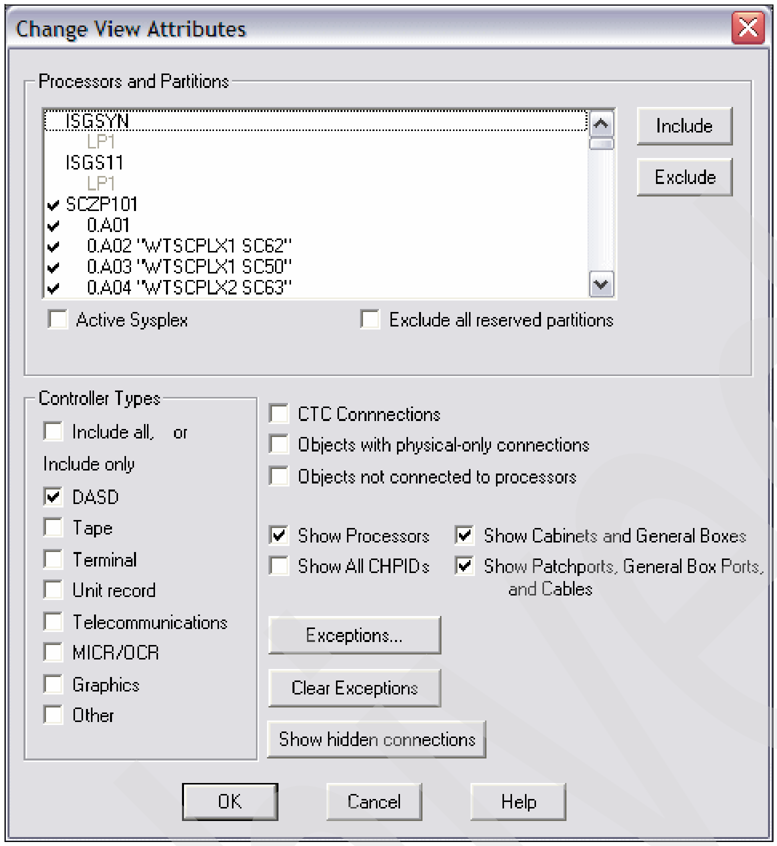


Figure 8-5 HCM: Change View Attributes

Note: Additionally, to zoom in on part of the diagram, click the left mouse button and drag it, magnifying the display for that area selected.

Pressing **F2** (Fit to window) will return the diagram to the previously Filtered display.

By clicking once on an object in the diagram (changing to the color red, using default colors), then pressing **F4** (View Highlighted Objects), only that object will be displayed.

7. To return the display to the previously filtered display, select **View** → **Filter Diagram** → **Clear Exceptions** → **OK**. Now click anywhere in the display to deselect the object in the display and view all previously filtered objects.

8.1.2 Creating a new IODF using HCM

To create a new work IODF using HCM, perform the following steps:

1. Select **File** → **IODFs**.
2. Enter the high-level qualifier in the entry box and click **OK**.

   A list of all existing IODFs that are catalogued under that high-level qualifier is displayed.
3. Click **Create** to open the Create IODF dialog box, shown in Figure 8-6 on page 224. Enter the following information and then click **OK**:

   – Preferred data set name
   – IODF volume name

– Number of 4K blocks to allocate
– Whether you want to use activity logging

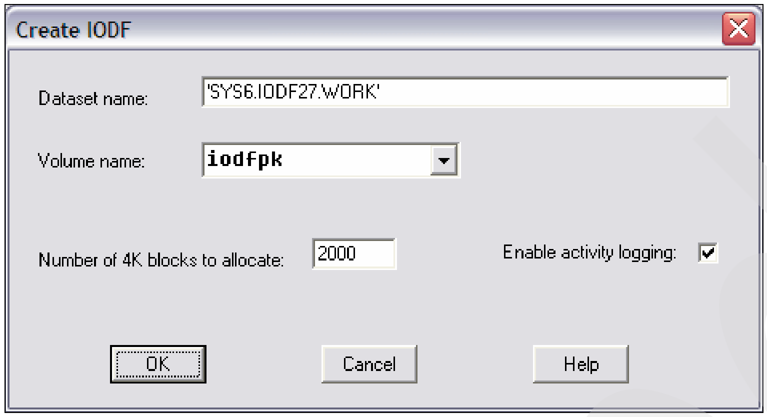


Figure 8-6 HCM: Create IODF

4. At the following message, click **OK**:

    `CBDA450I New IODF SYS6.IODF27.WORK defined`

    The new IODF is highlighted in the data set name list.

5. Click **Load** to open the Choose Local File window, select or verify the required HCM file name, and click **Save**. Our example uses the `IODF27.hcm` file. See Figure 8-7.

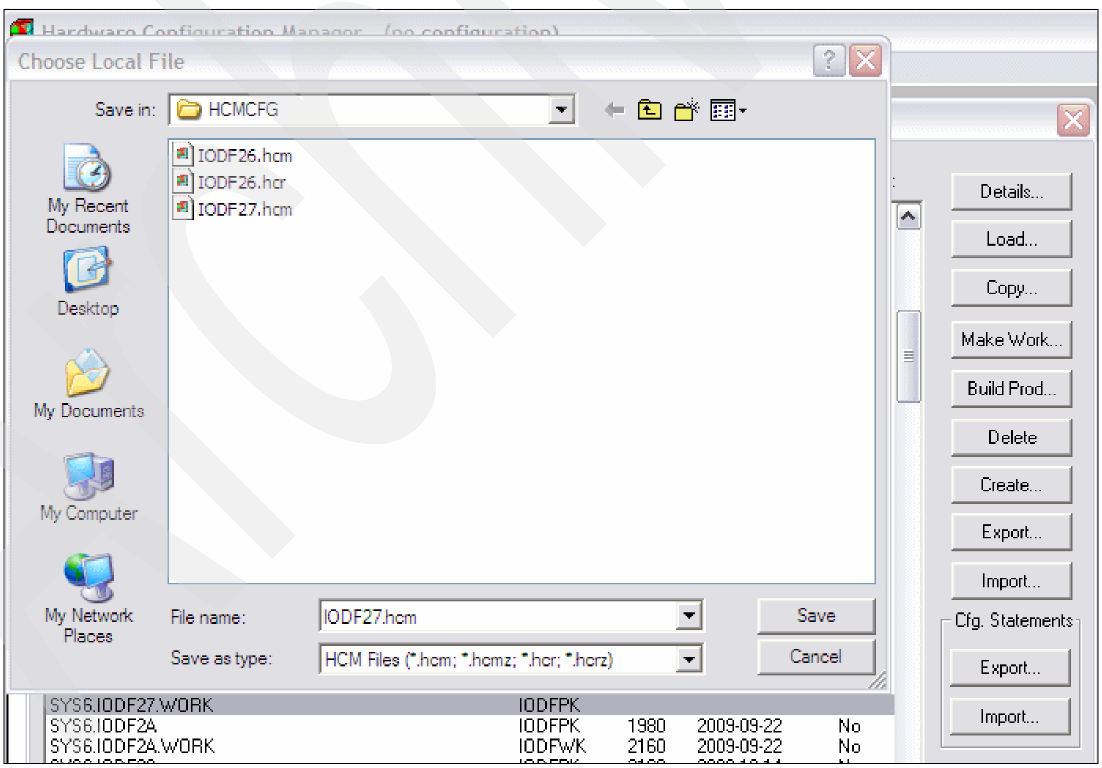


Figure 8-7 HCM: Choose Local File

HCM has now created the IODF data set named `SYS6.IODF27.work` on the host, and is *associated* with `IODF27.hcm` on the PC workstation.

6. Verify this information by looking at the top of the window in the window header. See Figure 8-8.

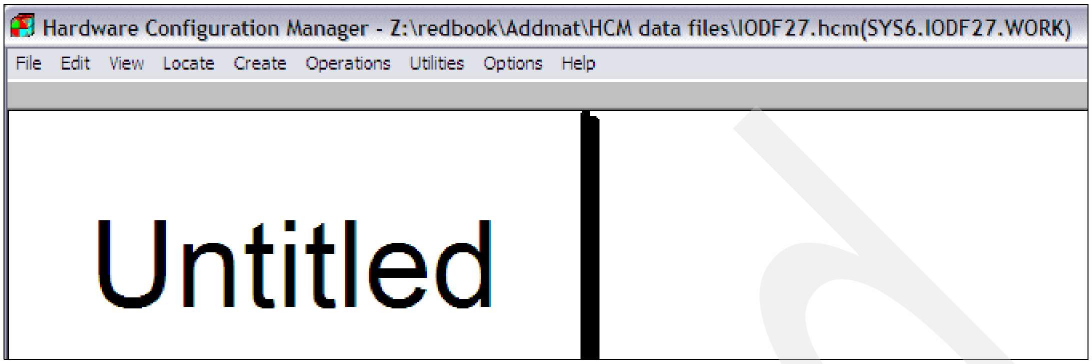


Figure 8-8 HCM: File association displayed in window header

8.1.3 Modifying an IODF by using HCM

To use HCM to modify an existing IODF, perform the following steps:

1. Select **File** → **Open,** select the `IODF##.hcm` file you want to modify. See Figure 8-9.

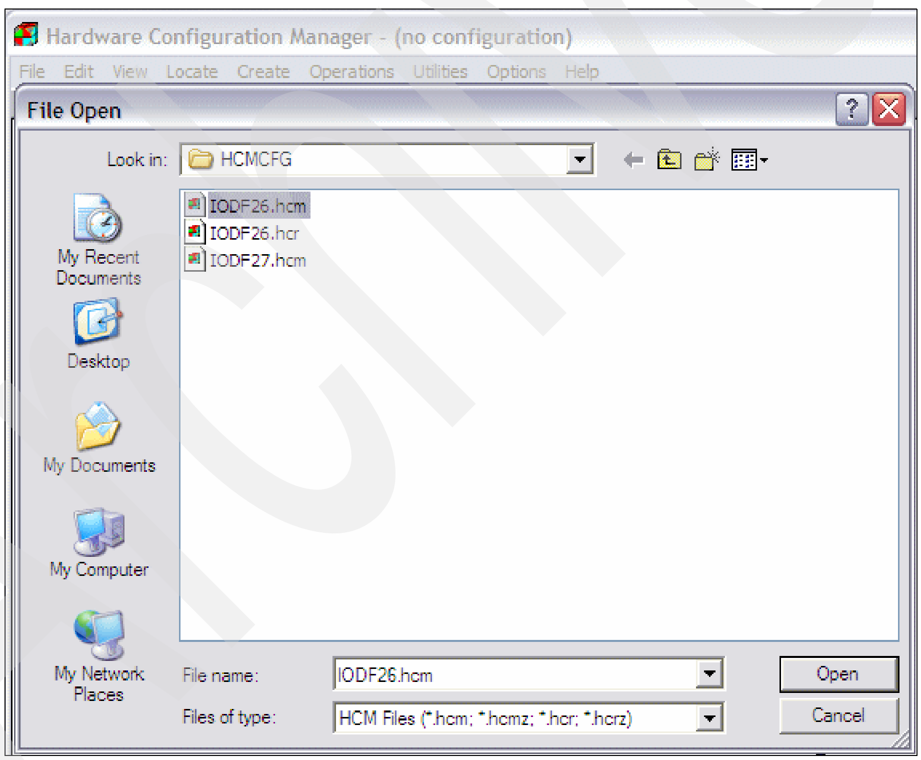


Figure 8-9 HCM: File Open, file to modify

2. Click **Open**. The IODF is displayed with the last saved view.
3. Select any object to modify, or click the **Locate** menu and navigate to the category in which to search.

For further information about modifying existing hardware definitions, consult the *Hardware Configuration Manager User's Guide*, SC33-7989.

8.2 Changing view attributes and setting filters

In HCM, when you view large or complex configurations, the display might seem unusable. Also, viewing a printed large-configuration diagram might require a large wall.

HCM works in small components, such as processors and subsystems, where you select and zoom a component that you want to work on.

Consider the following work methods to help you with large or complex configurations:

- Printing DASD or VTS subsystems with cabling and interface information is more practical and useful than printing the entire configuration complex.
- Using a larger monitor or checking whether the screen resolution can be increased is also helpful.

Visual warnings is another feature that HCM offers. For example, you can see at a glance whether all the CHPIDs have partition access for a certain DASD subsystem, or whether only seven PCHIDs are connected instead of eight.

HCM has many methods of controlling what is displayed on the workstation. This section describes filtering, such as changing the view attributes and setting filters when you use the Locate option.

8.2.1 Changing view attributes

As mentioned in a previous section, by selecting **View** → **Filter Diagram**, you can customize what HCM displays, eliminating hardware objects you do not want to see and making the display more practical.

To control what is displayed, use any of the following methods (see Figure 8-10 on page 227):

- Processor and Partition section

  This method is useful with z10 processors because all partitions and CSSs are now defined by default but we do not need to see all the reserved LPARs

- Controller Types

  All controller types are put into Display Classes. As an example, 2107 goes into DASD. This Display Class can be changed by editing the controller and changing the class as follows:

  a. Select **Edit** → **Controller.**
  b. Select the controller.
  c. Click **Edit.**
  d. Use the Display Class panel, where the category can be changed.

- CTC Connections

  Select this option to determine whether to display the CTC links.

- Objects with physical-only connections

  Select this option in the following situations, for example: Open Systems connections into DASD or channel; and cabling to switches that are currently not configured to controllers and devices. This option is useful if you want to reuse cabling.

- ► Objects not connected to processors

  Select this option to see devices that sometimes need to be defined for disaster recovery (DR) purposes but not connected to processors, or devices that are defined only to OS configurations but not CHPIDs and processors.

- ► Show Processors

  Select this option to display PCHIDs that have no connection (generally, PCHIDs that have no connection are not displayed).

- ► Show Cabinets, Show Patchports

  Enabling these options allows for additional hardware components such as channel converters, patch panels, and cabling numbers, to be shown in the display.

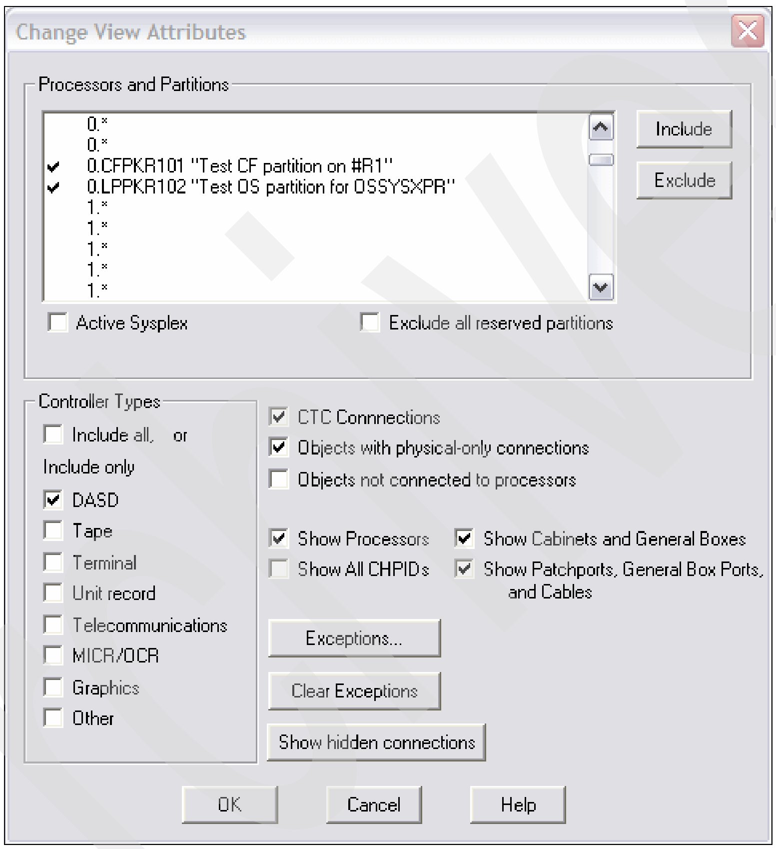


Figure 8-10 HCM: Change View Attributes

8.2.2 Setting filters

Additionally, you can set filters in the Edit and Locate options, further controlling what is displayed, and removing unnecessary definitions from the display, as follows:

1. Select **Locate** → **CHPID**.
2. Click **Filter**.

   We can set the filter to show many combinations of listings. See Figure 8-11 on page 228. The Filter dialog box is available in many windows.

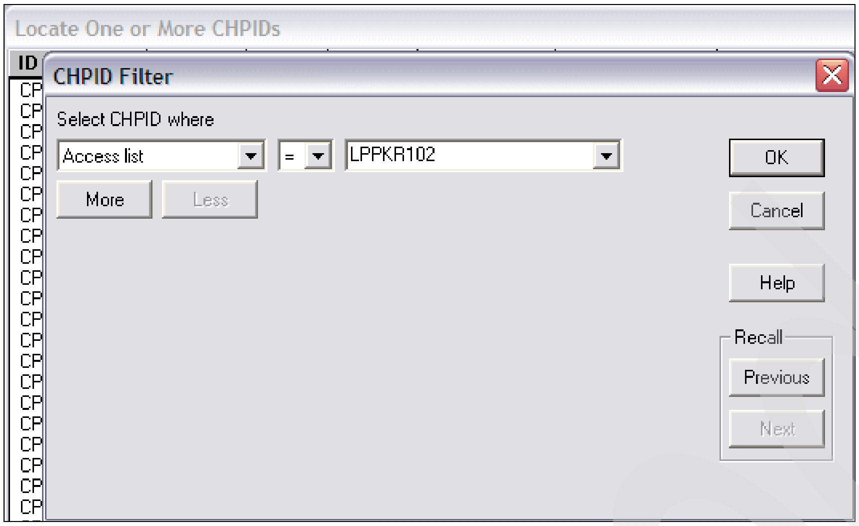
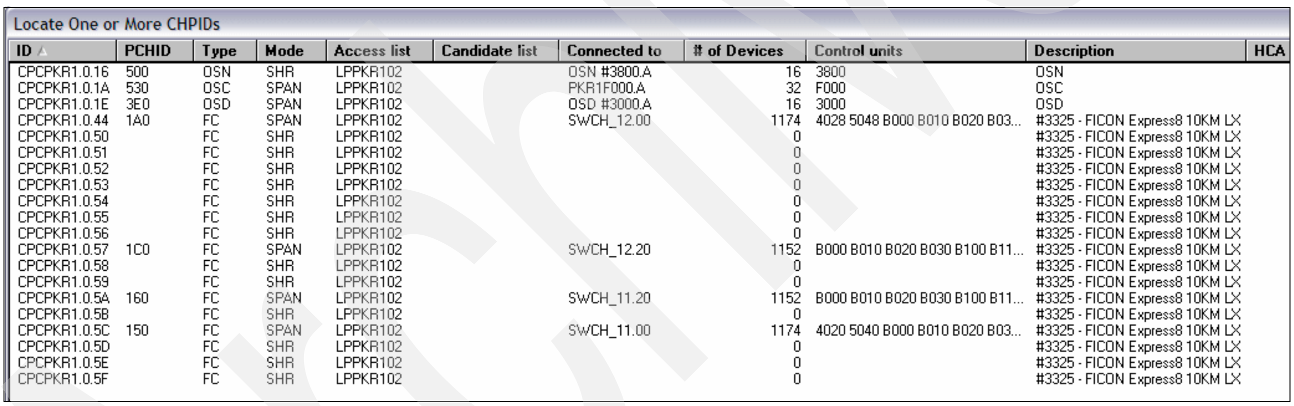


Figure 8-11 HCM: Filtering for CHPIDs in Locate CHPIDs

In our example we are filtering for all **CHPIDs** in the **Access List** for Partition **LPPKR102**

3. Click **OK** to activate the filter and observe that the **Use filter** check box is automatically selected and the display list is modified to our filter parameters. See Figure 8-12.


Locate One or More CHPIDs

ID	PCHID	Type	Mode	Access list	Candidate list	Connected to	# of Devices	Control units	Description	HCA
CPCPKR1.0.16	500	OSN	SHR	LPPKR102		OSN #3800.A	16	3800	OSN	
CPCPKR1.0.1A	530	OSC	SPAN	LPPKR102		PKR1F000.A	32	F000	OSC	
CPCPKR1.0.1E	3E0	OSD	SPAN	LPPKR102		OSD #3000.A	16	3000	OSD	
CPCPKR1.0.44	1A0	FC	SPAN	LPPKR102		SWCH_12.00	1174	4028 5048 B000 B010 B020 B03...	#3325 - FICON Express8 10KM LX	
CPCPKR1.0.50		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.51		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.52		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.53		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.54		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.55		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.56		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.57	1C0	FC	SPAN	LPPKR102		SWCH_12.20	1152	B000 B010 B020 B030 B100 B11...	#3325 - FICON Express8 10KM LX	
CPCPKR1.0.58		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.59		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.5A	160	FC	SPAN	LPPKR102		SWCH_11.20	1152	B000 B010 B020 B030 B100 B11...	#3325 - FICON Express8 10KM LX	
CPCPKR1.0.5B		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.5C	150	FC	SPAN	LPPKR102		SWCH_11.00	1174	4020 5040 B000 B010 B020 B03...	#3325 - FICON Express8 10KM LX	
CPCPKR1.0.5D		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.5E		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	
CPCPKR1.0.5F		FC	SHR	LPPKR102			0		#3325 - FICON Express8 10KM LX	

Figure 8-12 HCM: Filtering results for CHPIDs

Notice also that the **Save As** option can save the filtered data to the workstation with various delimiters for use as input, for example into a spreadsheet.

Clicking the Filter check box toggles the filter on and off. These setting can also be saved.

Additionally the column name can be clicked to sort the data in ascending and descending order for that column.

8.3 HCM configuration examples

Using the same configuration example in Chapter 7, “Configuration with HCD” on page 83, we show how HCM can be used to create the same configuration, along with additional features that HCM offers when you create a hardware configuration. See Figure 8-13 on page 229.

Note: Although these procedures document the standard methods for accessing and invoking the HCM options and utilities, as the configuration starts to build, double-clicking the objects or items in locate lists might be more convenient for you.

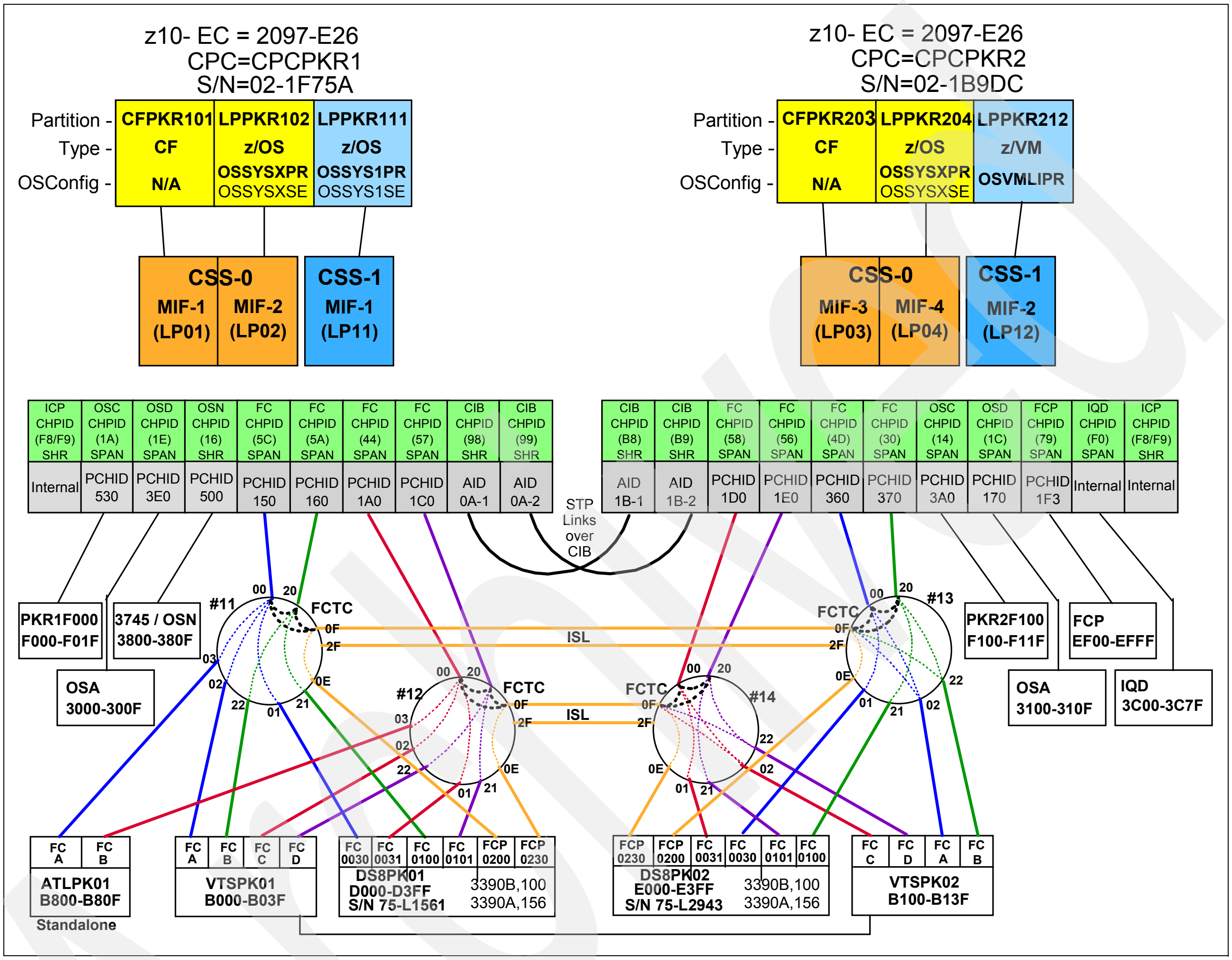


Figure 8-13 Configuration example

8.3.1 Creating OS configurations, EDTs, and esoterics

To create OS configurations, EDTs, and esoterics, perform the following steps:

1. Select **Edit → OS configurations.**
2. Click **Create OS Config.**

   Enter name, type and description, as shown in Figure 8-14 on page 230.

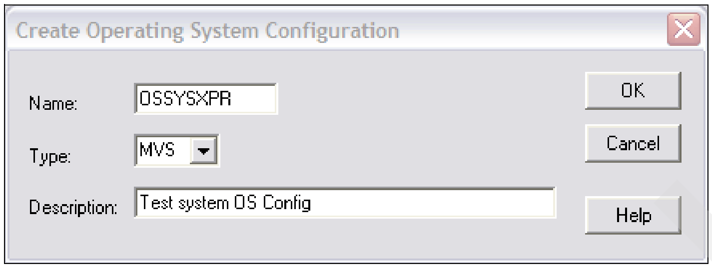


Figure 8-14 HCM: Create Operating System Configuration

3. Click **OK**.
4. Select the newly created OS configuration and click **Create EDT.**
5. Enter the EDT number and description, as shown in Figure 8-15.

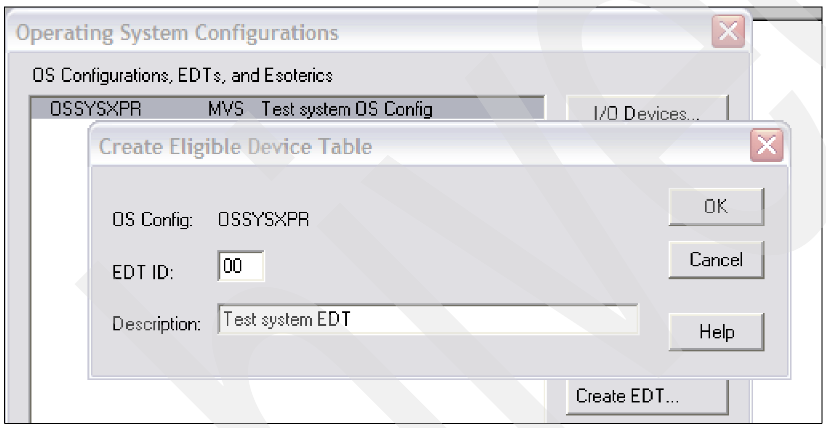


Figure 8-15 HCM: Create EDT

6. Click **OK**.
7. Select the newly created EDT.
8. Click **Create Esoteric**.

   Enter the esoteric name and token, and then select the VIO Eligible check box. See Figure 8-16.

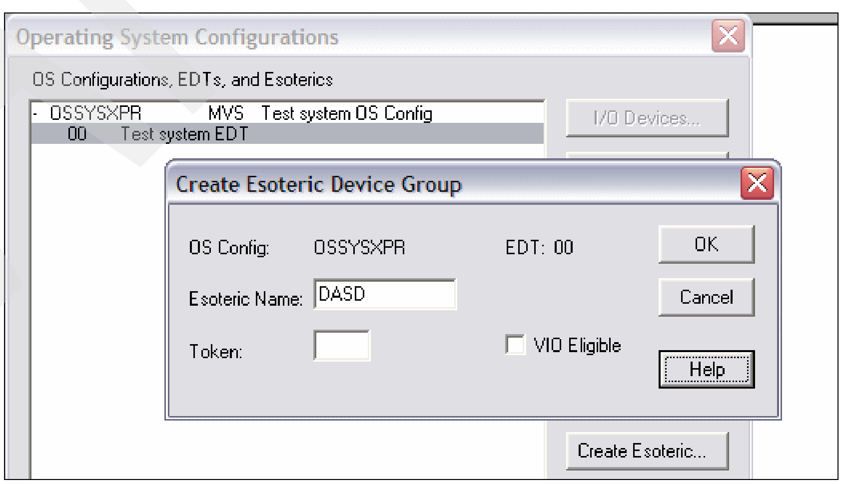


Figure 8-16 HCM: Create Esoteric Device Group

9. Click **OK**.
10. Continue until all required esoterics are created.
11. Click **Close**.

After we create devices, in a later step, we add them to the esoterics with consoles to the OS configuration.

8.3.2 Creating a processor

To create a processor, perform the following steps:

1. Select **Create** → **Processor.**

   Enter ID, Short name, Description, Serial No.,Type-Model, Network Name, CPC Name and Local system name, as shown in Figure 8-17.

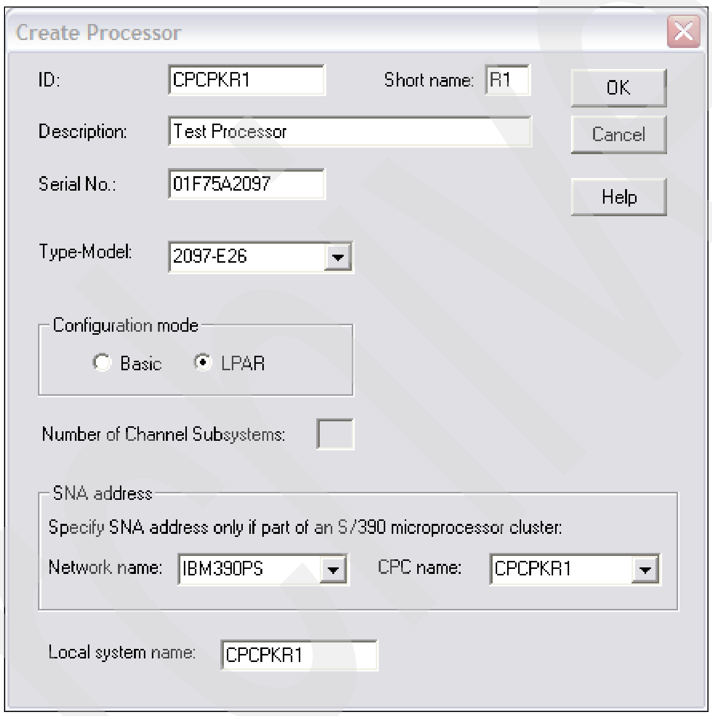


Figure 8-17 HCM: Create Processor

2. Click **OK**.
3. Choose **Support Level** and click **OK.**
4. At the following message that is displayed, click **OK**.

   `CBDG540I Definitions of processor CPCPKR1 has been extended to its maximum configuration`
5. Click **OK**.
6. Press **F2** (Fit to window) to show the complete processor object.
7. Continue until all required processors are created.

8.3.3 Creating a partition

To create a partition, perform the following steps:

1. Select **Edit** → **Processor.**
2. Select **CPCPKR1**; we can add partitions to CPCPKR1 (if more than one processor is defined to the IODF).
3. Click **OK.**
4. Select **Channel SubSystem ID-0** so we can create a new partition in CSS0.
5. Click **Partitions** in the Processor window.

   Observe that 15 partitions have been created, reserved with the name of asterisk (*). See Figure 8-18.
6. In the Partitions window, select the partition ID, click **Edit**, and enter information in the ID, Description, and Usage fields in the Edit Partition dialog box.

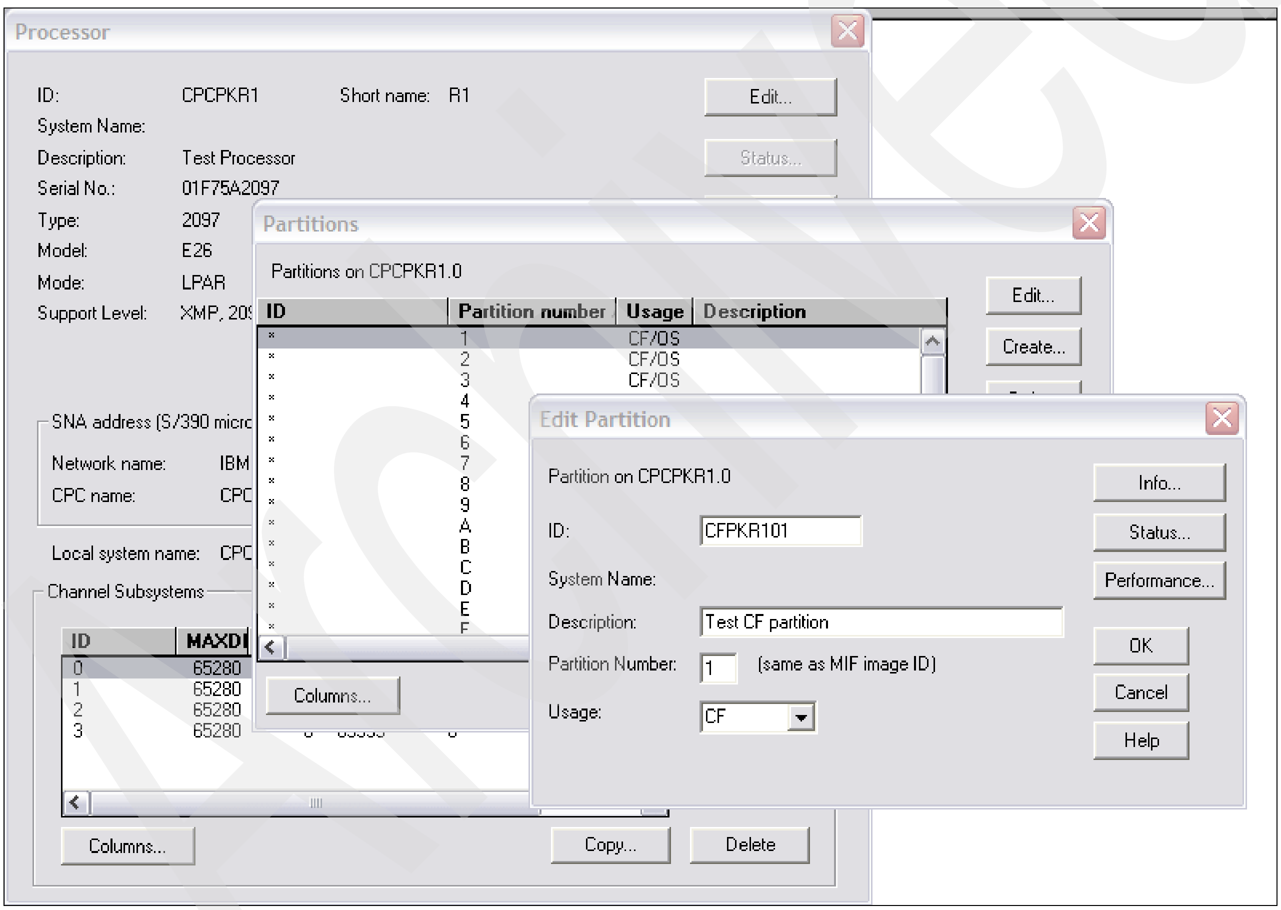


Figure 8-18 HCD: Create/Edit Partition

7. Click **OK.**
8. Continue until all required partitions have been edited.
9. Click **OK.**

8.3.4 Creating a CHPID

To create a CHPID, perform the following steps:

1. Select **Edit** → **Processor.**
2. Select **CPCPKR1** (so we can add Partitions to CPCPKR1, if more than one processor is defined to the IODF).
3. Click **OK.**
4. Select **Channel SubSystem ID-0** (so we can create CHPIDs for that CSS0).
5. In the Processor window, click **CHPIDs.**
6. In the CHPIDs window, click **Create.**
7. Enter information in these fields: From, or From and To (for CHPID ID), Description, and Type. Also, select a mode. See Figure 8-19.

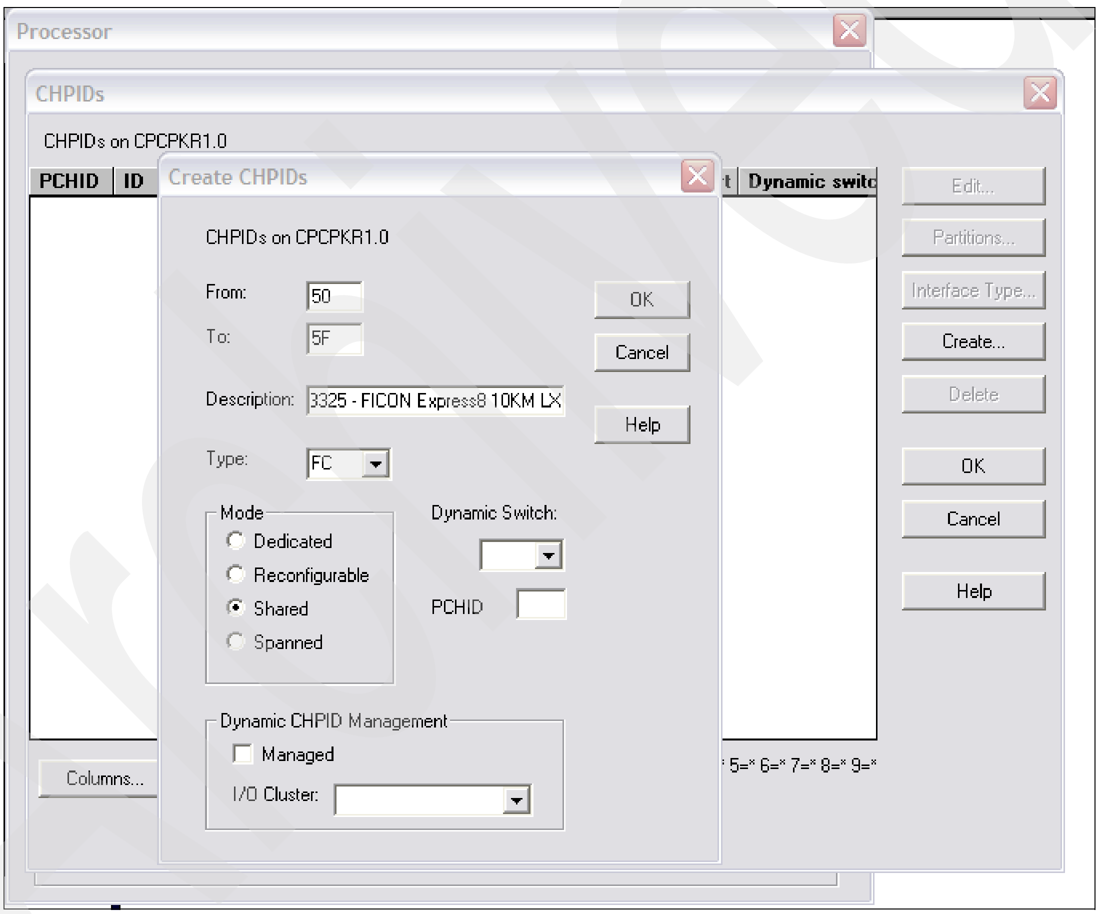


Figure 8-19 HCM: Create CHPIDs

8. Click **OK.**
9. Click **Add** to add CHPIDs to the Access or Candidate list. See Figure 8-20 on page 234.

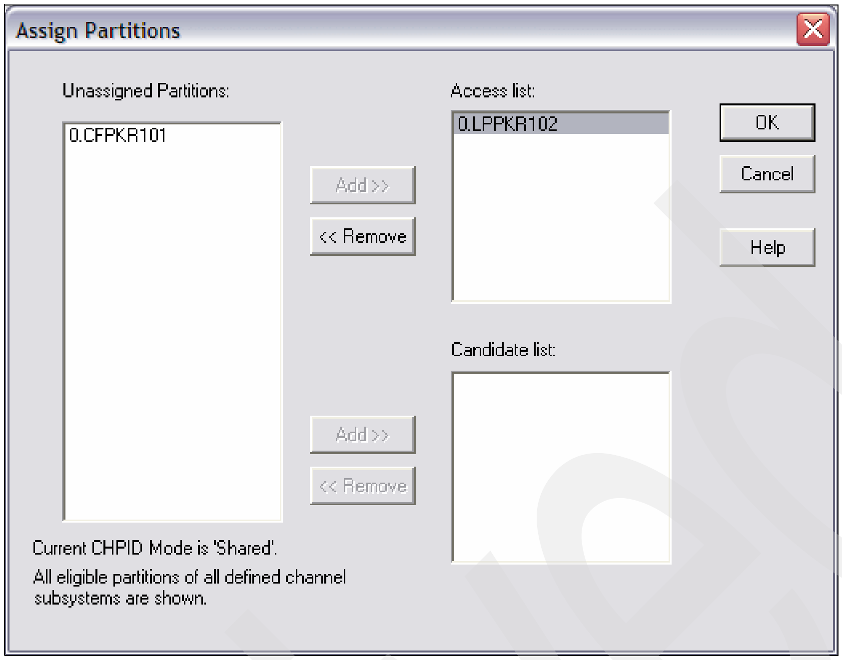
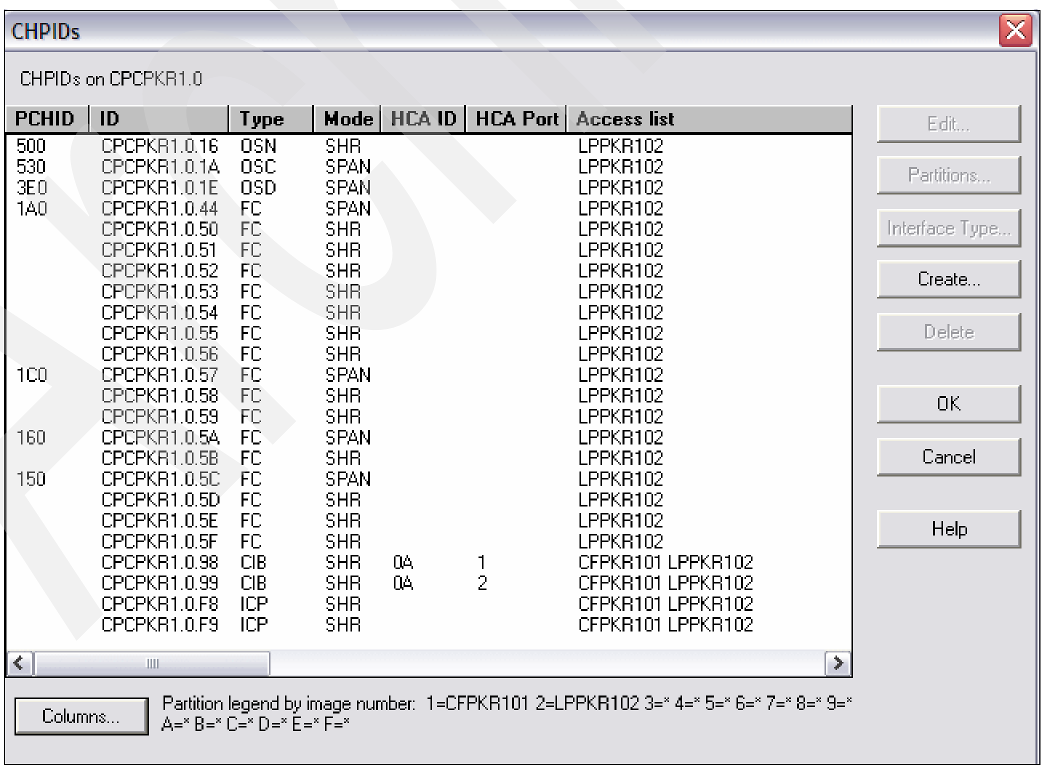


Figure 8-20 HCM: Assign Partitions

10.Click **OK.**

11.Continue until all required chpids have been created.

Figure 8-21 is a sample of the CHPID list according to our configuration example.



PCHID	ID	Type	Mode	HCA ID	HCA Port	Access list
500	CPCPKR1.0.16	OSN	SHR			LPPKR102
530	CPCPKR1.0.1A	OSC	SPAN			LPPKR102
3E0	CPCPKR1.0.1E	OSD	SPAN			LPPKR102
1A0	CPCPKR1.0.44	FC	SPAN			LPPKR102
	CPCPKR1.0.50	FC	SHR			LPPKR102
	CPCPKR1.0.51	FC	SHR			LPPKR102
	CPCPKR1.0.52	FC	SHR			LPPKR102
	CPCPKR1.0.53	FC	SHR			LPPKR102
	CPCPKR1.0.54	FC	SHR			LPPKR102
	CPCPKR1.0.55	FC	SHR			LPPKR102
	CPCPKR1.0.56	FC	SHR			LPPKR102
1C0	CPCPKR1.0.57	FC	SPAN			LPPKR102
	CPCPKR1.0.58	FC	SHR			LPPKR102
	CPCPKR1.0.59	FC	SHR			LPPKR102
160	CPCPKR1.0.5A	FC	SPAN			LPPKR102
	CPCPKR1.0.5B	FC	SHR			LPPKR102
150	CPCPKR1.0.5C	FC	SPAN			LPPKR102
	CPCPKR1.0.5D	FC	SHR			LPPKR102
	CPCPKR1.0.5E	FC	SHR			LPPKR102
	CPCPKR1.0.5F	FC	SHR			LPPKR102
	CPCPKR1.0.98	CIB	SHR	0A	1	CFPKR101 LPPKR102
	CPCPKR1.0.99	CIB	SHR	0A	2	CFPKR101 LPPKR102
	CPCPKR1.0.F8	ICP	SHR			CFPKR101 LPPKR102
	CPCPKR1.0.F9	ICP	SHR			CFPKR101 LPPKR102

Figure 8-21 HCM: CHPID listing

12. Click **OK** twice.

13. Select **View** → **Filter Diagram.**

14. Select the **Show All CHPIDs** check box.

15. Press F2 (Fit to window) to show the complete processor object.

16. Because we are only working with CSS-0 and CSS-1, we remove CSS-2 and CSS-3 from the processor display:

   a. Select **View** → **Filter Diagram.**

   b. In the Processors and Partitions window, select all reserved partitions pertaining to CSS-2 and CSS-3.

   c. Click **Exclude.**

   d. Click **OK.**

17. We can now remove all reserved partitions from CSS-0 and CSS-1 to add more clarity to our diagram:

   a. Select **View** → **Filter Diagram.**

   b. In the Processors and Partitions window, highlight all reserved partitions pertaining to CSS-0 and CSS-1.

   c. Click **Exclude.**

   d. Click **OK.**

8.3.5 Creating a switch

To create a switch, perform the following steps:

1. Select **Create** → **Switch**.
2. Enter information in these fields, as shown in Figure 8-22: Switch ID, Switch Address, Type-Model, Description, Serial No, Installed Ports, Control Unit Number, Device Number.

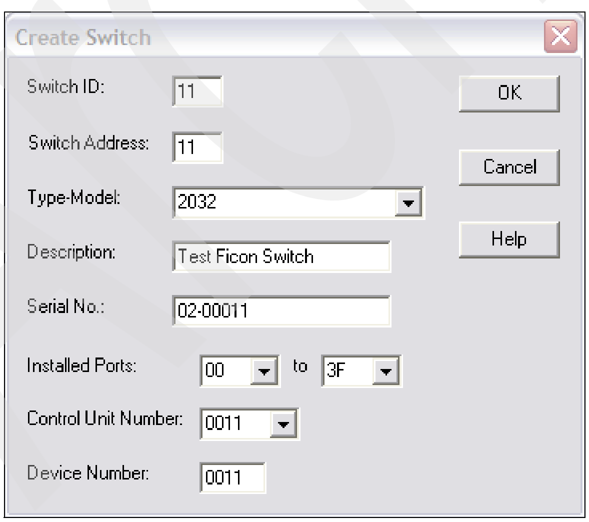


Figure 8-22 HCM: Create Switch

3. Click **OK.**
4. Continue until all required switches have been created.

Figure 8-23 shows a sample of the four switches, according to our configuration example.

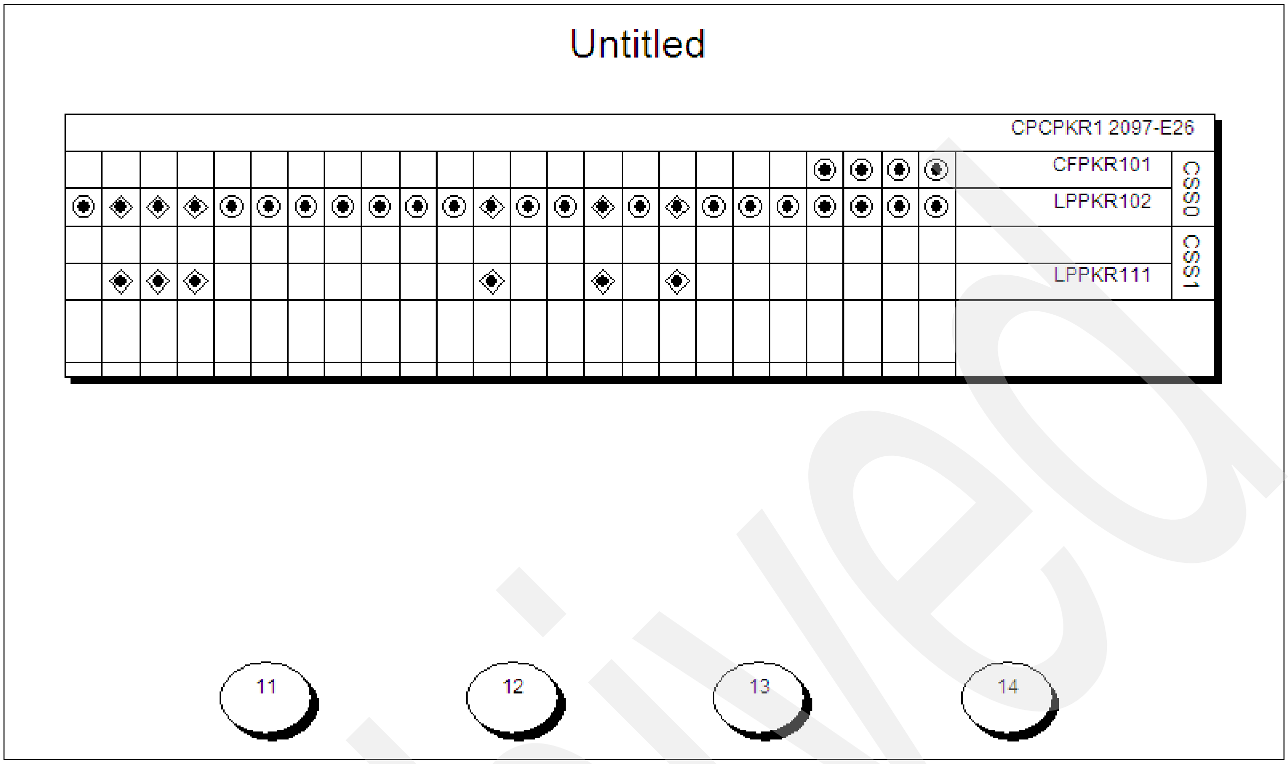


Figure 8-23 HCM: Create Switches example

8.3.6 Creating ISLs between switches

To create ISLs between switches, perform the following steps (and see Figure 8-24 on page 237):

1. Select **Edit** → **Switch**.
2. Select **Switch ID #11**, so we can edit the port connections for Switch #11.
3. Click **OK**.

   In this example, we connect Switch Ports 0F <-> 0F and Switch Ports 2F <-> 2F between Switch ID #11 <-> #13 and Switch ID #12 <-> #14.

   > **Note:** A bidirectional communication path is indicated by the <-> symbol.

4. Scroll down to and select **Port 0F**.
5. Click **Connect**.
6. Double-click **SWCH_13** to expand its Port List.
7. Select **Port 0F**.

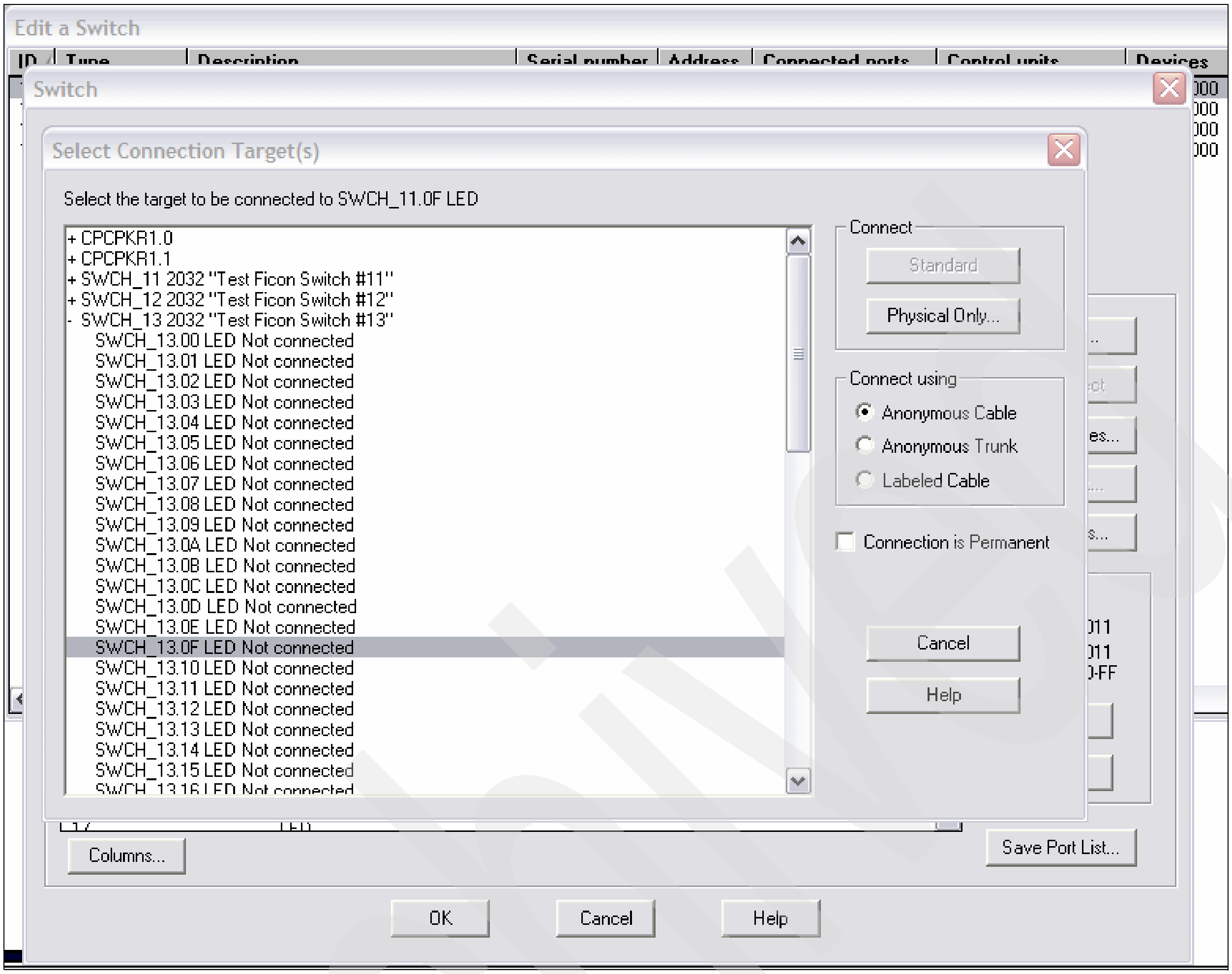


Figure 8-24 HCM: Connect Switch ISL Ports

8. Click **Physical Only**.
9. Continue until all required ISL ports have been connected.
10. Click **OK**, and then click **Close**.
11. Because the default display for HCM is not to display Physical Connections, the Filter must be adjusted, as follows:
    a. Select **View** → **Filter Diagram**.
    b. Click the **Objects with physical-only connections** check box.
    c. Click **OK**.

The inter-switch links are now displayed. See Figure 8-25 on page 238.

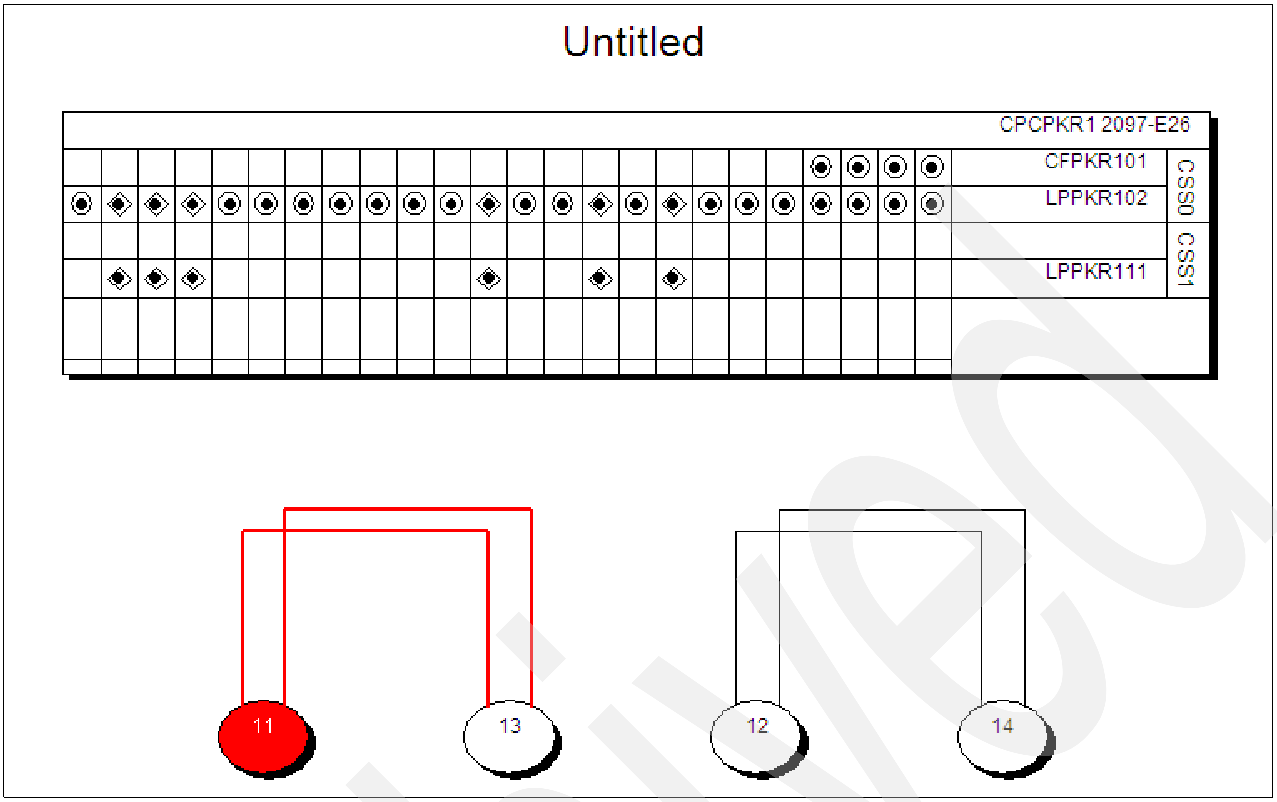


Figure 8-25 HCM: Switch ISL ports display

8.3.7 Creating a 2107 DASD subsystem

HCM uses physical description files (PDFs) so that the controller diagram can represent, as closely as possible, the physical hardware. For example, DASD can be configured in many ways with various card and port numbers.

We show how this comes into effect in our DASD example.

For more details about how to set up and modify PDF files, see the *Hardware Configuration Manager User's Guide,* SC33-7989.

> **Note:** To make a new or modified PDF available to HCM, the text file must be saved to the CPDFA folder for controllers, and the SPDFA folder for strings. Additionally, the HCM program must be restarted on the PC workstation.

Figure 8-26 on page 239 shows a PDF file that contains a 2107 with 4x I/O cards, each with four ports.

```
! Licensed Materials - Property of IBM
! 5694-A01, 5739-A03
! (c) Copyright IBM Corp. 1995, 2006
!
 Subsystem = "DS8PK01 Model 2107-932"
        AbbrevId = "21070005"
        UnitType = "2107"
        Class = "DASD"
        ComGroup = No
        CanGroupAdapters = No
        OwnsAllDevices = Yes
        Integrated = Yes
        Allow 1 Controllers
        CONTROLLER
           SEGMENT
              Allow (2, 4) DEFAULT 4 CAs
              CA =  "R1E1S4" DEFAULT 4 CUINTS = (0030, 0031, 0032, 0033)
              CA =  "R1E2S1" DEFAULT 4 CUINTS = (0100, 0101, 0102, 0103)
              CA =  "R1E3S1" DEFAULT 4 CUINTS = (0200, 0201, 0202, 0203)
              CA =  "R1E3S4" DEFAULT 4 CUINTS = (0230, 0231, 0232, 0233)
              Allow (2, 4, 6, 8, 10, 12, 14, 16) DEFAULT 16
              DEVINTS = ("", "", "", "", "", "", "", "", "", "", "", "", "", "", "", "")
```

Figure 8-26 HCM: Physical Description File example

The specifications for our first DASD subsystem are as follows:

- CU Type = 2107-932
- Serial number (S/N) = 71-L1561
- CHPID connections (processor -> entry switch -> exit switch -> DASD). A connection to be made is indicated by the -> symbol. See Table 8-1.

Table 8-1 CHPID connections

Processor and CHPID	Entry switch and port	Exit switch and port	DASD subsystem interface logical port ID
R1.5C	#11.00	#11.01	Interface #0030
R1.5A	#11.00	#11.21	Interface #0100
R1.44	#12.00	#12.01	Interface #0031
R1.57	#12.20	#12.21	Interface #0101

- CU IDs = D000, D100, D200, D300
- Device range = D000 - D3FF
- CUADDs range = 10 - 13
  - Device Type = 3390B x 100
  - Device Type = 3390A x 156

The specifications for our second DASD subsystem are as follows:

- CU Type = 2107-932
- S/N = 71-L2943

- CHPID connections (processor -> entry switch -> exit switch -> DASD). A connection to be made is indicated by the -> symbol. See Table 8-2.

Table 8-2 CHPID connections

Processor and CHPID	Entry switch and port	Exit switch and port	DASD subsystem interface logical port ID
R2.4D	#13.00	#13.01	Interface #0030
R2.30	#13.20	#13.21	Interface #0100
R2.58	#14.00	#14.01	Interface #0031
R2.56	#14.20	#14.21	Interface #0101

- CU IDs = E000, E100, E200, E300
- Device range = E000 - E3FF
- CUADDs range = 10 - 13
  - Device Type = 3390B x 100
  - Device Type = 3390A x 156

To create a 2107 DASD subsystem, perform the following steps:

1. Select **Create** → **I/O Subsystem.**
2. Click **Next**. A list of all existing PDF is displayed.
3. Select **DS8PK01**, as shown in Figure 8-27, and click **Next**.

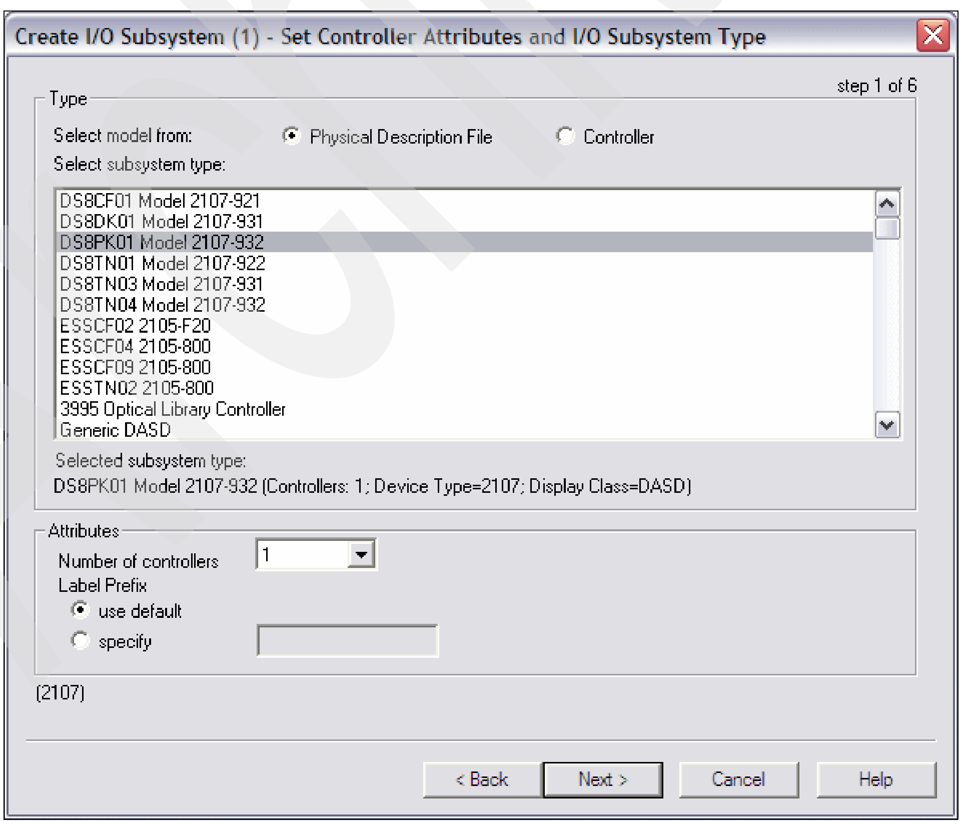


Figure 8-27 HCM: Create I/O Subsystem type

4. Enter information in these fields: Serial number, Starting number (D000), Offset (0100), SSID (D000), Description, and Times (4).
5. Click **Add.**

   The control units are added in the Added Control Units panel in the window, shown in Figure 8-28.

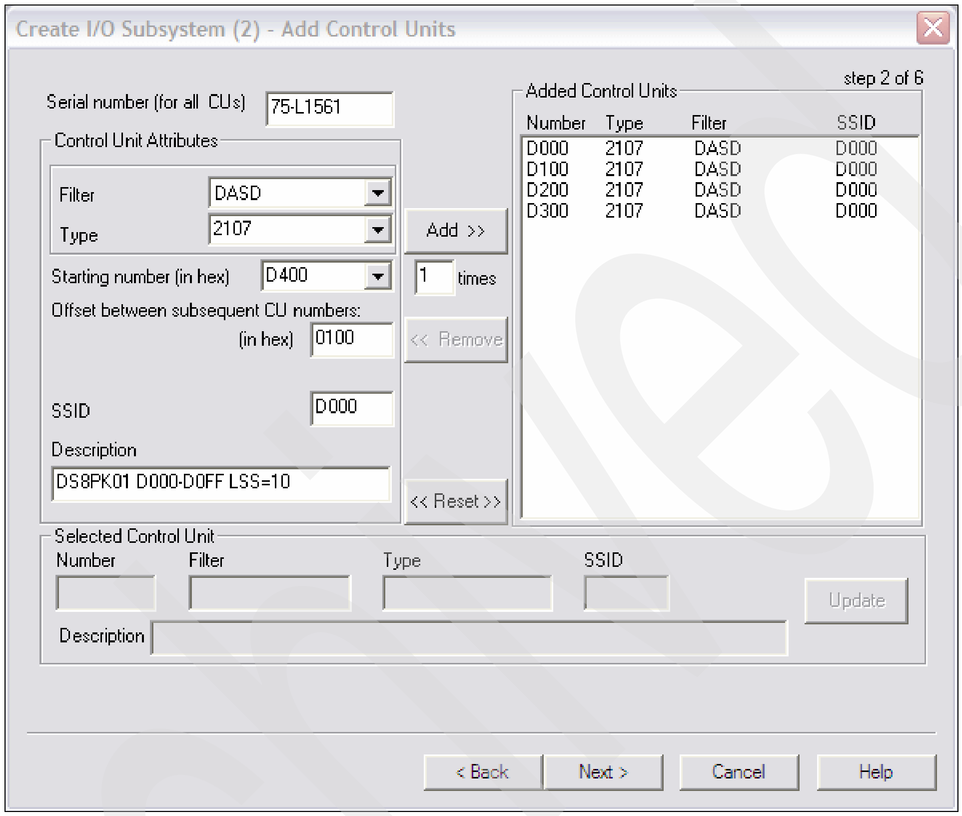


Figure 8-28 HCM: Create I/O Subsystem add CU

6. Click **Next** to open the next window, shown in Figure 8-29 on page 242.

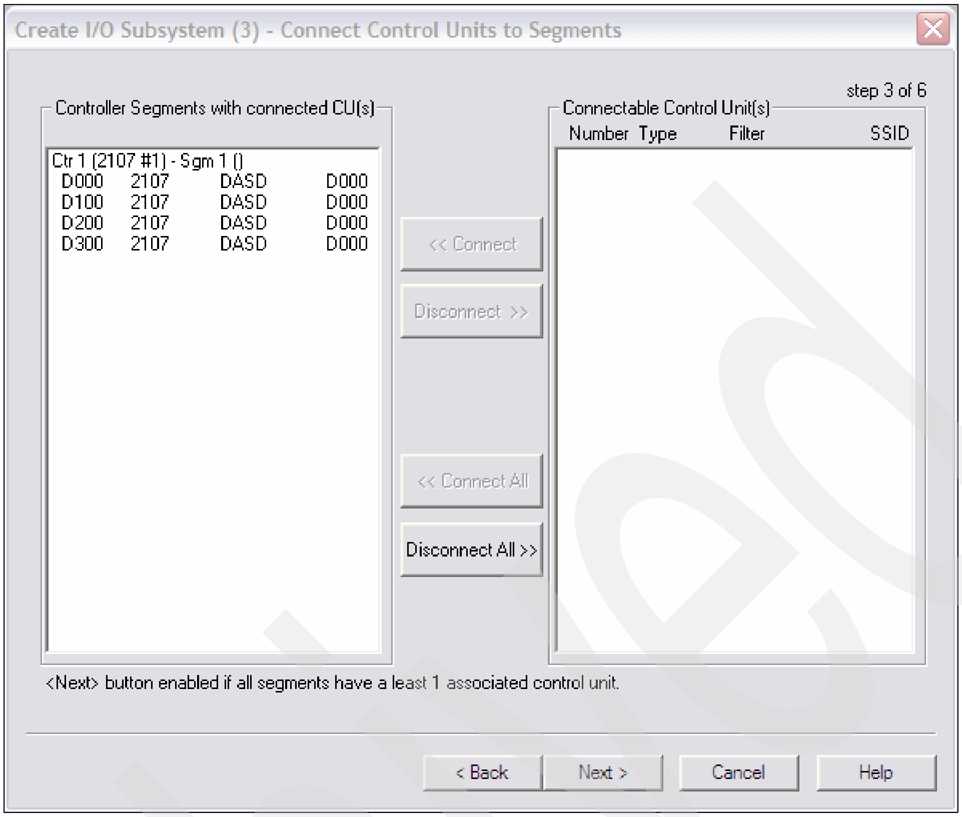


Figure 8-29 HCM: Create I/O Subsystem connect CU

7. Click **Next** again.
8. Enter information into these fields: Type (3390B), Starting device number (D000), Number of devices (100) Offset (0100), and Times (4).
9. Click **Add**.
10. Enter information into these fields: Type (3390A), Starting device number (D063), Number of devices (100) Offset (0100), Times (4). See Figure 8-30 on page 243.
11. Click **Add.**

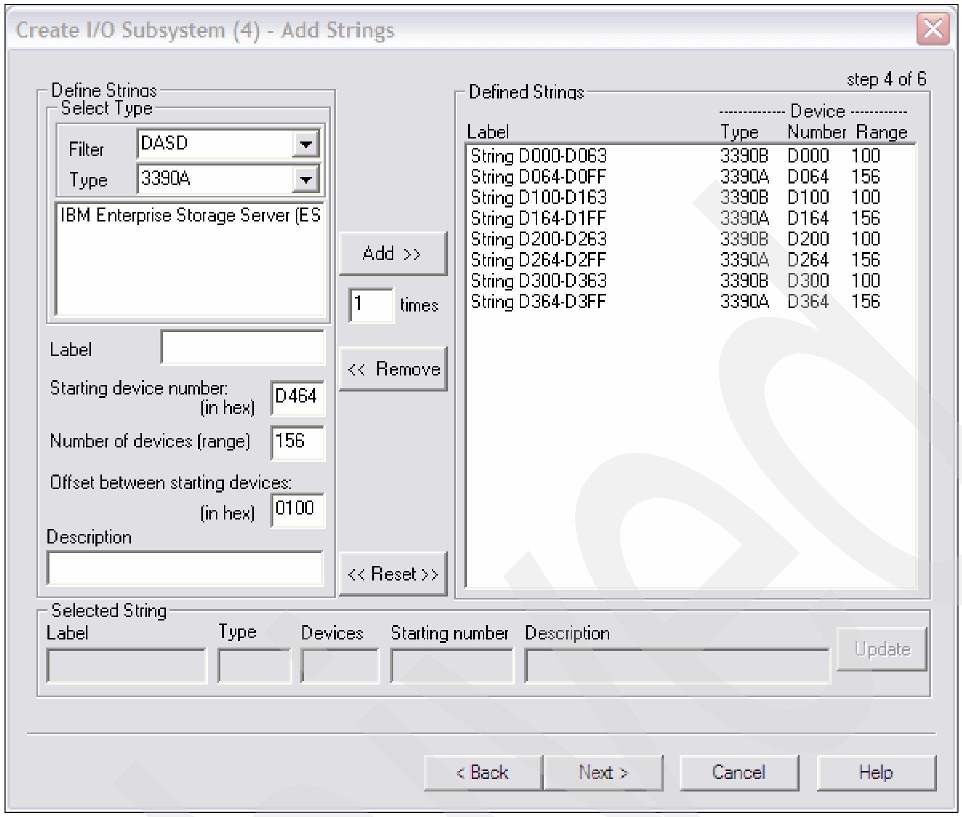


Figure 8-30 HCM: Create I/O Subsystem add String

12. Click **Next.**

    This panel, shown in Figure 8-31 on page 244, allows us to connect the device strings to a particular interface in the DASD controller. This step is mainly for aesthetics because the device strings are internal for 2107 DASD.

13. Select the *string* on the right and connect to the *interface* on the left.

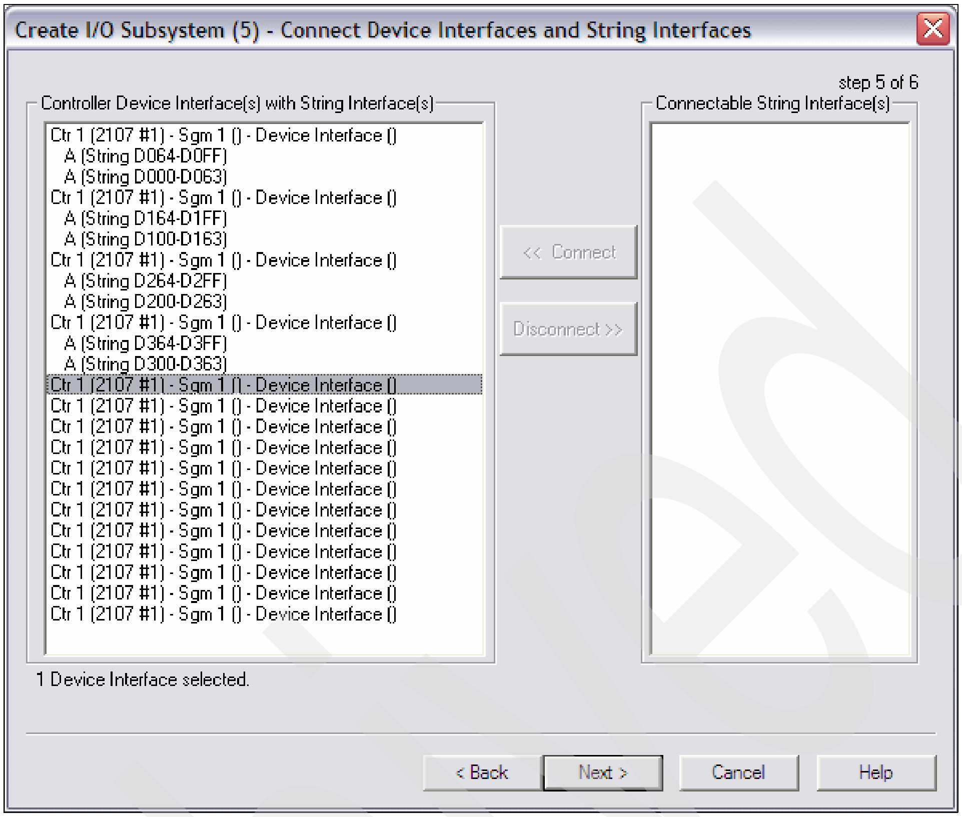


Figure 8-31 HCM: Create I/O Subsystem connect String

14. Click **Next.**

This next panel, in Figure 8-32 on page 245, shows how the controller and devices will be built.

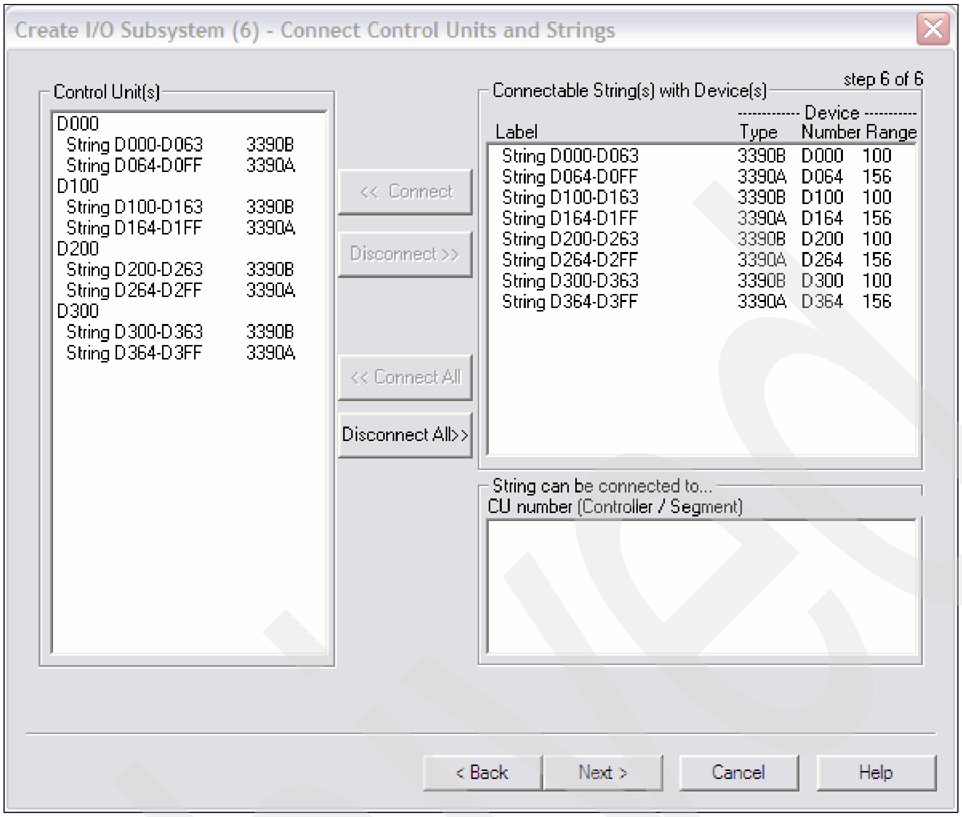


Figure 8-32 HCM: Create I/O Subsystem connect CU to String

15. If everything looks as expected, click **Next**; HCM issues the message shown in Figure 8-33.

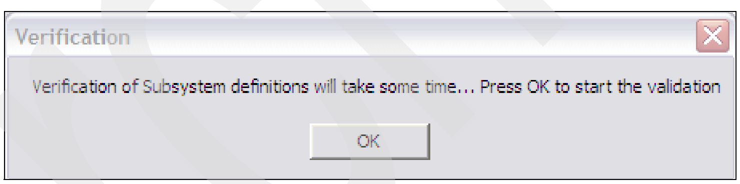


Figure 8-33 HCM: Create I/O Subsystem verification message

16. Click **OK**; HCM issues the message shown in Figure 8-34.

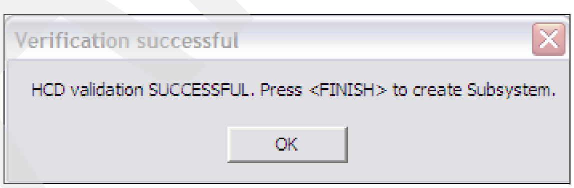


Figure 8-34 HCM: Create I/O Subsystem validation successful

17. Click **OK**; HCM displays the panel shown in Figure 8-35.

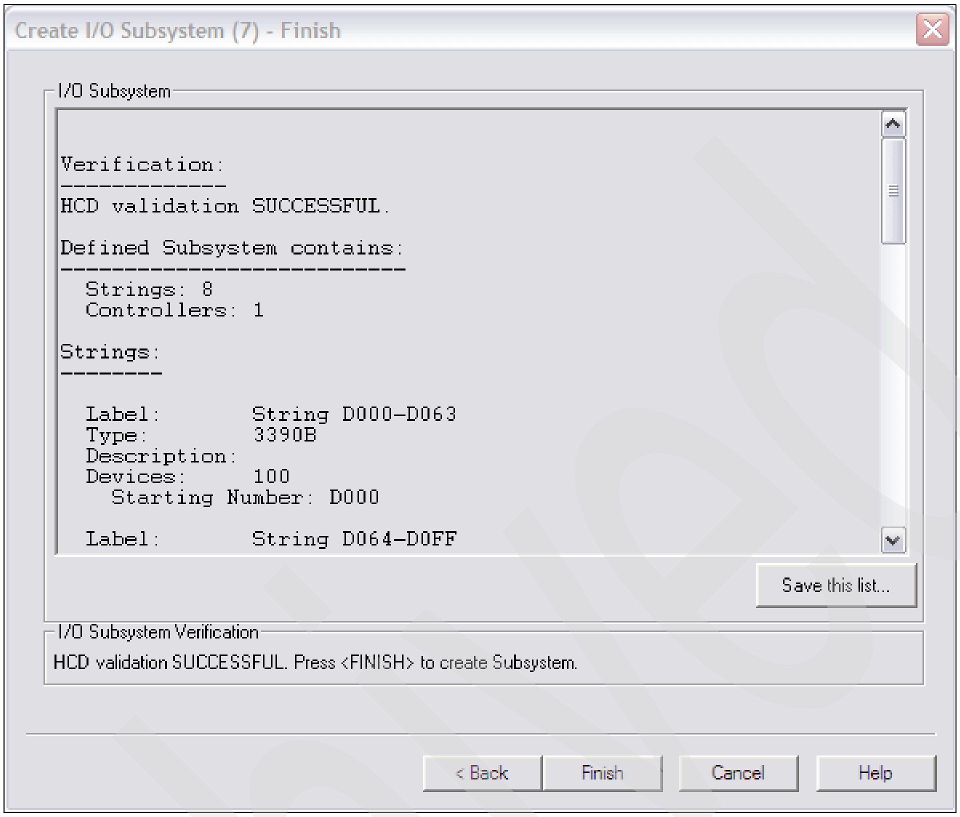


Figure 8-35 HCM: Create I/O Subsystem finish

18. Click **Finish**. The subsystem is created, as shown in Figure 8-36.

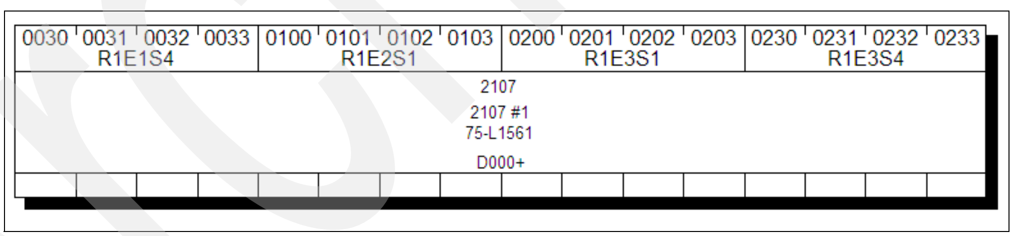


Figure 8-36 HCM: DASD Subsystem created

The DASD subsystem has been created with four cards (R1ExSx) with four ports (0xxx) containing four CUs (D000-D300) with four device strings (D000-D3FF)

We can now connect the controller to the switches and the processor CHPIDs.

First, we connect the CHPIDs from the processor to the switches as follows:

1. Select **Edit** → **Switch.**
2. Select **Switch ID #11**, so we can edit the port connections for switch #11.

3. Click **OK**.

   In our example, we make the following connections (The communication path is indicated by the -> symbol):

   – R1.5C -> #11.00
   – R1.5A -> #11.20
   – R1.44 -> #12.00
   – R1.57 -> #12.20

4. Scroll down to Port 00, select it, and click **Connect.**
5. Double-click **CPCPKR1.0** to expand its CHPID list.
6. Select **CPCPKR1.0.5C** to highlight CHPID 5C. See Figure 8-37.

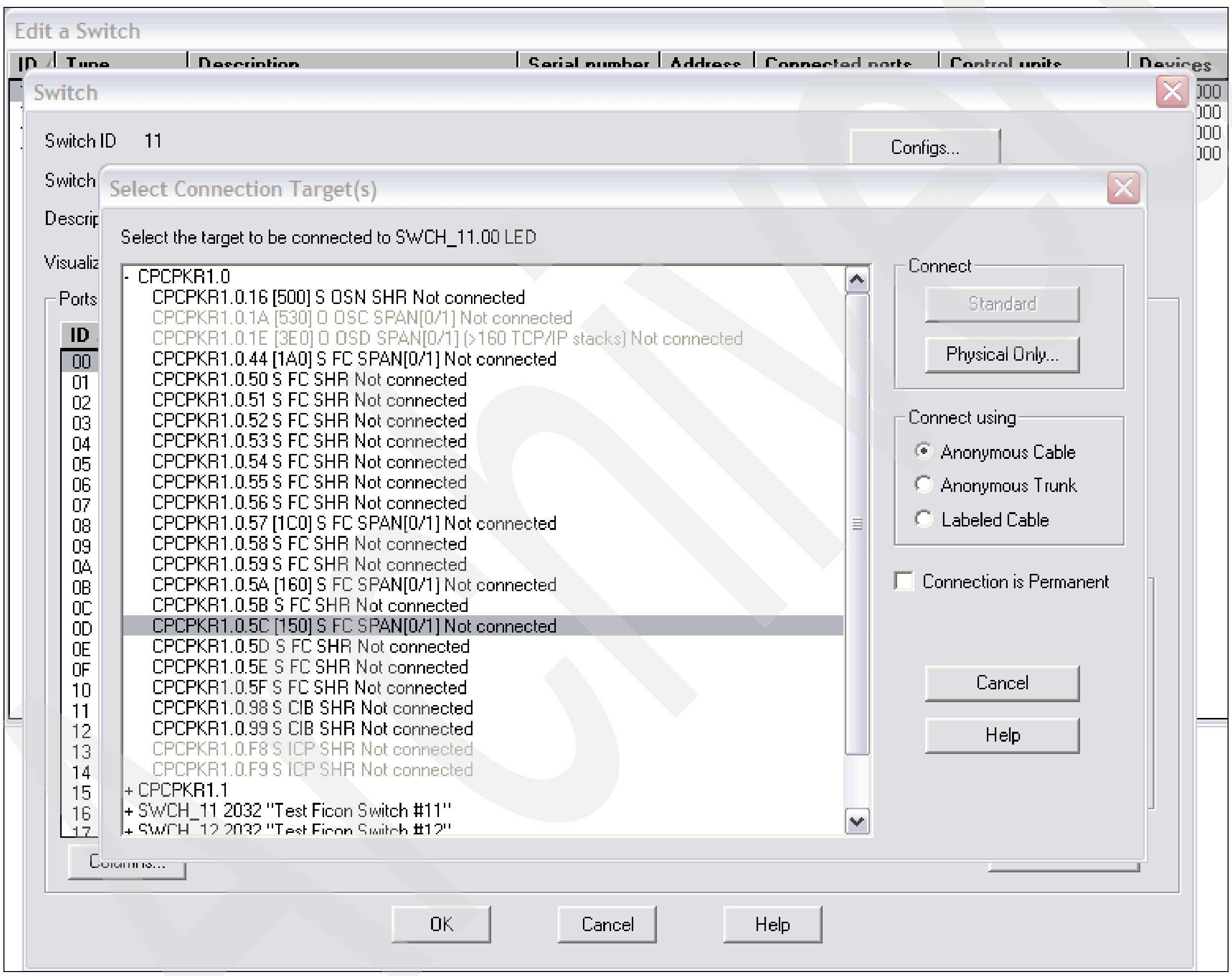


Figure 8-37 HCM: Connect CHPIDs to switch ports

7. Click **Physical Only.**
8. Continue until all required CHPIDs have connected.
9. Click **OK**, and then click **Close.**

   Figure 8-38 on page 248 shows the connection diagram.

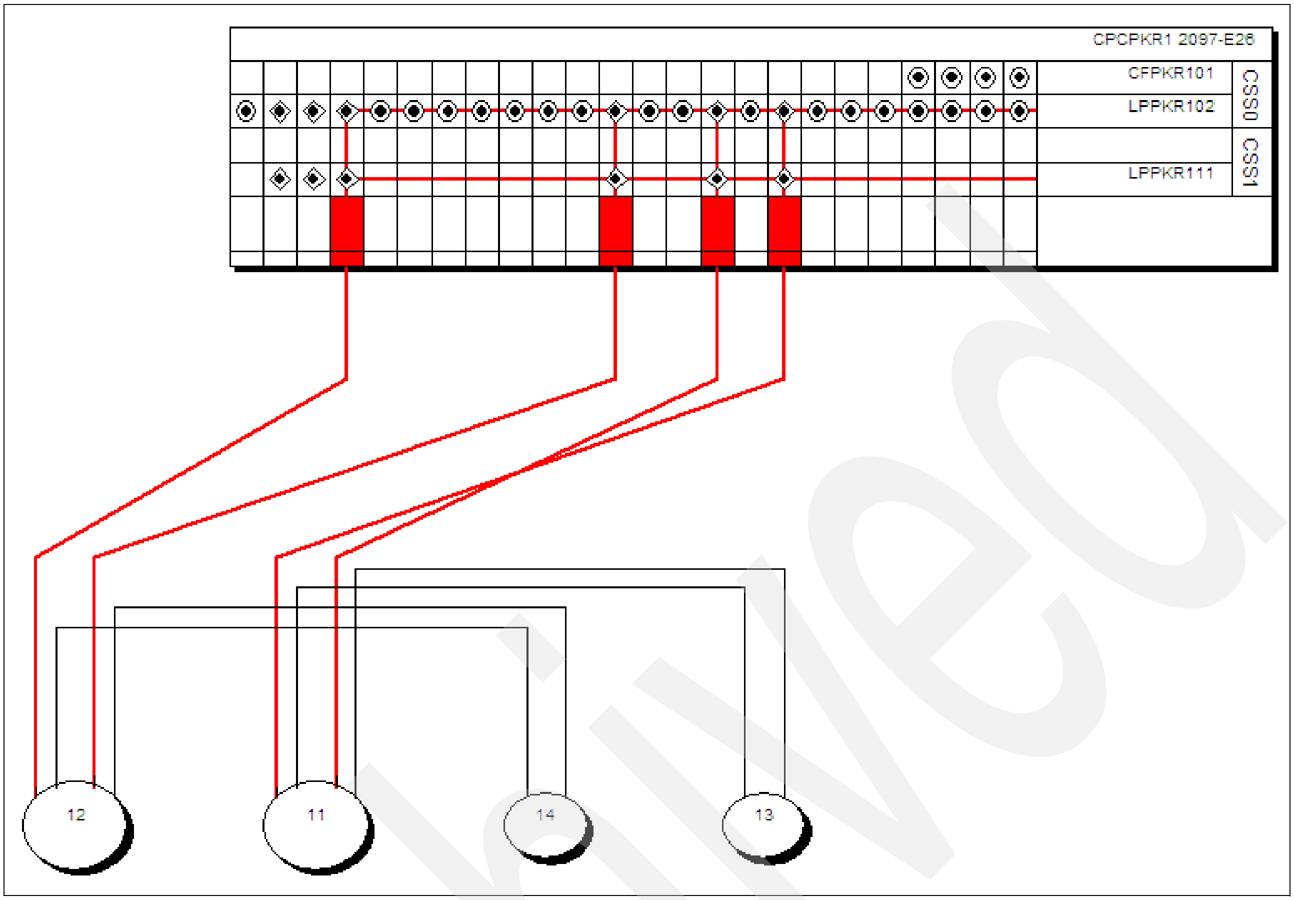


Figure 8-38 HCM: Connect CHPIDs to switch ports diagram

We connect the DASD controller to the switches then to the processor CHPIDs, as follows:

1. Select **Edit** → **Controller.**
2. Select **2107#1** to highlight it, so we can edit the interface connections for 2107#1.
3. Click **OK**.

   In our example, we make the following connections:

   – #11.01 -> DASD interface #0030
   – #11.21 -> DASD interface #0100
   – #12.01 -> DASD interface #0031
   – #12.21 -> DASD interface #0101

   The communication path is indicated by the -> symbol.
   The #11.01 indicates switch 11 port 01.

4. Press the Ctrl key and select **RSE1S4.0030** to highlight it, then click interfaces **0100**, **0031**, and **0101** so they are all highlighted. See Figure 8-39 on page 249.

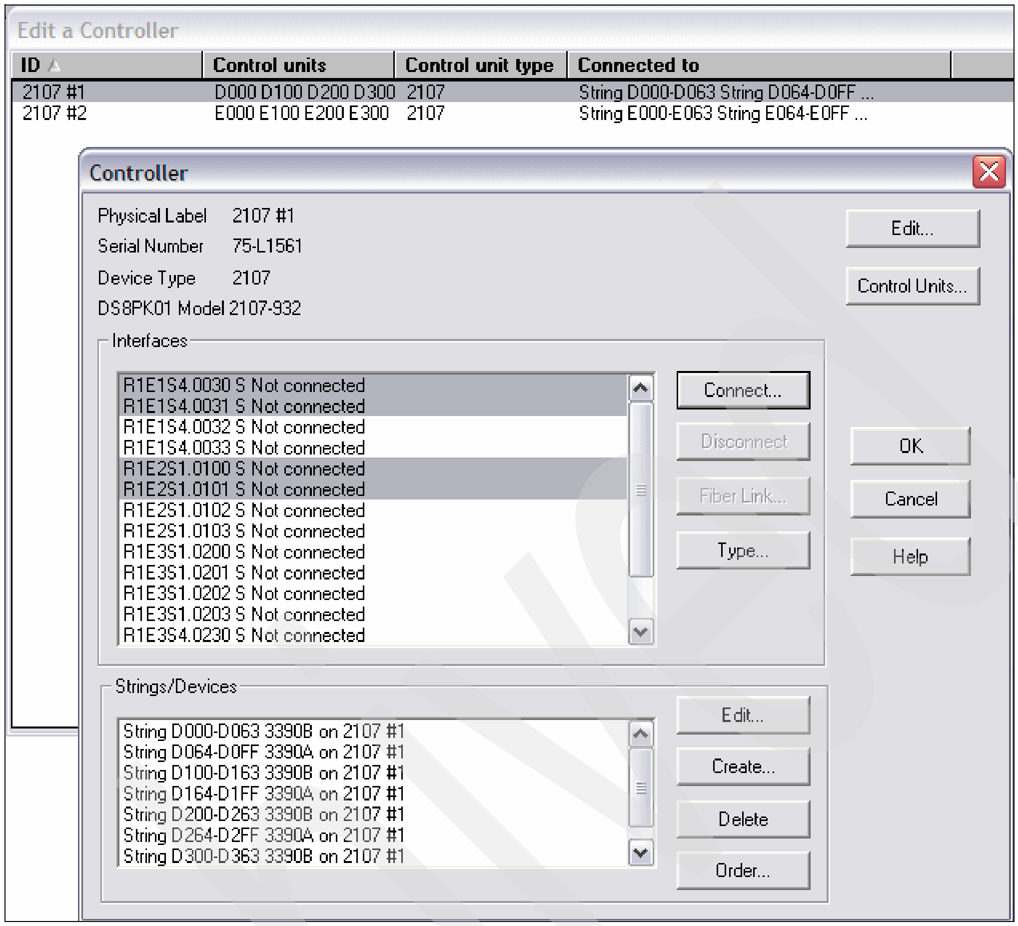


Figure 8-39 HCM: connect DASD to switch ports

5. Click **Connect.**
6. In the panel on the right, double-click **SWCH_11** to expand the port list, and select **SWCH_11.01** to highlight it.
7. In the left panel, **2107#1.R1E1S4.0030** to highlight it.
8. Click **Connect**. See Figure 8-40 on page 250.

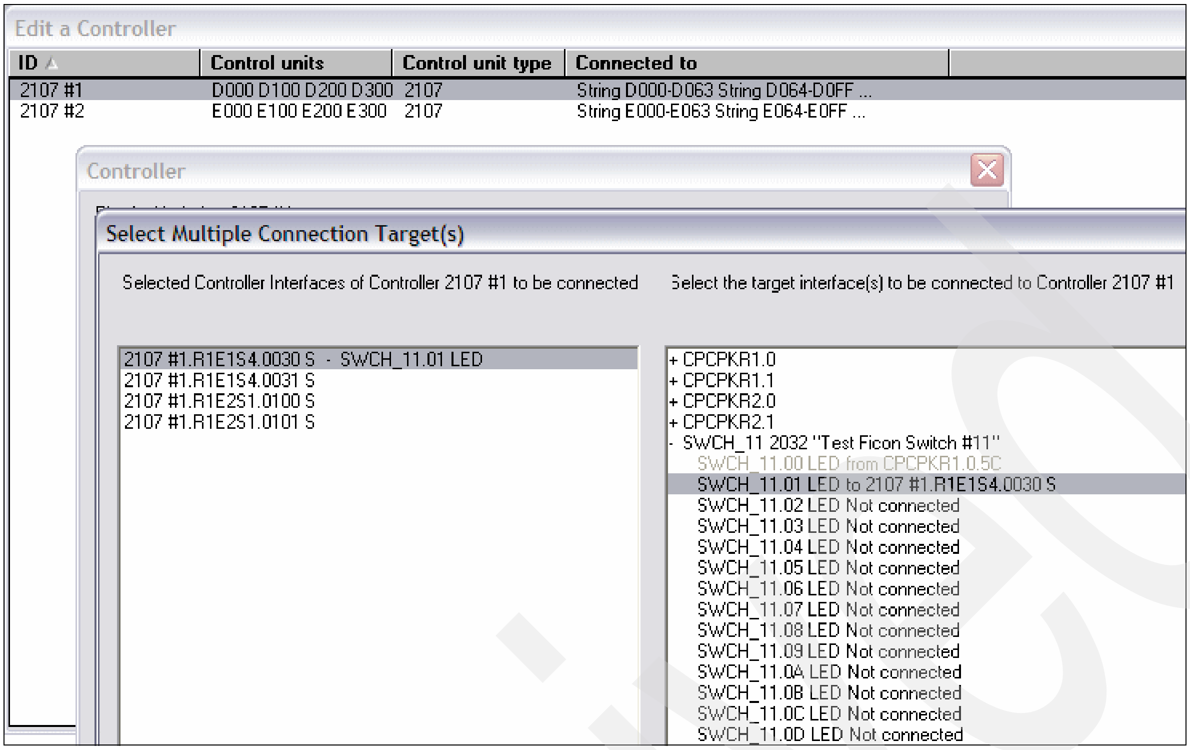


Figure 8-40 HCM: connect DASD to switch port targets

9. Continue until all required ports have connected to the DASD interfaces. See Figure 8-41.

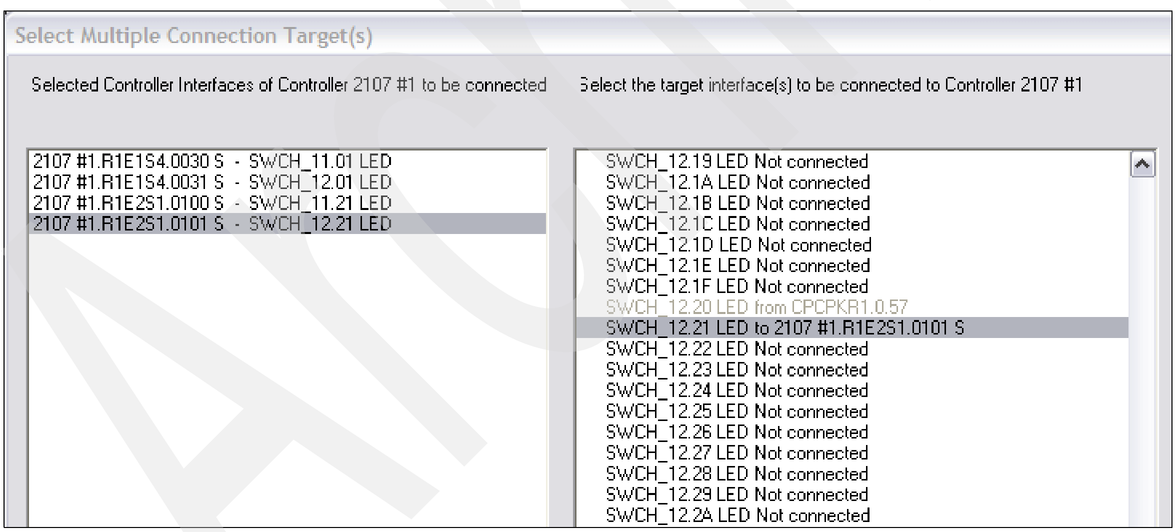


Figure 8-41 HCM: connect DASD to switch port standard

10. In the Connect window, click **Standard**.
11. Select the first control unit ID, and click **Connect.** See Figure 8-42 on page 251.

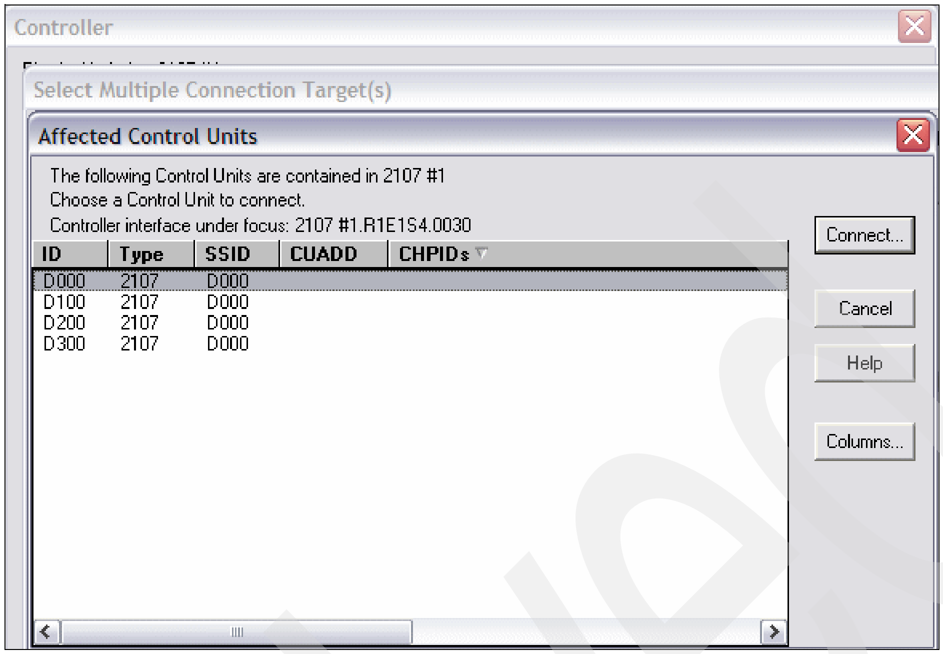


Figure 8-42 HCM: Connect DASD affected control units

12. Review the information at the top of the window to confirm the interface that you are connecting to.
13. In the left panel select CHPID **5C,** because we are connecting CHPID 5C to interface 0030. See Figure 8-43.
14. Click **Add >**

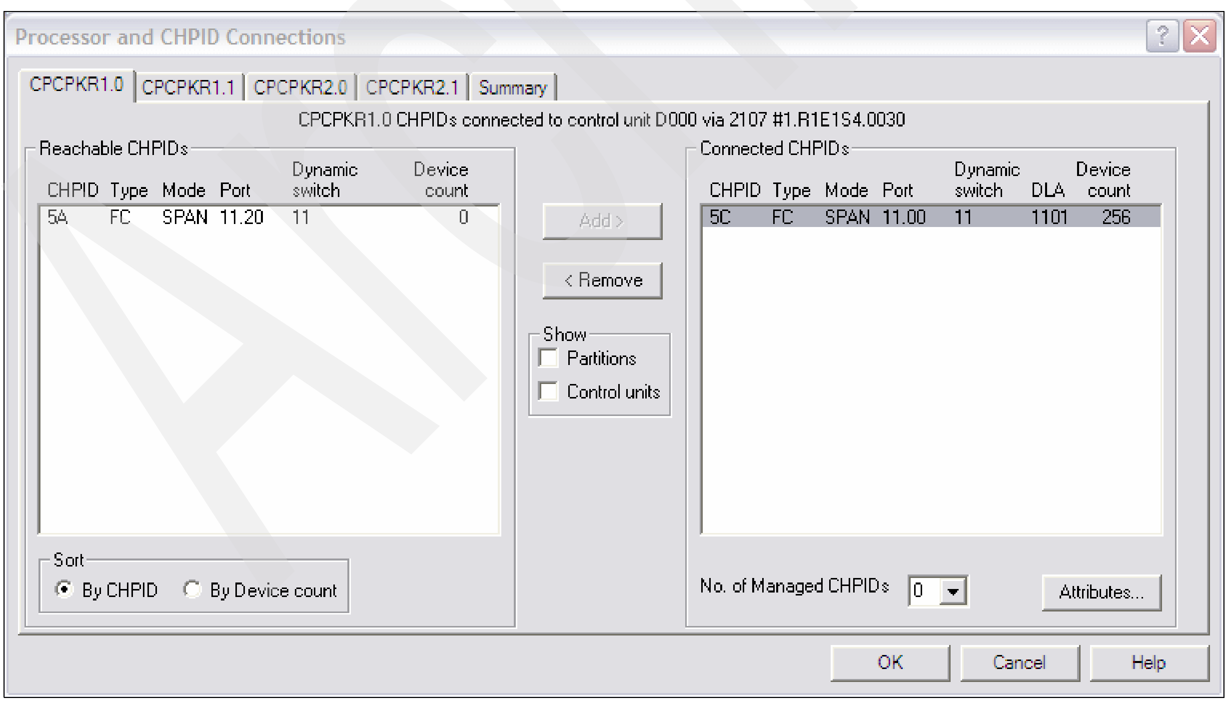


Figure 8-43 HCM: Processor and CHPID connections

15. Click **Attributes.** The dialog box in Figure 8-44 on page 252 opens.

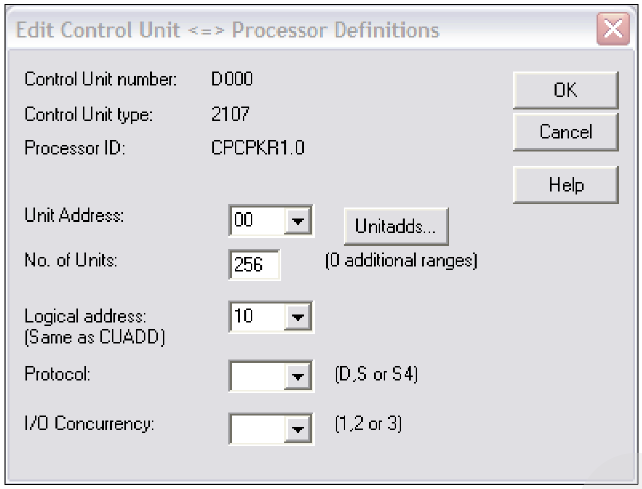


Figure 8-44 HCM: Edit control unit processor definitions

In our example, we use Unit Address = 00, No of Units = 256, Logical Address = 10.

16. Click **OK** twice.

17. Continue until all Control Units are connected to CHPID 5C. Remember that CU D100 will have Logical address 11, D200 = 12 and D300 = 13. See Figure 8-45.

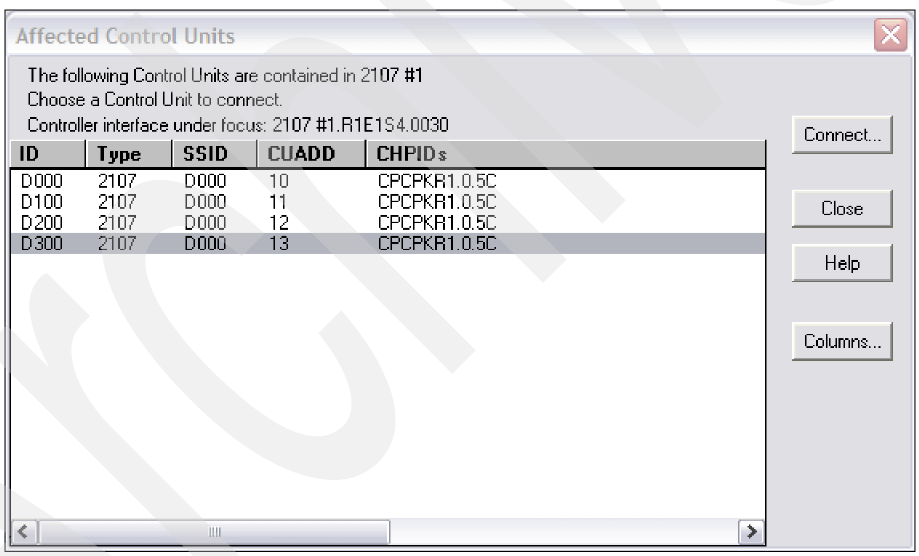


Figure 8-45 HCM: connecting CHPID to all Control Units

18. Click **Close.**

19. Continue until all CHPIDs are connected to all control units.

    Notice that after the initial CHPID connection to the first control unit, the attributes are *remembered*. See Figure 8-46 on page 253.

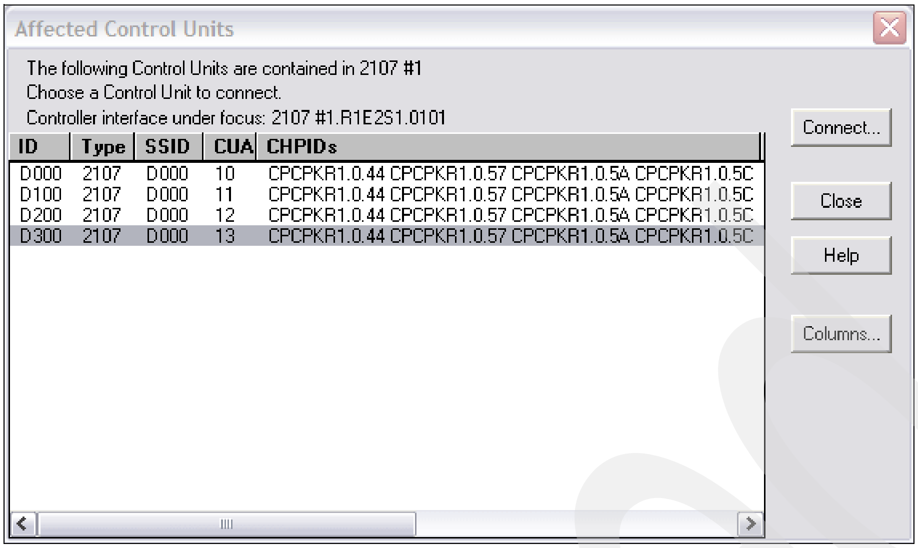


Figure 8-46 HCM: connecting all CHPID to all Control Units

20. Click **Close,** then **OK**, and then **Close**.

21. Press F2 (Fit to window) to return the diagram to the previously filtered display. See Figure 8-47.

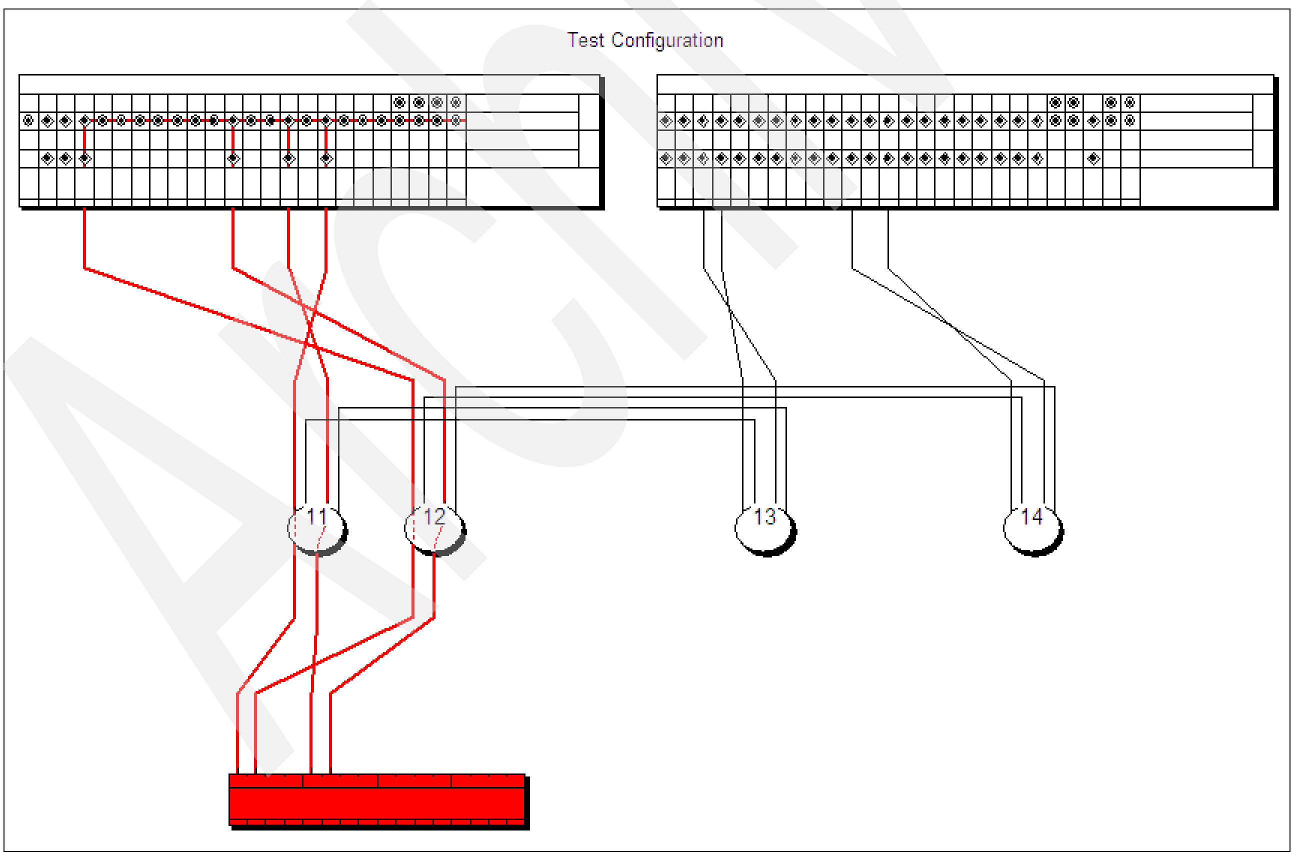


Figure 8-47 HCM: DASD connected display

22. Continue to connect the other DASD subsystem according the next example.

The specifications for our second DASD subsystem are as follows (see also Figure 8-48):

- CU Type = 2107-932
- S/N = 71-L2943
- CHPID connections (processor -> entry switch -> exit switch -> DASD). A connection to be made is indicated by the -> symbol. See Table 8-3.

Table 8-3 CHPID connections

Processor and CHPID	Entry switch and port number	Exit switch and port number	DASD subsystem interface logical port ID
R2.4D	#13.00	#13.01	Interface #0030
R2.30	#13.20	#13.21	Interface #0100
R2.58	#14.00	#14.01	Interface #0031
R2.56	#14.20	#14.21	Interface #0101

- CU IDs = E000, E100, E200, E300
- Device Range = E000-E3FF
- CUADDs = 10-13
  - Device Type = 3390B x 100
  - Device Type = 3390A x 156

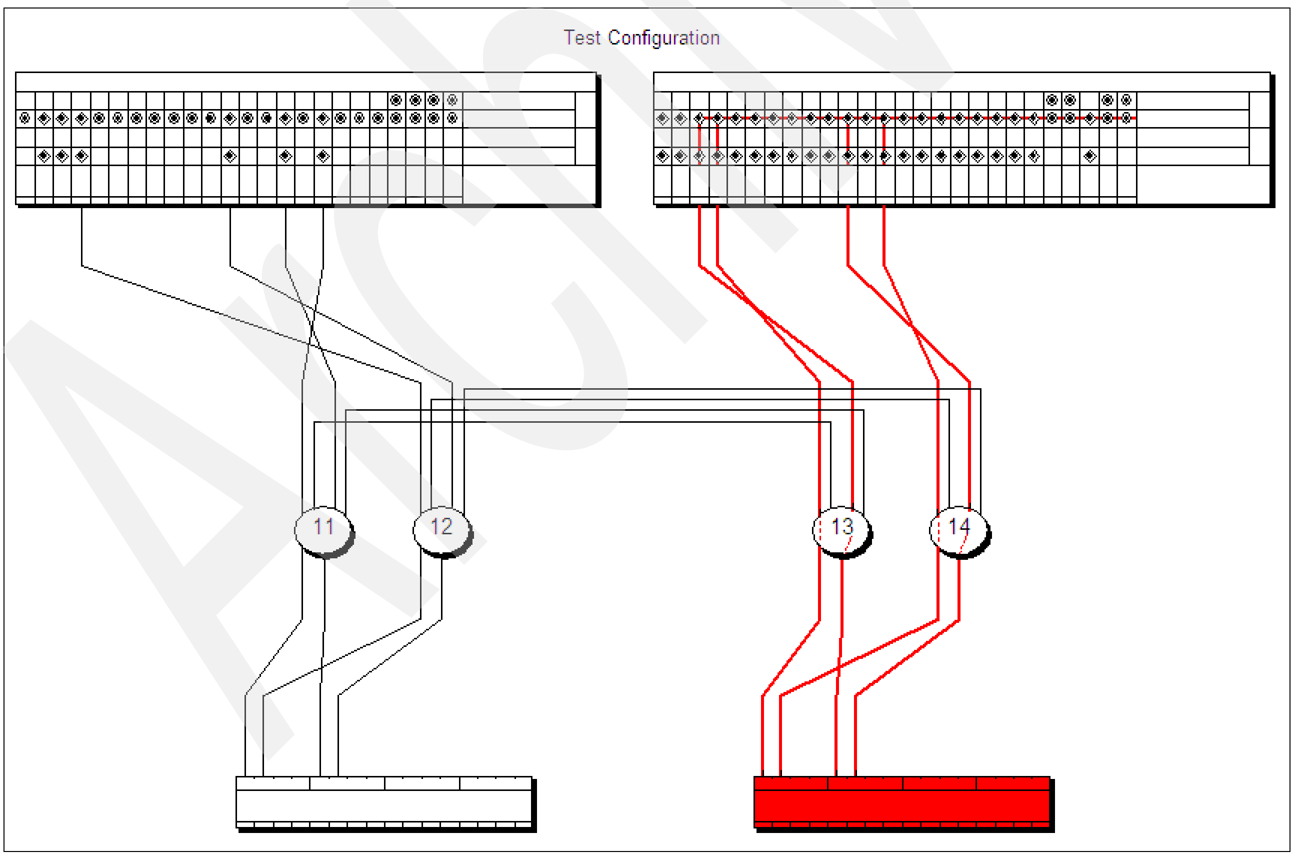


Figure 8-48 HCM: All DASD connected display

Now, add the devices to an OS configuration as follows:

1. Select **Edit** → **OS configurations.**
2. Select **OSSYSXPR** to highlight it, so we can add devices to it.
3. Click **I/O Devices.**
4. Click **Add.**
5. Press Ctrl and select **D000,100 3390B** to highlight it, then click all other 3390B definitions to add them to this OS configuration. See Figure 8-49.

> **Note:** Only the same Device Type can be added in one operation.

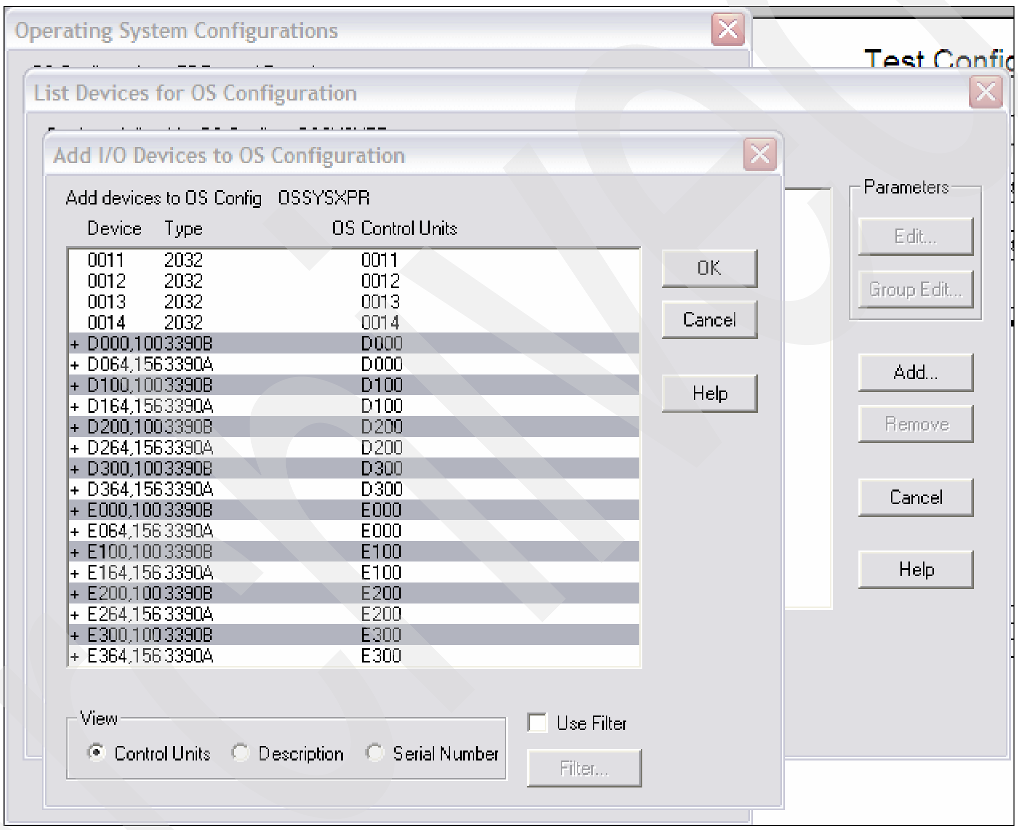


Figure 8-49 HCM: Add I/O devices to OS configuration

6. Click **OK**. The result is shown in Figure 8-50 on page 256.

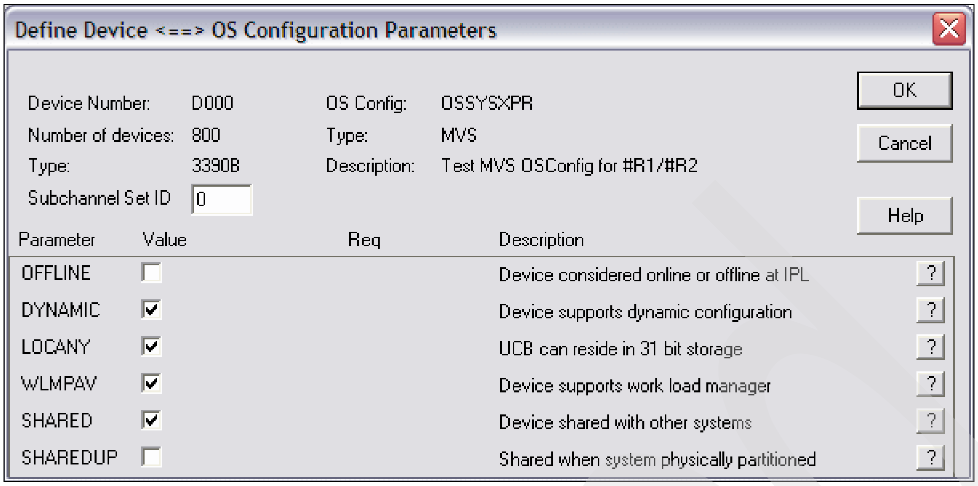


Figure 8-50 HCM: Add OS configuration parameters

7. Click **OK**.
8. Click **Add** to add more devices to this OS configuration, or click **Close**.
9. Perform the same operation now to add all the 3390A devices.
10. Click **Close**.

8.3.8 Adding FICON CTCs between LPARs and across cascading switches

The specifications for our FICON CTCs example are as follows:

> **Note:** A communication path is indicated by the bidirectional symbol (<->) and the one-way symbol (->).

- Processor: CPCPKR1
  - CHPID connections (processor R1 -> entry switch -> exit switch -> processor R1)
    - R1.0.5C -> #11.00 -> #11.20 -> R1.1.5A
    - CU ID = 4020 <-> 4110
    - Device Range = 4020-7 <-> 4110-7
  - CHPID connections (processor R1 → switch → switch → processor R1)
    - R1.0.44 -> #12.00 -> #12.20 -> R1.1.57
    - CU ID = 4028 <-> 4118
    - Device Range = 4028-F <-> 4118-F
- Processor: CPCPKR2
  - CHPID connections (processor R2 → switch → switch → processor R2)
    - R2.0.4D -> #13.00 -> #13.20 -> R2.1.30
    - CU ID = 5040 <-> 5120
    - Device Range = 5040-7 <-> 5120-7
  - CHPID connections (processor R2 -> switch -> switch -> processor R2)
    - R2.0.58 -> #14.00 -> #14.20 -> R2.1.56
    - CU ID = 5048 <-> 5128
    - Device Range = 5048-F <-> 5128-F

Because we are using existing FICON CHPIDs connected to the FICON directors, we do not have to perform the connection process.

To create CTC connections for R1.0.5C -> #11.00 -> #11.20 -> R1.1.5A, perform the following steps:

1. Select **Create** → **CTC connection.**
2. Click **CTC** or **FC CHPID.**
3. Double-click **CPCPKR1** to expand the list of eligible CHPIDs.
4. Select **CPCPKR1.0.5C** to highlight it.
5. Click **OK.**
6. Click **CNC/FCV** or **FC CHPID.**
7. Double-click **CPCPKR1** to expand the list of eligible CHPIDs.
8. Select **CPCPKR1.1.5A** to highlight it.
9. Click **OK**. The window in Figure 8-51 opens.

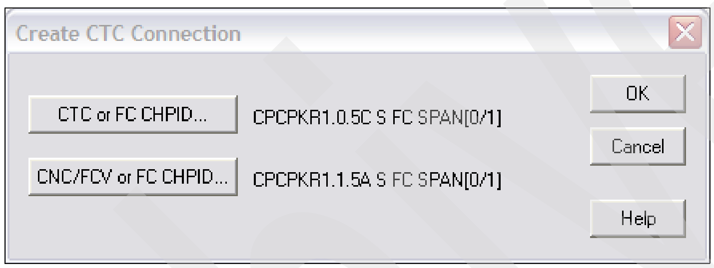


Figure 8-51 HCM: Create CTC connection CHPIDs

10. Click **OK**.
11. In the Edit CTC Connection window, click **Add New** in the left panel. The dialog box, shown in Figure 8-52 on page 258 opens.
12. For the Control Unit, enter **4020** and for the Number of Devices enter **8**.

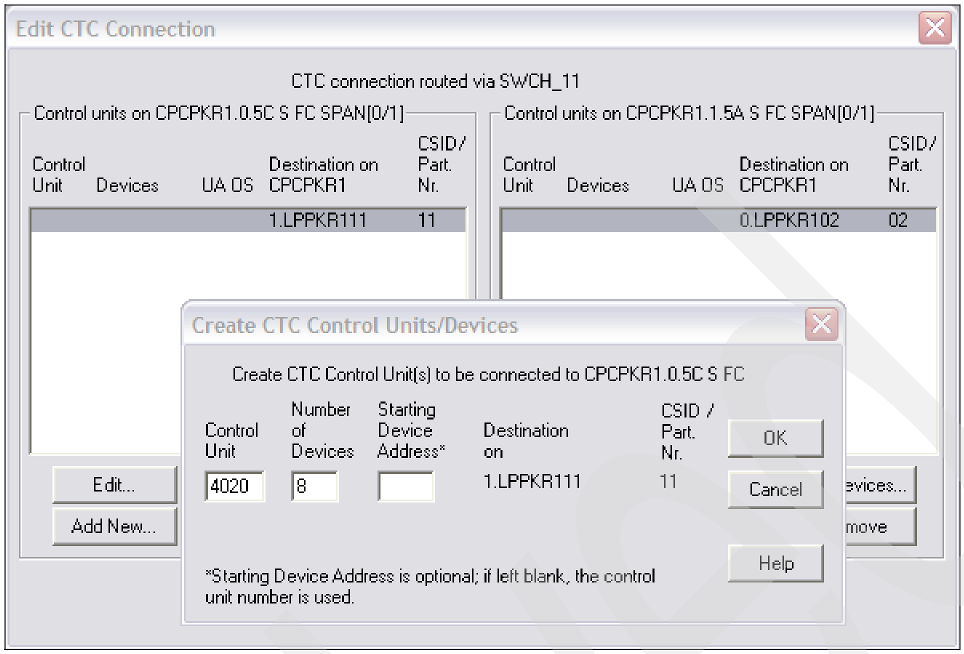


Figure 8-52 HCM: Create CTC connection CU/Devices

13. Click **OK**.
14. In the panel on the right, click **Add New.**
15. For the Control Unit, enter **4110**, and for the Number of Devices, enter **8**. See Figure 8-53.

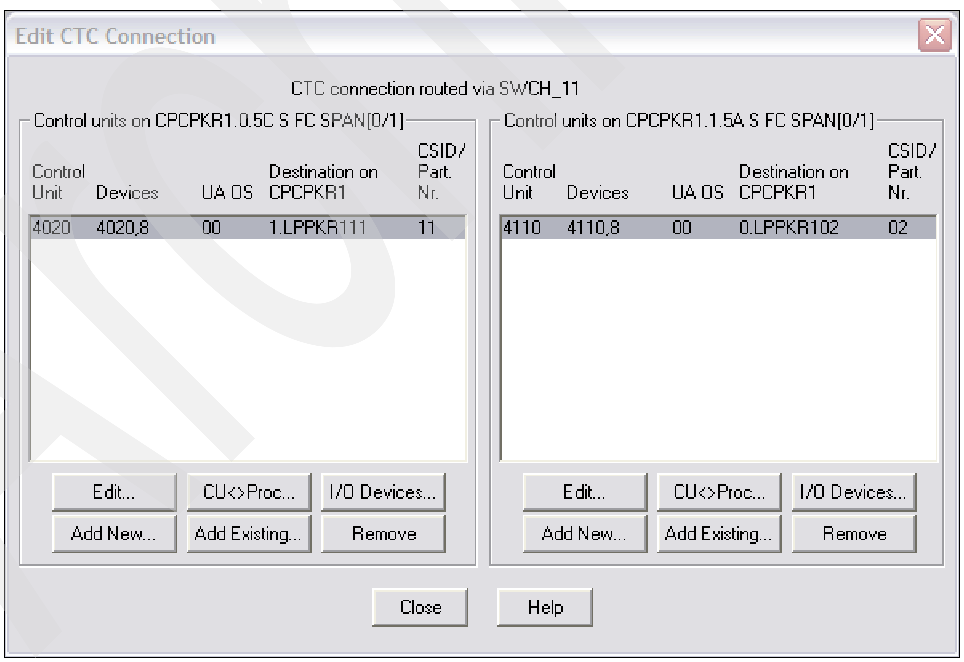


Figure 8-53 HCM: Create CTC connection CU/Devices complete

16. Click **Close**.

17. Create the following connections (see Figure 8-54):

   – R1.0.44 -> #12.00 -> #12.20 -> R1.1.57
   – R2.0.4D -> #13.00 -> #13.20 -> R2.1.30
   – R2.0.58 -> #14.00 -> #14.20 -> R2.1.56

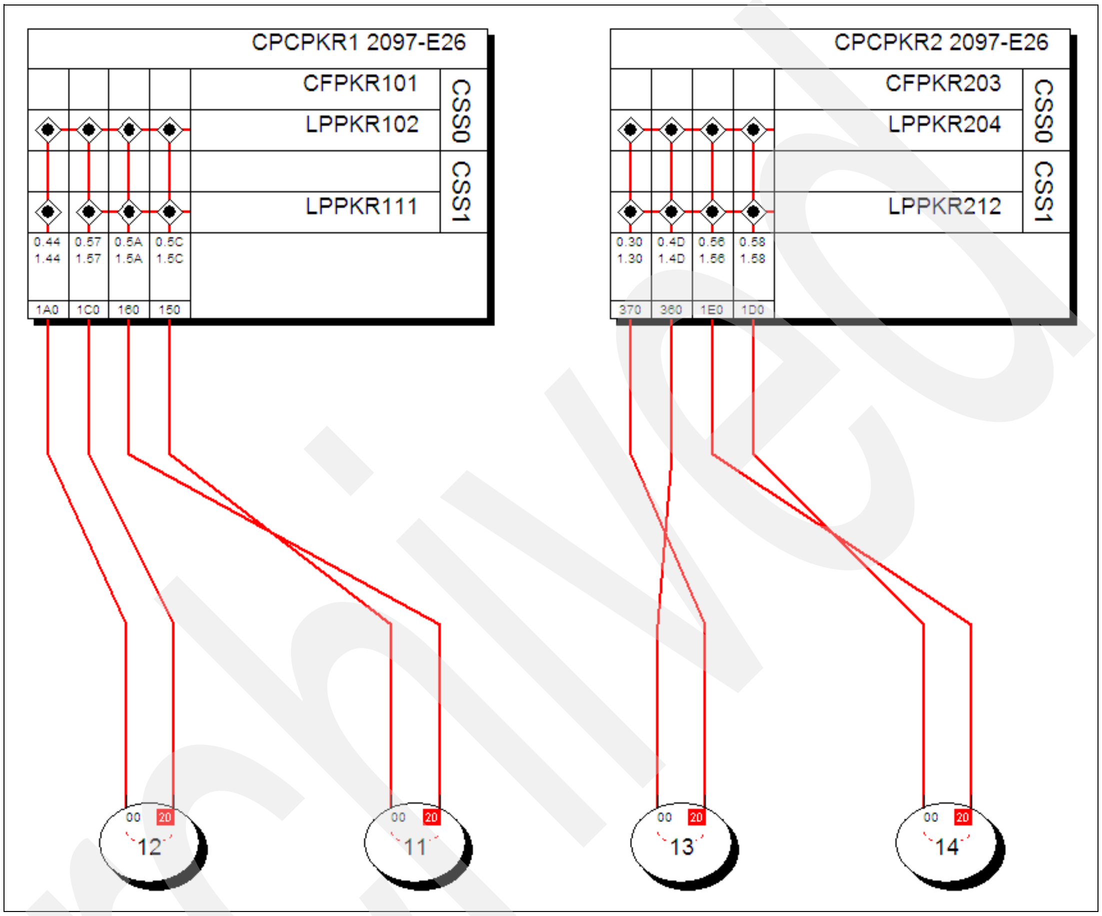


Figure 8-54 HCM: CTC connections diagram

That completes creating FCTCs between LPARs on each processor. Now we create FCTCs across the ISLs to LPARs on the other processor.

Because we are using existing FICON CHPIDs connected to the FICON directors, we do not have to perform the connection process.

Create the following connections by using the steps as previously described, starting with step 1 on page 257:

R1.0.5C -> #11.00 -> #13.20 -> R2.1.30

This time, observe that HCM has detected existing CTC control units and is proposing CU connections for you, as shown in Figure 8-55 on page 260.

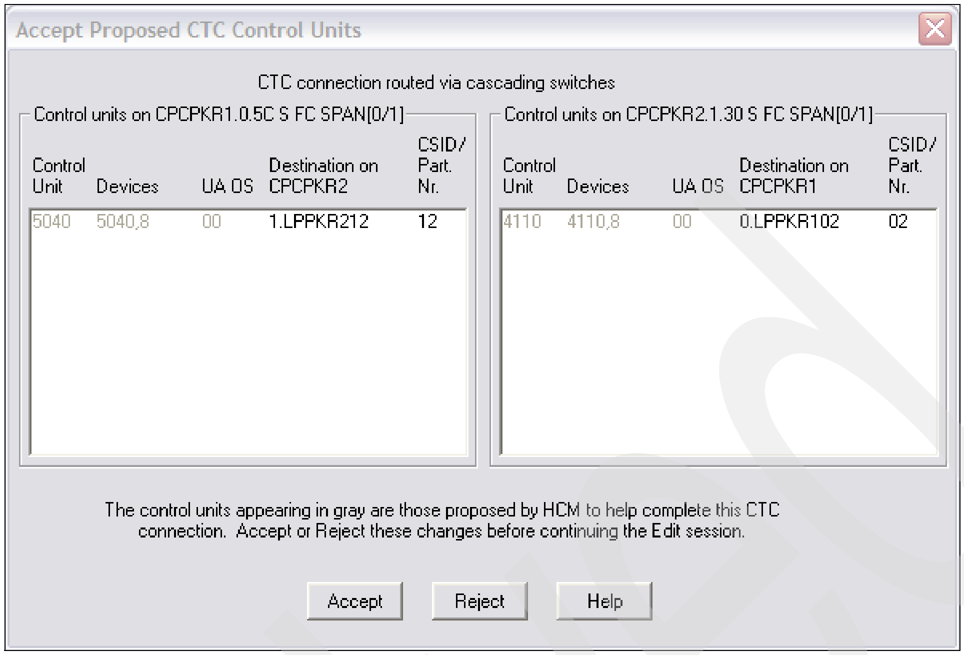


Figure 8-55 HCM: Accept proposed CTC control units

18. Click **Accept** (or, click **Reject** if you think that the proposal is incorrect or not what you require).

    The proposed control units convert from disabled (gray color) to enabled (black color).

19. Click **Close**.

20. Create the following connections (see Figure 8-56 on page 261):

    – R1.1.5A -> #11.20 -> #13.00 -> R2.0.4D
    – R1.0.44 -> #12.00 -> #14.20 -> R2.1.56
    – R1.1.57 -> #12.20 -> #14.00 -> R2.0.58

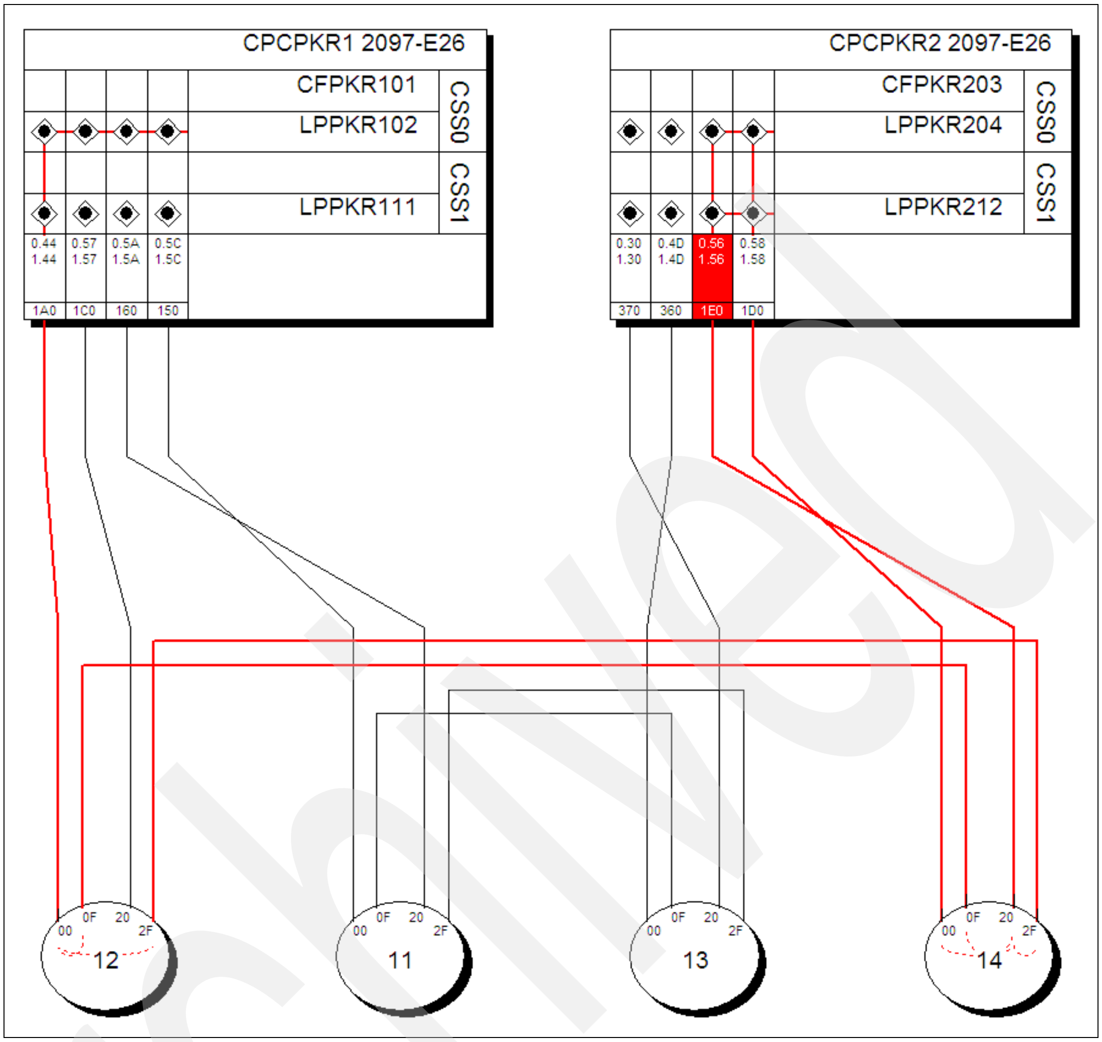


Figure 8-56 HCM: CTC connections over ISLs diagram

That completes creating FCTCs across the ISLs to LPARs on the other processor.

8.3.9 Adding OSA-ICC console definitions

For our configuration example, we create the following OSA-ICC console controller connections (processor -> control unit):

- CPCPKR1.0.1A -> OSC F000-F01F
- CPCPKR2.0.14 -> OSC F100-F11F

To add OSA-ICC console definitions, perform the following steps:

1. Select **Create** → **Controller**.
2. Enter information into these fields: Control Unit Number, Control Unit Type, Serial No, Description, Physical Label, and Device Type, as shown in Figure 8-57 on page 262.

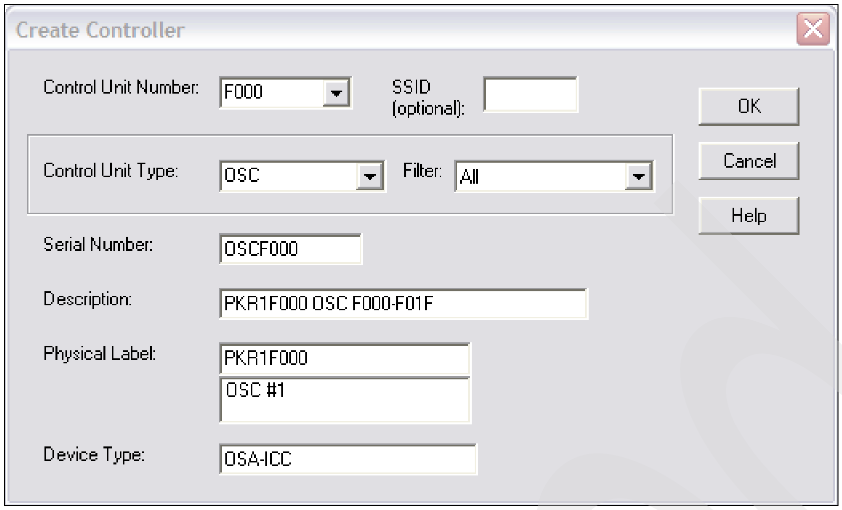


Figure 8-57 HCM: Create OSC control unit

3. Click **OK.**
4. Make the appropriate connections according to the process in our previous examples. See Figure 8-58.

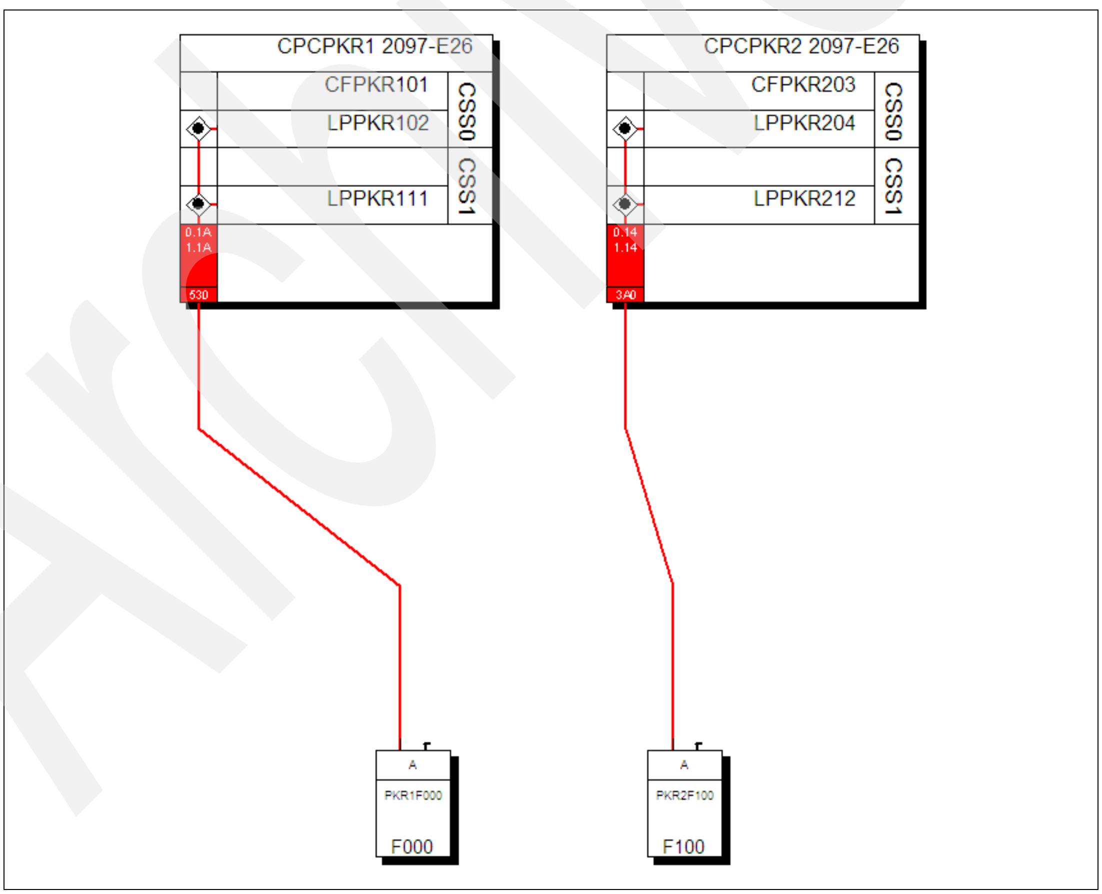


Figure 8-58 HCM: OSC control unit drawing

Now we can add the NIP Console definition to the OS configurations.

5. Select **Edit** → **OS configurations**.
6. Select **OSSYS1PR** and click **Consoles.**

   HCM opens the List Consoles window, where you can edit existing NIP consoles or add new definitions.
7. Click **Add**, and then enter the device, as shown in Figure 8-59.

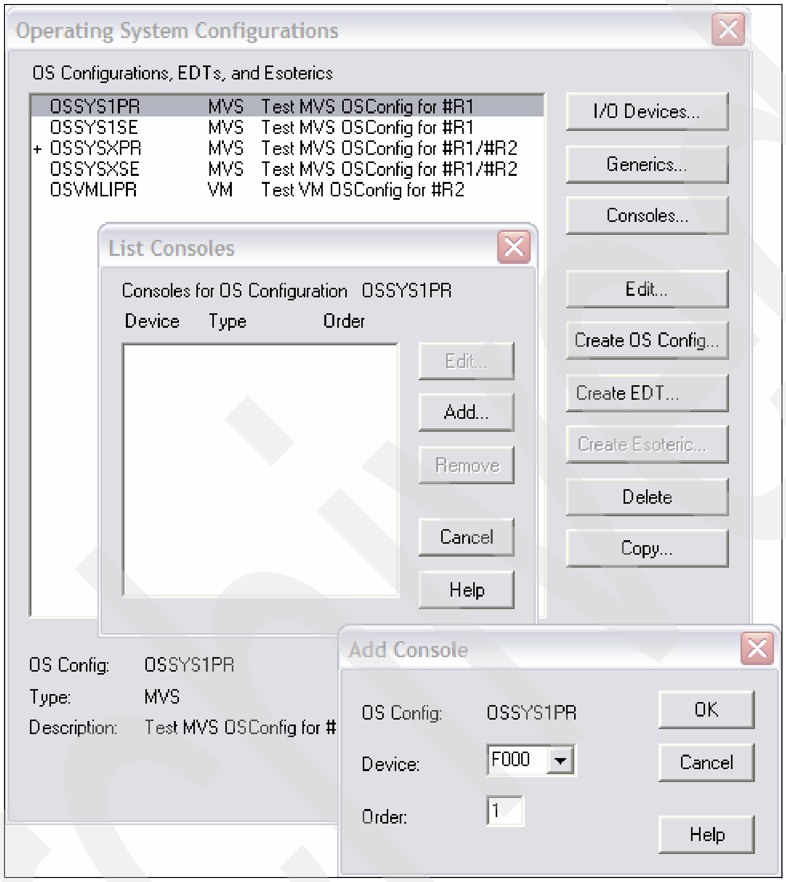


Figure 8-59 HCM: Add NIP console to OS configuration

8. Click **OK** and then click **Close**.
9. Repeat the procedure until all required NIP consoles have been defined to all the OS Configs
10. Click **Close**.

8.3.10 Adding CIB timer-only and ICP Coupling CF Links

In our example, we add coupling facility links over the ICP CHPIDs and timer-only links over the CIB CHPIDs, as follows:

> **Note:** Although CF links are normally created over the CIB CHPIDs, we illustrate the timer-only example.

1. Select **Create** → **CF connection** to open the dialog box in Figure 8-60 on page 264.

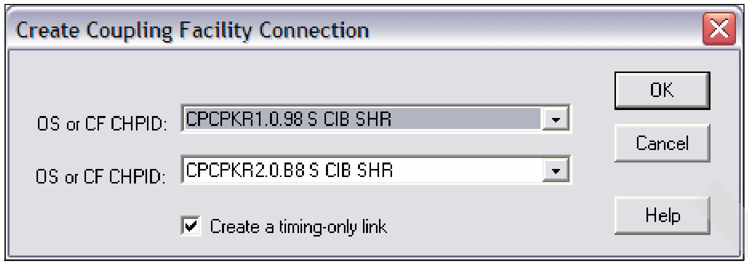


Figure 8-60 HCM: Create STP timing-only links over CIB CHPIDs

2. In the OS or CF CHPID field, select **CPCPKR1.0.98**.
3. In the next OS or CF CHPID field, select **CPCPKR2.0.B8**.
4. Select the **Create a timing-only link** check box.
5. Click **OK**.

   Because these links are STP timing-only links, only FFxx control units are created, no devices. See Figure 8-61.

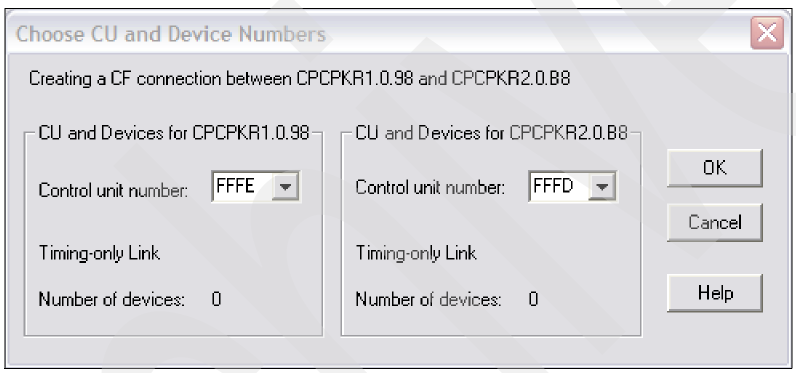


Figure 8-61 HCM: STP timing-only links with FFxx CUs

6. Click **OK**. Figure 8-62 shows timing-only links.

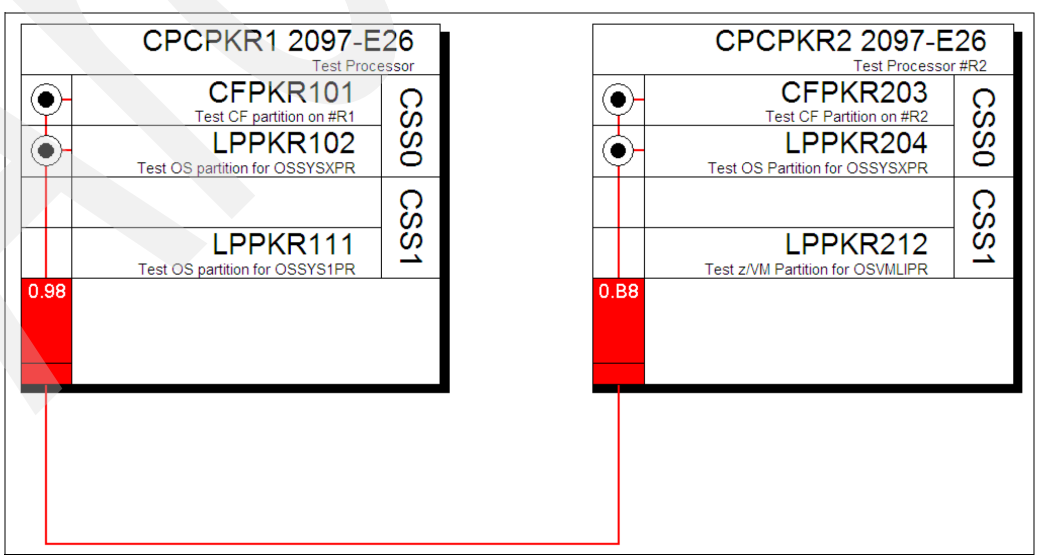


Figure 8-62 HCM: Timing-only CF links

7. Select **Create** → **CF connection.** See Figure 8-63.
8. In the top OS or CF CHPID field, select **CPCPKR1.0.F8**.
9. In the next OS or CF CHPID field, select **CPCPKR1.0.F9**.
10. Click **OK.**

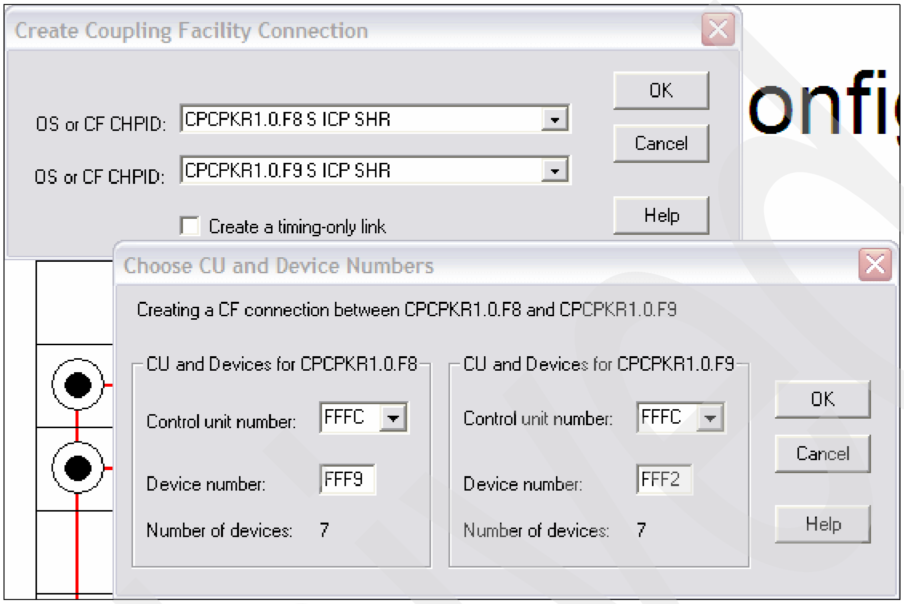


Figure 8-63 HCM: Create CF links over ICP CHPIDs

Observe the FFxx addresses for the CF links

11. Click **OK.**

Figure 8-64 shows the CIB and ICP links.

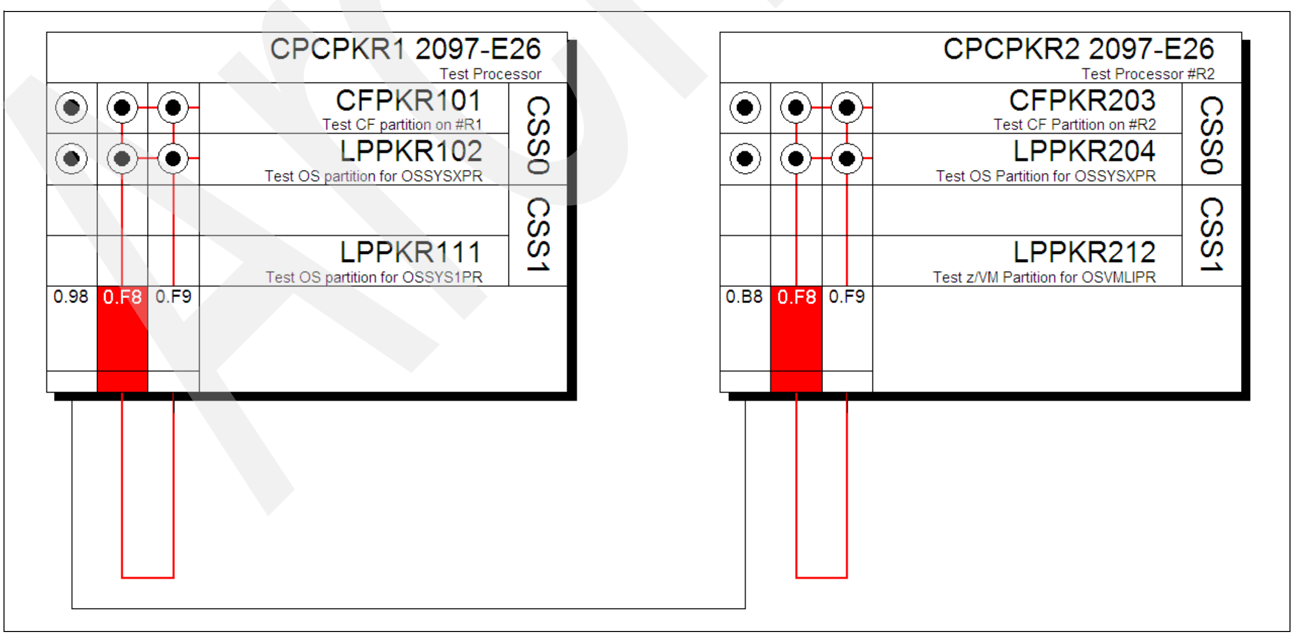


Figure 8-64 HCM: All CF links

The configuration example is now complete. Figure 8-65 shows the HCM drawing.

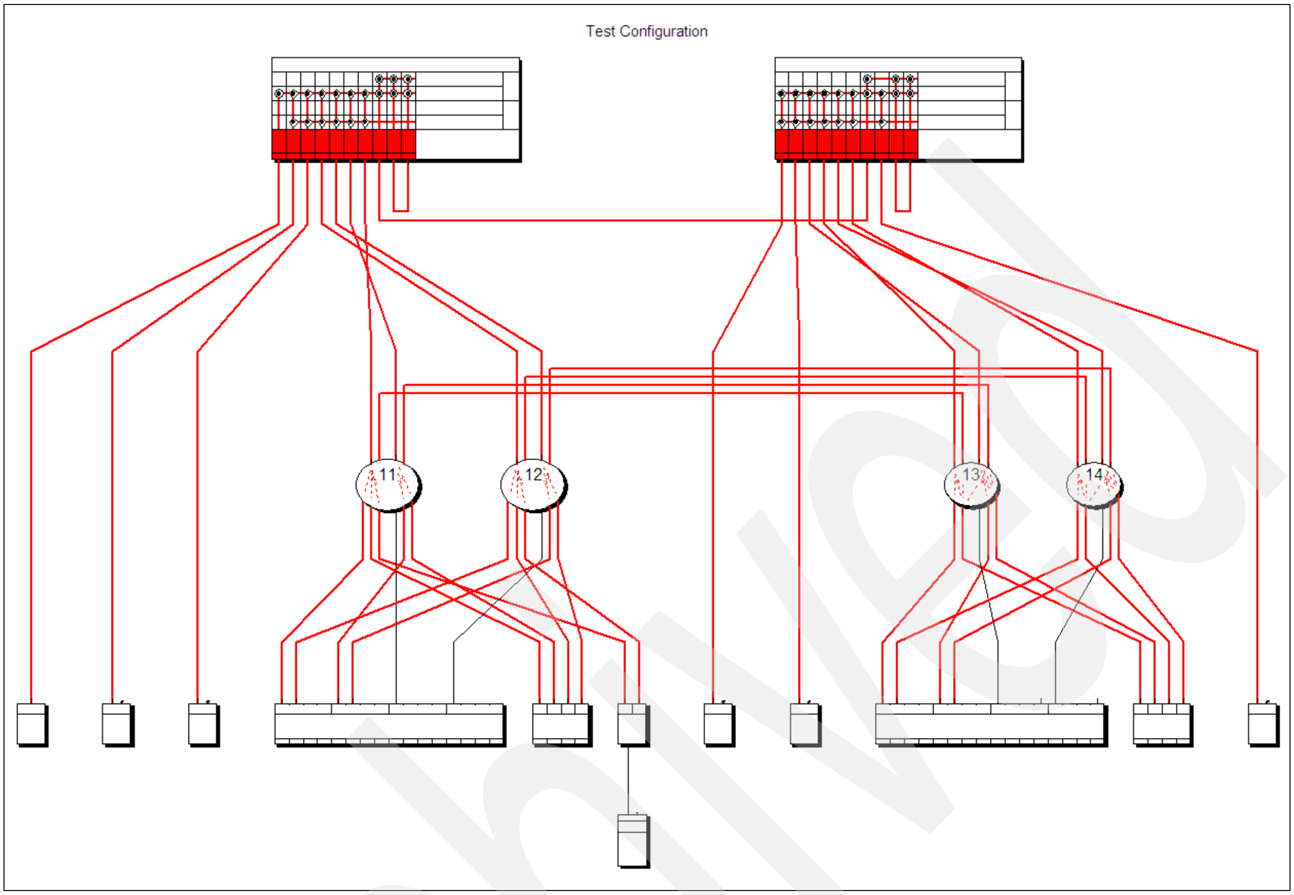


Figure 8-65 HCM: Completed configuration example drawing

8.4 Defining additional hardware features

Use HCM to define additional information about the hardware that is not contained or required in HCD.

As described in the previous configuration example, we can use HCM to label hardware interfaces (using PDF files, or editing the controllers and changing the physical description) with the exact interface IDs and show CHPID connections to these interfaces.

After this information is defined and saved in the HCM data file, it is maintained there if HCM is used to make additional changes to the IODF.

Although using HCD to update the IODF (when HCM is also not accessing the IODF) is possible, the next time HCM tries to open the same IODF, a *resyncronization* will be required; depending on what was changed by using HCD, depends on how much the specific hardware information remains in place.

8.4.1 Adding PPRC links between two DASD subsystems through cascading switches

In our example, we connect the DASDs PPRC links to Port 0E on the FICON directors.

The PPRC connections (DASD -> switch -> switch -> ISL -> switch -> switch -> DASD) are as follows:

- 2107#1.0200 -> #11.0E -> #11.0F -> ISL -> #13.0F -> #13.0E → 2107#2.0200
- 2107#1.0230 -> #12.0E -> #12.0F -> ISL -> #14.0F -> #14.0E → 2107#2.0230

To add PPRC links between two DASD subsystems through cascading switches, perform the following steps:

1. Select **Edit** → **Controller**.
2. Select **2107#1** to highlight it, so we can edit the interface connections for 2107#1.
3. Click **OK**.

   In our example, we make the following connections:

   – #11.0E -> interface #0200 for 2107#1
   – #12.0E -> interface #0230 for 2107#1
   – #13.0E -> interface #0200 for 2107#2
   – #14.0E -> interface #0230 for 2107#2
4. Press Ctrl and select **R1E3S1.0200** to highlight it, and then click interface **0230** to highlight it also.
5. Click **Connect.**
6. In the panel on the right panel, double-click **SWCH_11** to expand the port list, and select **SWCH_11.0E** to highlight it. See Figure 8-66 on page 268.
7. In the left panel, select **2107#1.R1E3S1.0200** to highlight it.
8. Click **Connect.**

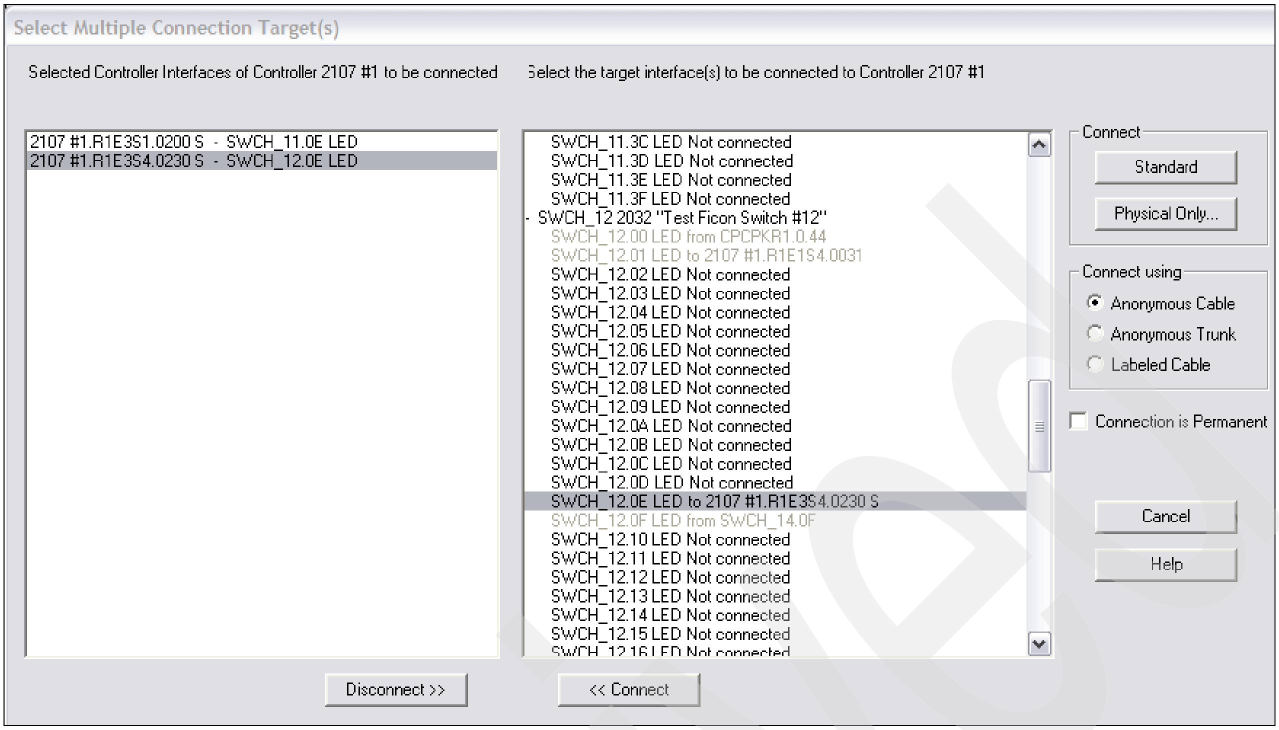


Figure 8-66 HCM: Connect DASD PPRC to switches

9. Click **Physical Only**.
10. Continue until 2107#2 is also connected to switches #13 and #14.
11. Click **OK** then click **Close.**
12. Press F2 (Fit to window) to return the diagram to the previously filtered display. See Figure 8-67 on page 269.

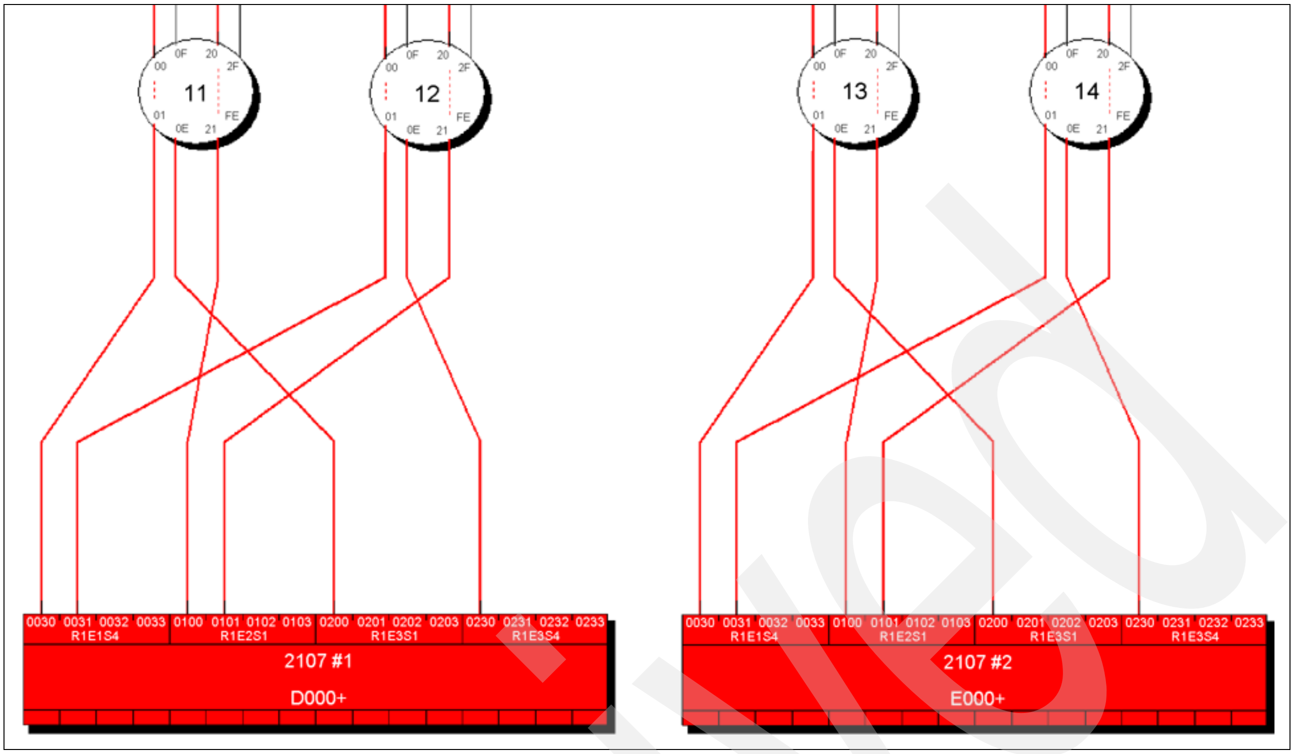


Figure 8-67 HCM: First part DASD PPRC connections display

13. Select **Create** → **PPRC connection.**
14. In the left panel, select control unit **D000 2107** for the primary (source) subsystem.
15. Click **Next.**
16. In the left panel click once on Control Unit **E000 2107** for secondary (target) subsystem
17. Click **Next** >
18. Choose the source and target interfaces, as shown in Figure 8-68.

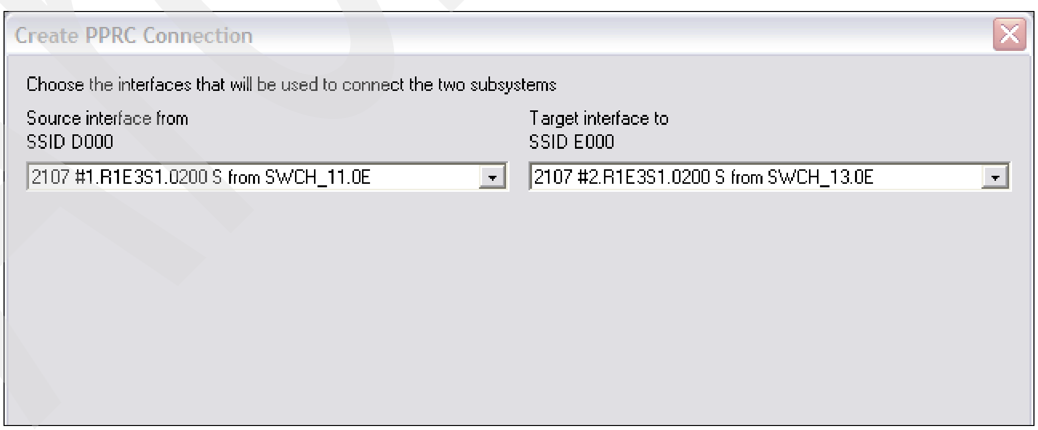


Figure 8-68 HCM: Choose DASD PPRC interfaces

19. Click **Next.**
20. In the Link address field, select an address for the PPRC link. See Figure 8-69 on page 270.

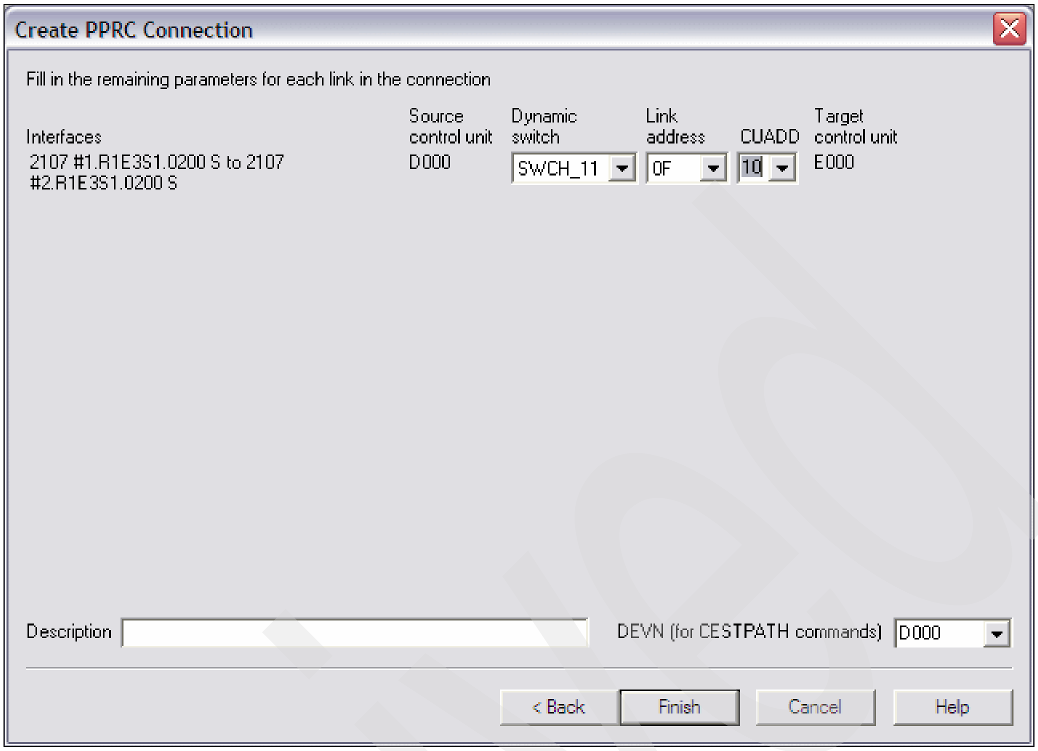


Figure 8-69 HCM: Choose DASD PPRC link address

21. Click **Finish**.
22. Press F2 (Fit to window) to return the diagram to the previously filtered display.
23. Now if you click interface **0200** on 2107#2 you see the PPRC being drawn to 2107#1.
24. Continue until all PPRC connections are defined.

The connection is complete, as shown in Figure 8-70 on page 271.

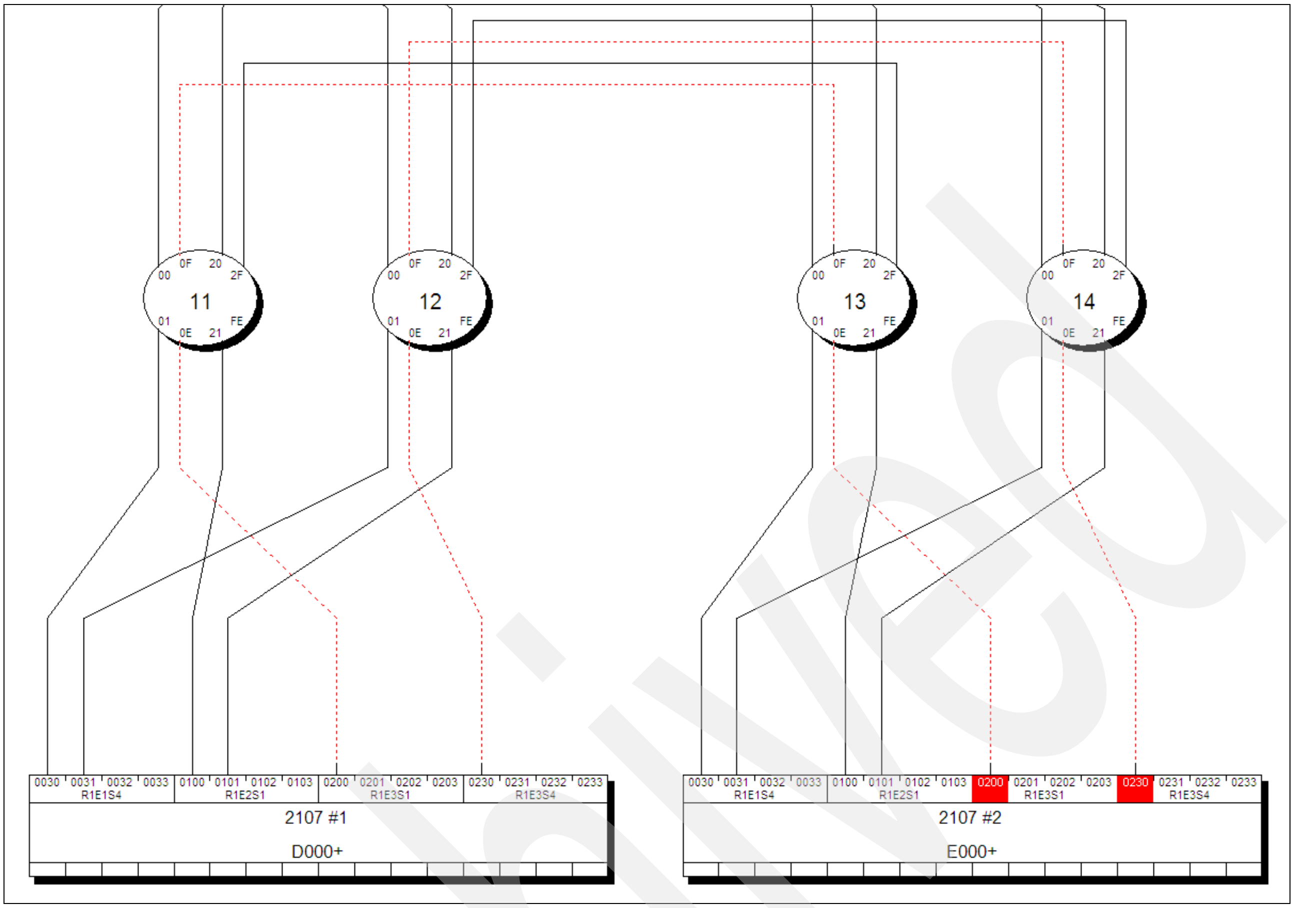


Figure 8-70 HCM: DASD PPRC connection complete

8.4.2 Defining open systems connections to shared DASD

Open systems and midrange systems also connect into DASD that are shared by System z systems. Additionally, these open systems often use their own fiber switches to consolidate, control, and share interfaces.

Perform the following steps to have HCM represent these connections:

> **Note:** HCM supports a generic FC switch (type=FCS), supporting port addresses 00 to FF. This switch type does not support a switch control unit and switch device, and therefore cannot be accessed by I/O operations functions like migrate or activate switch configuration.

1. Select **Create** → **Switch**.
2. Enter information in these files: Switch ID, Type-Model, Description, Serial No, and Installed Ports. See Figure 8-71 on page 272.

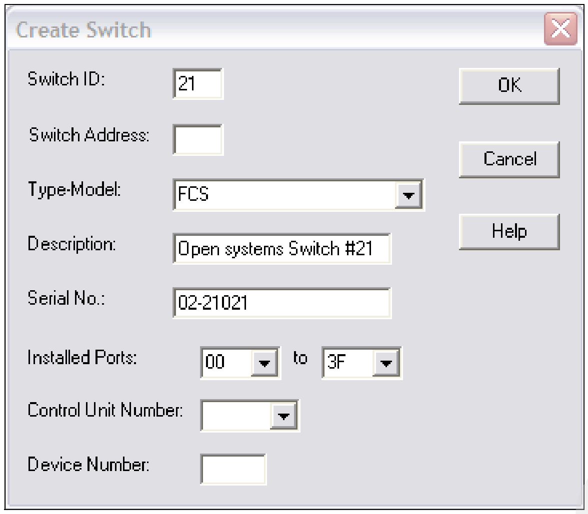


Figure 8-71 HCM: Create Switch for open systems

3. Click **OK.**

   In this example, we define control units as *book markers* with CUADDs 20 and 21, for our reference. In our example for open systems, we make the following connections:

   – Switch connections (switch -> DASD)
     - #21.01 -> interface #0203
     - #21.21 -> interface #0233
   – CU IDs = C000, C100
   – CUADDs = 20, 21
4. Select **Edit** → **Controller**.
5. Select **2107#2** to highlight it, so we can edit the interface connections for 2107#2.
6. Click **OK**.
7. Press Ctrl and select **R1E3S1.0203** to highlight it, and then click interface **R1E3S4.0233** to highlight it also.
8. Click **Connect.**
9. In the panel on the right panel, double-click **SWCH_21 FCS** to expand the port list, and then, select **SWCH_21.01** to highlight it.
10. In the left panel, select **2107#1.R1E3S1.0203** to highlight it.
11. In the panel on the right, select **SWCH_21.21** to highlight it. In the left panel, select **2107#1.R1E3S4.0233** to highlight it.
12. Click **Connect**.
13. Click **Physical Only**.
14. Click **OK** and then click **Close**.
15. Press F2 (Fit to window) returns the diagram to the previously filtered display.
16. By default, HCM does not to display Physical Connections, therefore you might have to adjust the filter, as follows:
    a. Select **View** → **Filter Diagram**.
    b. Select the **Objects with physical-only connections** check box.
    c. Click **OK**.

The Open Systems connections is now displayed. See Figure 8-72.

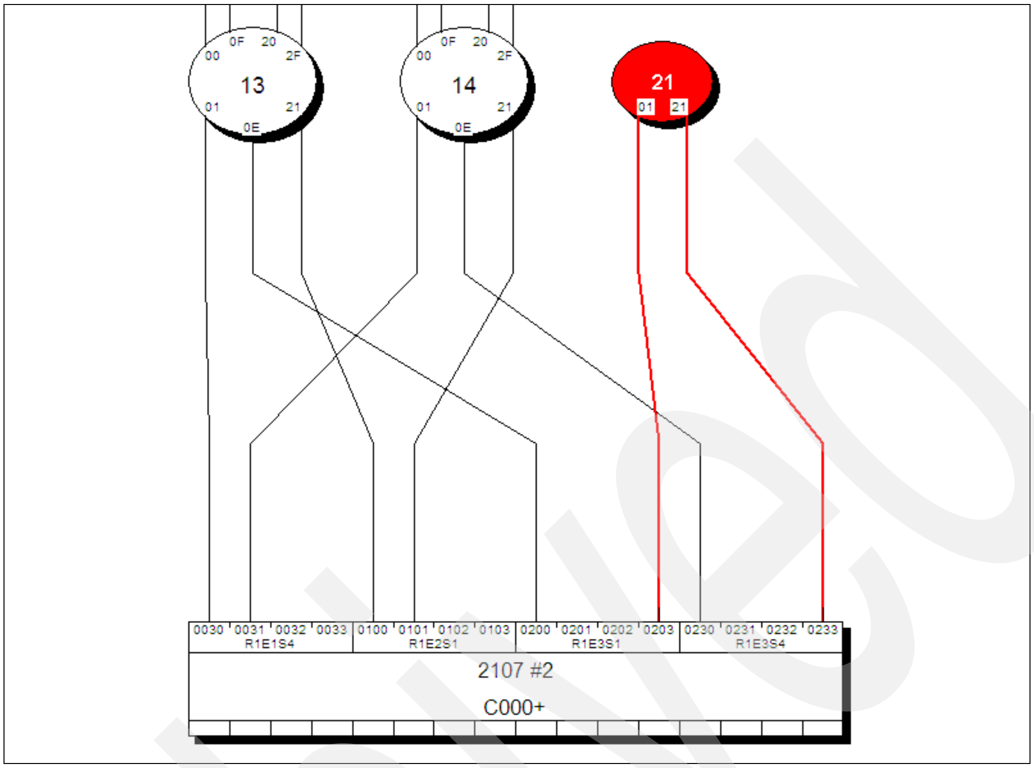


Figure 8-72 HCM: Open systems connections to DASD display

Now, the control units that are defined for 2107#2 are displayed. See Figure 8-73 on page 274.

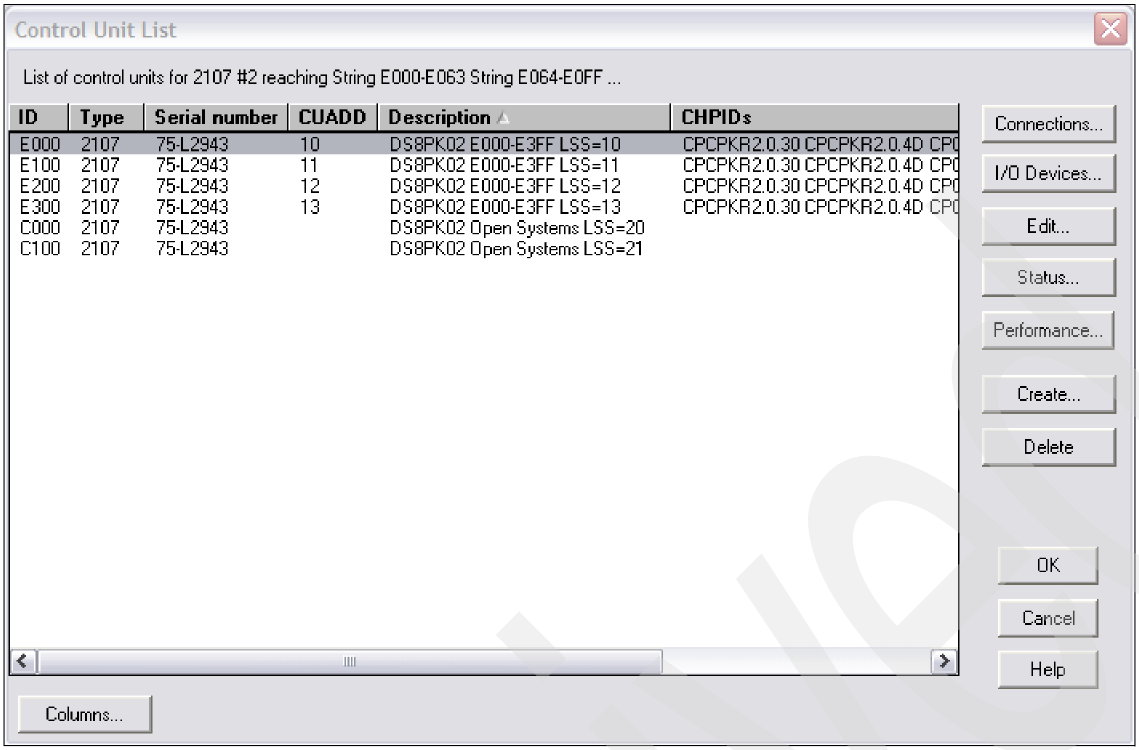


Figure 8-73 HCM: Open systems control unit book markers

8.4.3 Adding VTS subsystems and connecting them across cascading switches

In our configuration example, we define the two virtual tape server (VTS) subsystems. See Figure 8-74 on page 275 and Figure 8-75 on page 275.

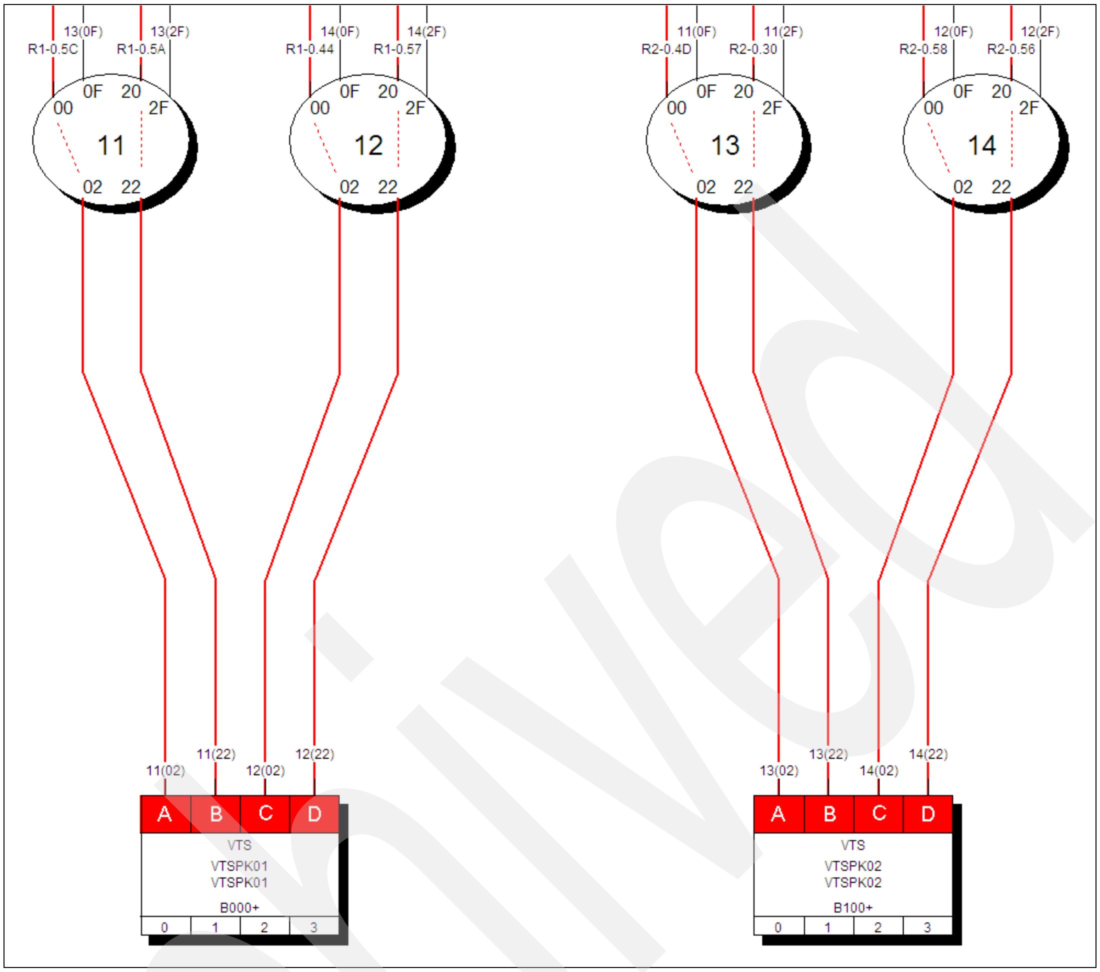


Figure 8-74 HCM: VTS subsystems defined drawing

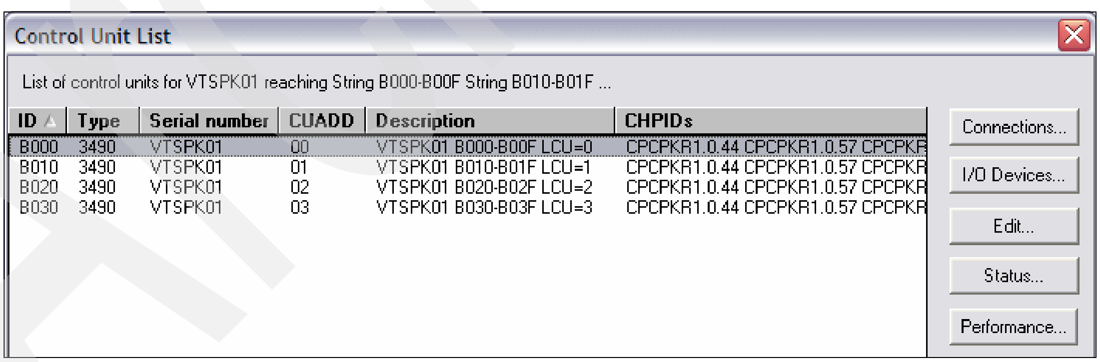


Figure 8-75 HCM: VTS Control Unit List

Now, we define the CHPID connections from VTSPK02 to processor CPCPKR1. See Figure 8-76 on page 276.

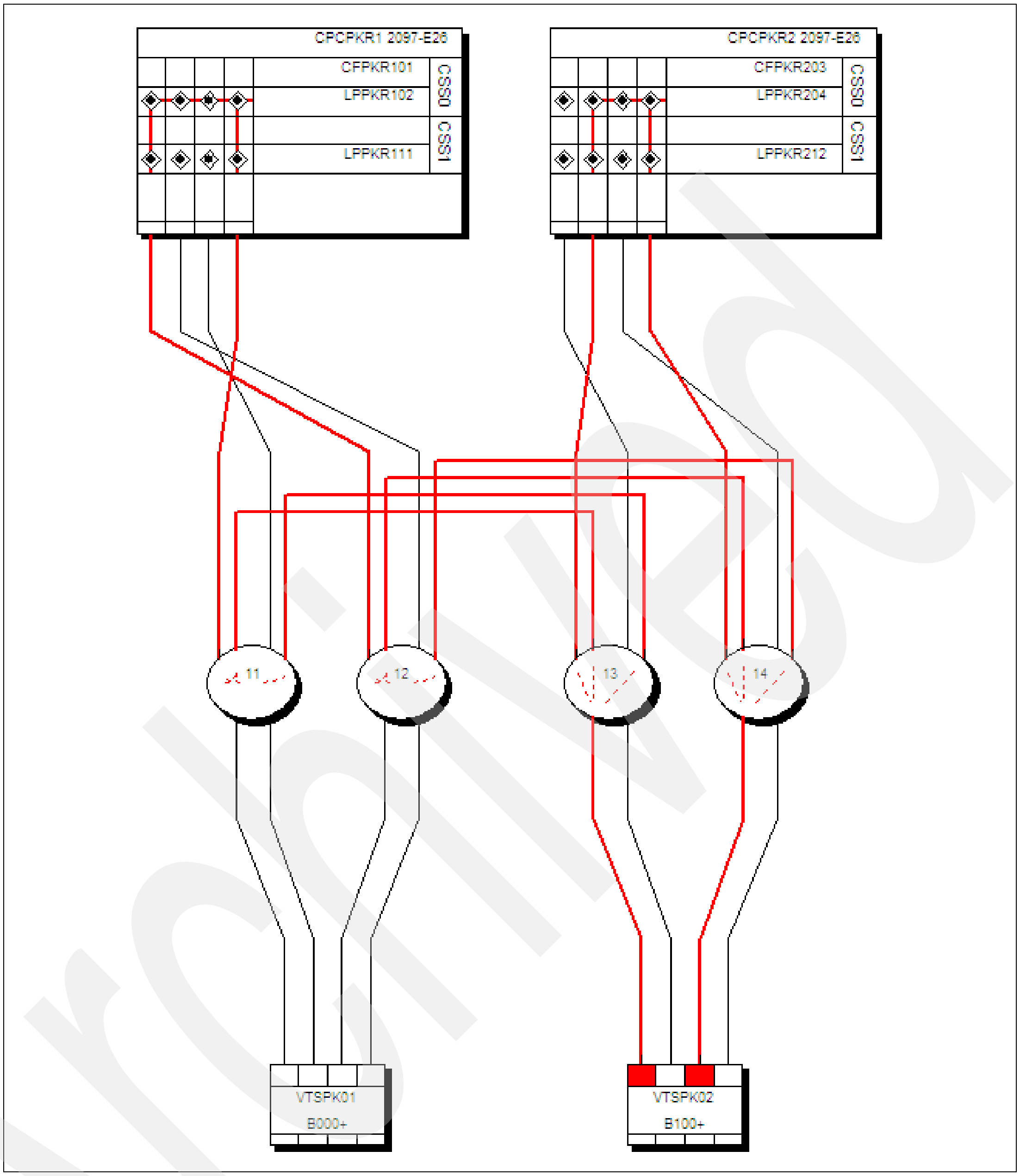


Figure 8-76 HCM: VTS defined over ISLs

> **Note:** Only two interfaces have been highlighted on VTSPK02 to show more clearly the connections

8.5 The IODF reporting and compare interface

When you are logged on with HCM and using both HCM(work) and HCR(production) IODFs, HCM can communicate with HCD to produce IODF reports that are delivered to your workstation. You may then save the reports to your workstation.

8.5.1 Creating IODF reports using HCM

To create reports, perform the following steps:

1. Select **File** → **View IODF Reports.** See Figure 8-77.

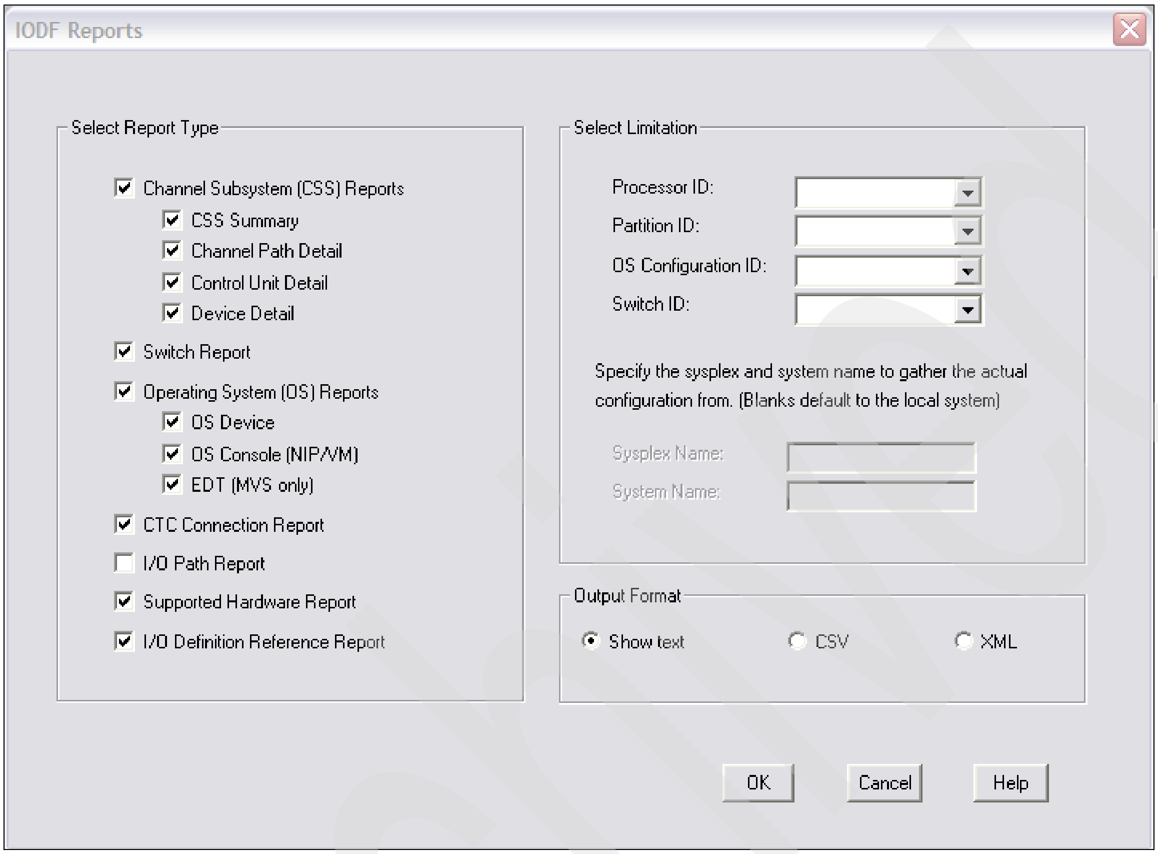


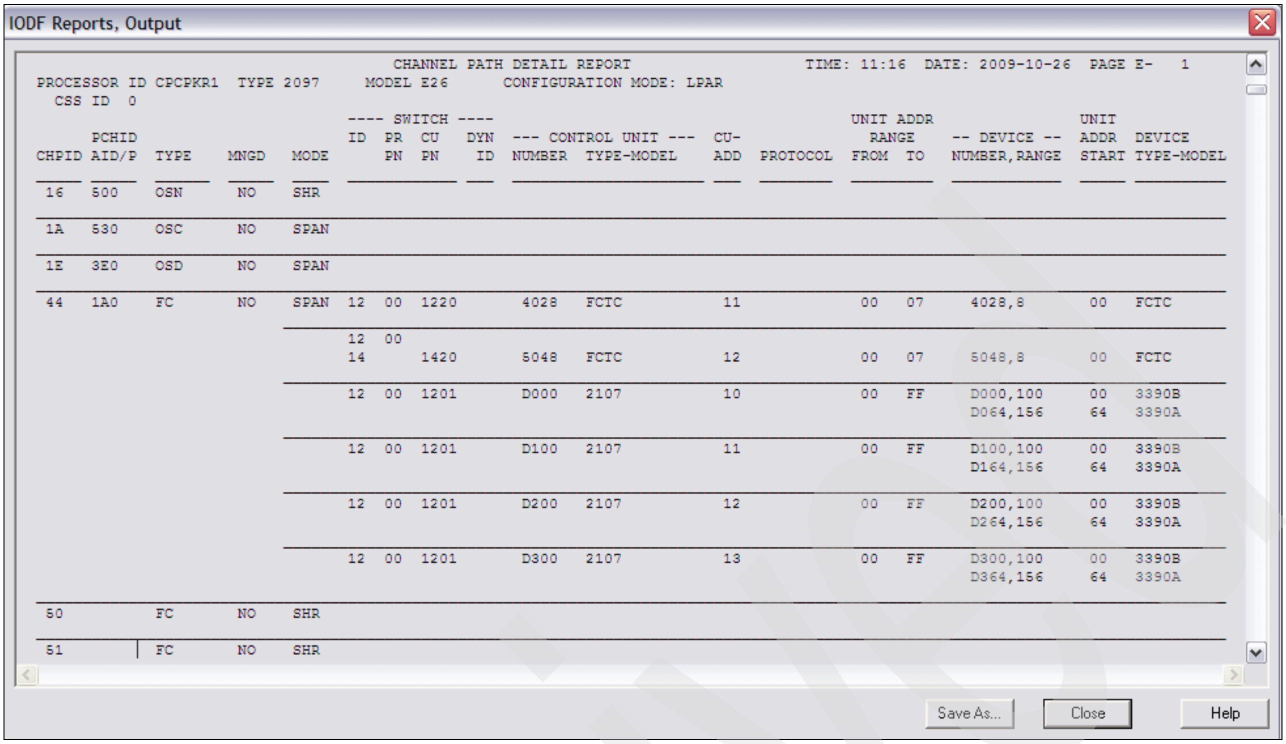
Figure 8-77 HCM: IODF Reports

In the dialog box, you can select and tailor the content that you require in the report.

2. Click **OK**.

   HCM issues warning or information messages.

3. Click **OK**. The report opens, as shown in Figure 8-78 on page 278.




```
                                  CHANNEL PATH DETAIL REPORT                    TIME: 11:16  DATE: 2009-10-26  PAGE E-   1
PROCESSOR ID CPCPKR1  TYPE 2097     MODEL E26      CONFIGURATION MODE: LPAR
  CSS ID  0
                                 ---- SWITCH ----                                        UNIT ADDR              UNIT
      PCHID                      ID  PR  CU   DYN  --- CONTROL UNIT ---  CU-              RANGE    -- DEVICE --  ADDR  DEVICE
CHPID AID/P  TYPE   MNGD  MODE       PN  PN    ID  NUMBER  TYPE-MODEL    ADD  PROTOCOL  FROM  TO   NUMBER,RANGE  START TYPE-MODEL
_____ _____  ______ _____ ____   ____________ ___  ___________________   ___  ________  _________  ____________  _____ __________
 16   500    OSN    NO    SHR
______________________________________________________________________________________________________________________________
 1A   530    OSC    NO    SPAN
______________________________________________________________________________________________________________________________
 1E   3E0    OSD    NO    SPAN
______________________________________________________________________________________________________________________________
 44   1A0    FC     NO    SPAN   12  00  1220        4028   FCTC          11              00   07    4028,8        00    FCTC
                          ____________________________________________________________________________________________________
                                 12  00
                                 14      1420        5048   FCTC          12              00   07    5048,8        00    FCTC
                          ____________________________________________________________________________________________________
                                 12  00  1201        D000   2107          10              00   FF    D000,100      00    3390B
                                                                                                     D064,156      64    3390A
                          ____________________________________________________________________________________________________
                                 12  00  1201        D100   2107          11              00   FF    D100,100      00    3390B
                                                                                                     D164,156      64    3390A
                          ____________________________________________________________________________________________________
                                 12  00  1201        D200   2107          12              00   FF    D200,100      00    3390B
                                                                                                     D264,156      64    3390A
                          ____________________________________________________________________________________________________
                                 12  00  1201        D300   2107          13              00   FF    D300,100      00    3390B
                                                                                                     D364,156      64    3390A
______________________________________________________________________________________________________________________________
 50          FC     NO    SHR
______________________________________________________________________________________________________________________________
 51          FC     NO    SHR
```

Figure 8-78 HCM: IODF Reports output

4. Click **Save As** to save the report to the workstation (or click **Close** if you want to re-create or discard the report).
5. Click **Close**.

8.5.2 Creating IODF Compare and CSS reports by using HCM

To view the reports, perform either of the following steps:

- Select **File** → **View IODF Compare Reports**.
- Select **File** → **View IODF CSS/OS Report**.

8.6 Interface with the CHPID Mapping Tool (CMT)

HCM provides an interface to help you with the following tasks:

- Exporting the IOCP file to the CMT for a selected processor.
- Launching the CMT.
- Importing the IOCP file (with PCHIDs) back into the IODF.

To open the interface, select **Utilities** → **CHPID Mapping Tool Support**. See Figure 8-79 on page 279.

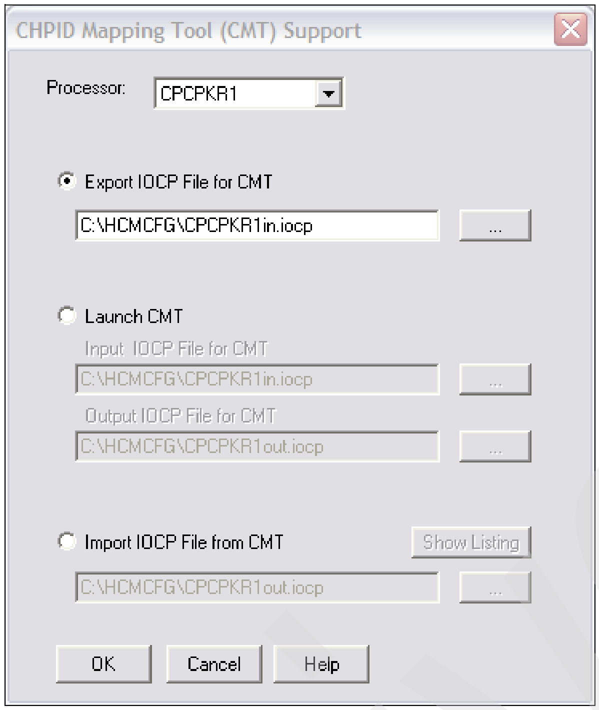


Figure 8-79 HCM: CHPID Mapping Tool Support

8.6.1 Exporting the IOCP file to the CMT for a selected processor

In our example, we export the IOCP file for processor CPCPKR1 to the workstation file:

```
C:\HCMCFG\CPCPKR1in.iocp
```

To export the IOCP file to the CMT for a selected processor, perform the following steps:

1. Click the **Processor** box to select **CPCPKR1**.
2. Select **Export IOCP File for CMT** to ensure the file is selected. If you want to change the default file name, click the ellipsis (**...**) button.
3. Click **OK**.

When the operation is successful, HCM returns the following message:

```
Message ID: CBDA675I IOCP deck successfully written for CPCPKR1
```

8.6.2 Launching the CMT

In our example, we use the following files:

- `C:\HCMCFG\CPCPKR1in.iocp` as the “Input IOCP File for CMT”
- `C:\HCMCFG\CPCPKR1out.iocp` as the “Output IOCP File for CMT”

To launch the CMT, perform the following steps:

1. Select **Launch CMT** to ensure the file is selected. If you want to change the default file names, click the ellipsis (**...**) button.
2. Click **OK**.

   The CHPID Mapping Tool is started and the Select CFReport panel is displayed, as shown in Figure 8-80 on page 280.

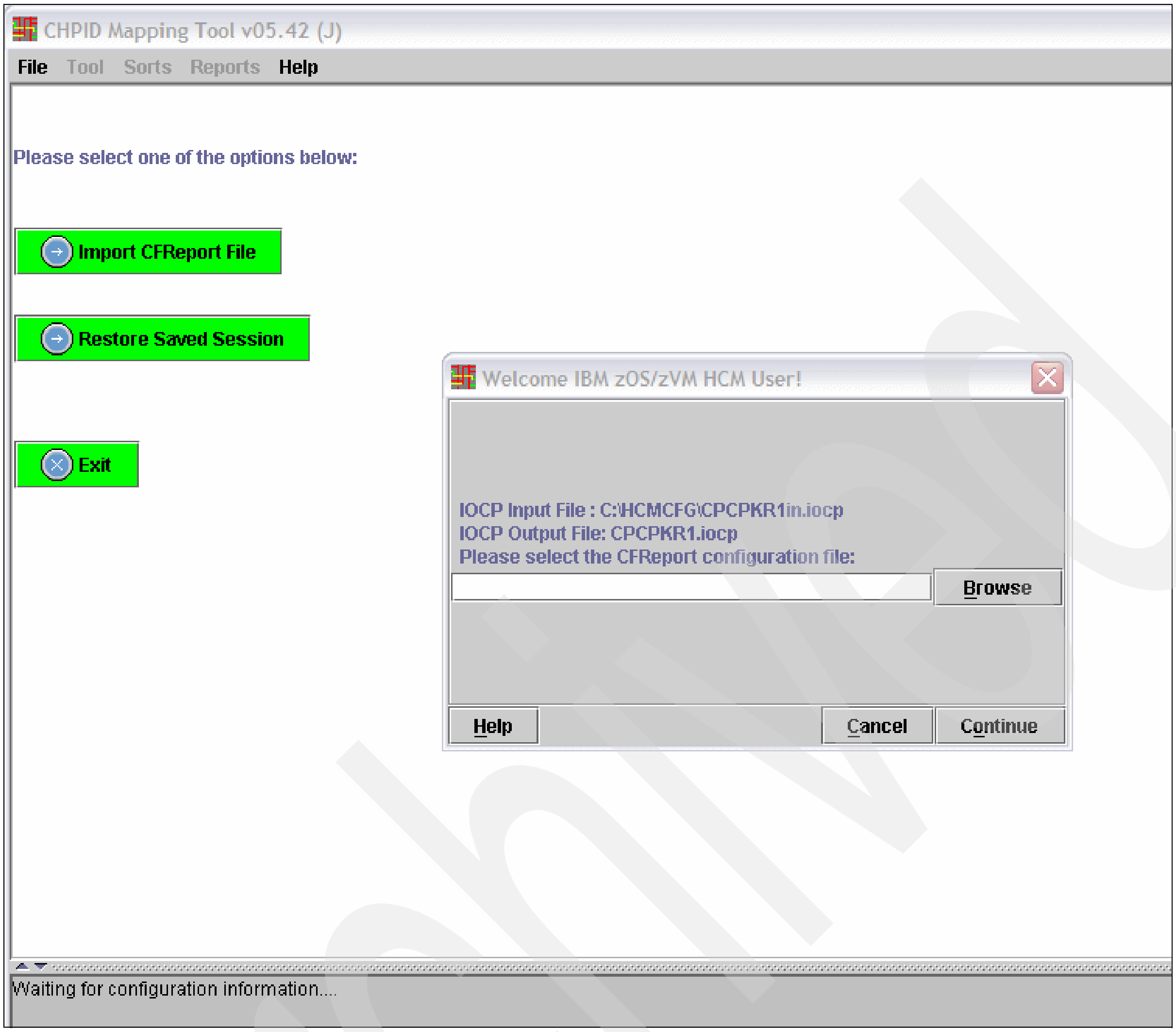


Figure 8-80 HCM: Launch CHPID Mapping Tool

3. Click **Browse** to find and select the CFR file on the workstation. See Figure 8-81 on page 281.

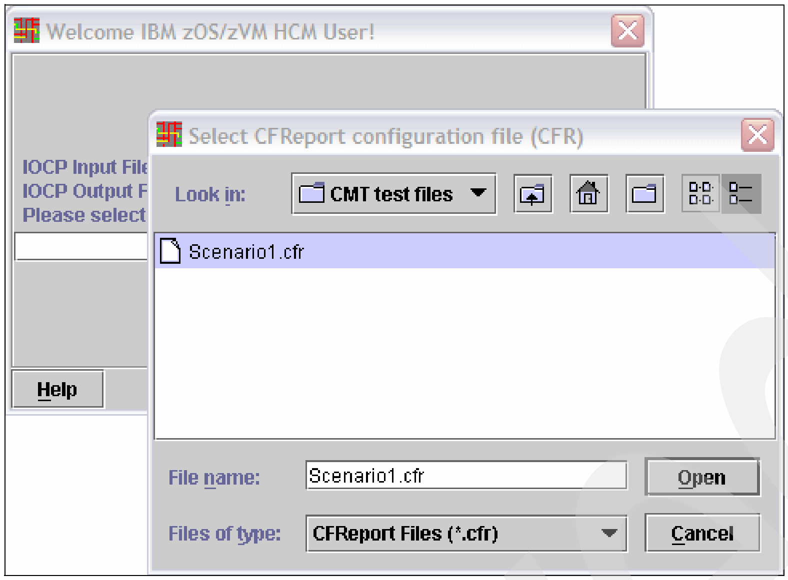


Figure 8-81 HCM: Select CFReport file

4. Click **Open** and then click **Continue.**

For more specific CHPID Mapping Tool procedures, see Chapter 10, “CHPID Mapping Tool (CMT)” on page 315.

8.6.3 Importing the IOCP file (with PCHIDs) back into the IODF

After the “Updated IOCP File” has been created and saved to the workstation by using the CHPID Mapping Tool, return to HCM to import the IOCP file back into the IODF.

In our example, we import the following IOCP file:

```
C:\HCMCFG\CPCPKR1out.iocp
```

To migrate the IOCP with PCHIDs back into the IODF, perform the following steps:

1. Select **Utilities** → **CHPID Mapping Tool Support.**
2. Select **Import IOCP File from CMT** to ensure the file is selected. If you want to change the default file name, click the ellipsis (**...**) button.
3. Click **OK.**

   When the operation is successful, HCM returns the following message:

   ```
   Message ID: CBDA517I I/O configuration successfully written to the IODF.
   ```

   See Figure 8-82 on page 282.

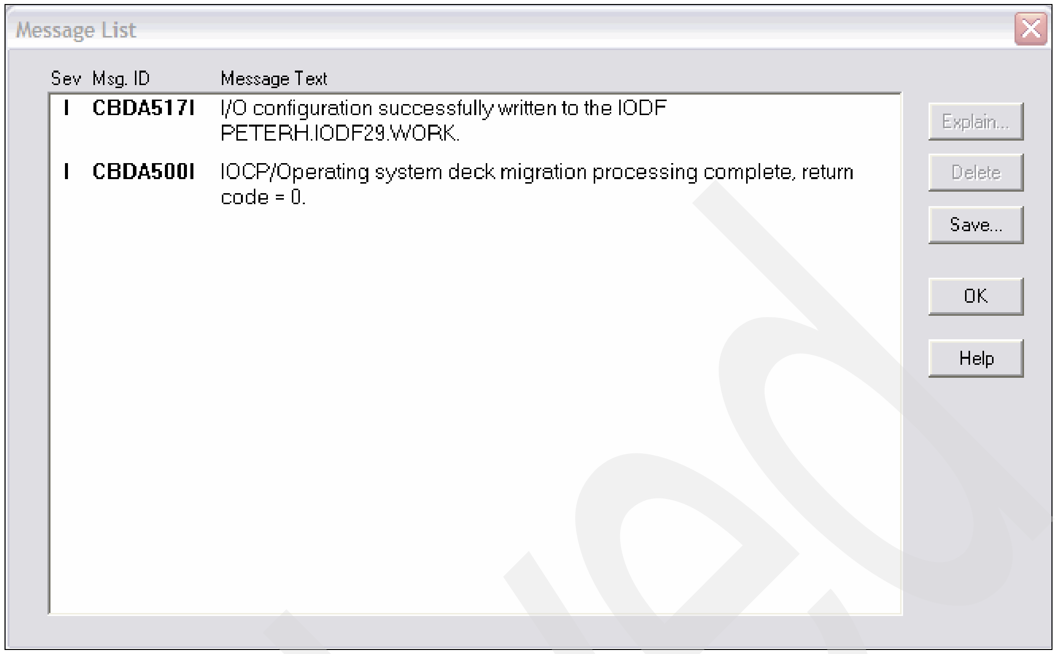


Figure 8-82 HCM: IOCP successfully imported back into the IODF

4. Click **OK**.

The production IODF is now ready to be built.

8.7 Checking and repairing the IODF and HCM data file

Using HCM to perform the HCD "check and repair IODF" procedure is easy because you do not have to remember the HCD commands to perform the procedure.

8.7.1 Using the IODF check and repair tasks

To use the check and repair tasks, perform the following steps:

1. Select **Utilities** → **Check Configuration File**. See Figure 8-83 on page 283.
2. Select **IODF** in the "Select file to check" section.
3. Select the **Repair** check box in the Options section, if you want to also perform a repair.
4. Click **Start**.

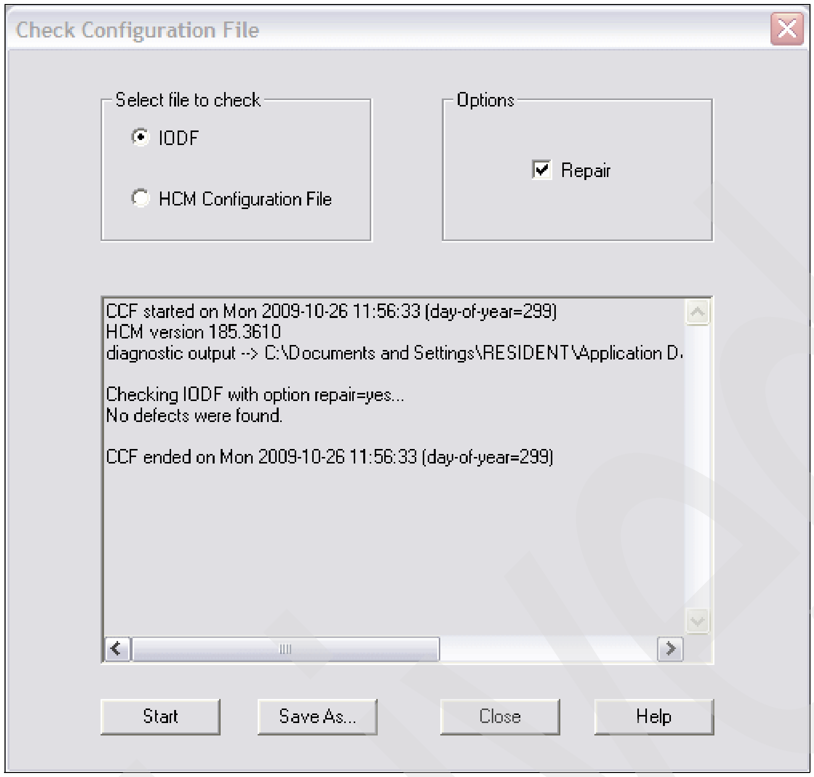


Figure 8-83 HCM: Check and Repair IODF

5. Read the messages in the panel and click **Save As,** if you want to retain the messages.
6. Click **Close.**

8.7.2 Using the HCM data file check and repair tasks

Additionally, you can check and repair the integrity of the HCM data file:

1. Select **Utilities** → **Check Configuration File**. See Figure 8-84 on page 284.
2. Select **HCM Configuration File**.
3. Select the **Repair** check box if you want to also perform a repair.
4. Click **Start**.
5. Click **Close**.

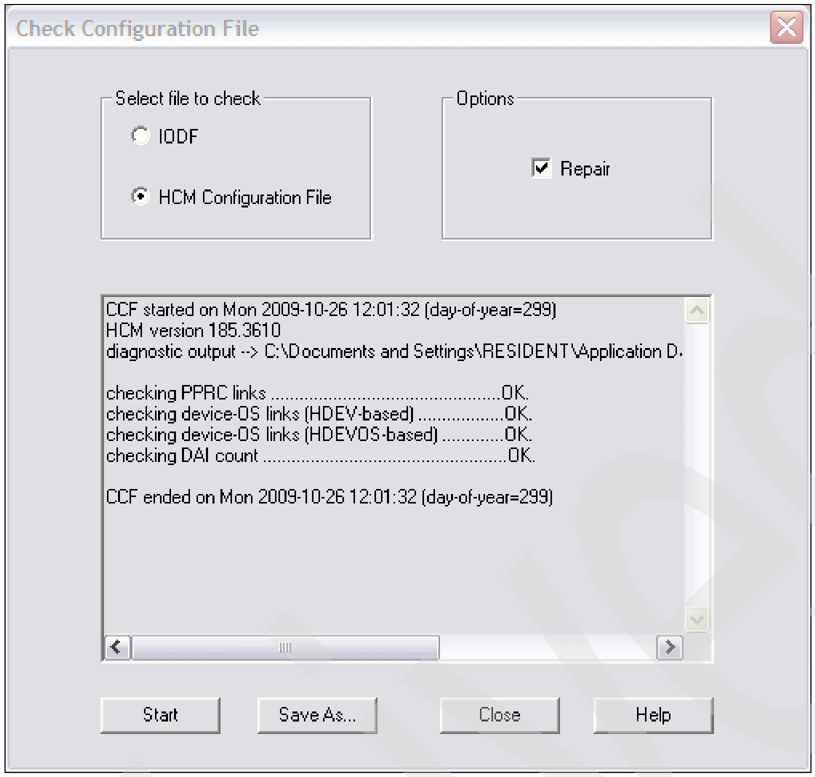


Figure 8-84 HCM: Check and Repair HCM

9

HMC and SE configuration

This chapter contains the following topics:

- Using a naming standard when defining a CPC
- Associating SNA addresses (network and CPC name)
- Adding a CPC to the HMC network with ACSADMIN logon
- Writing the IODF (IOCP deck) to an IOCDS by using HCD Option 2.11
- Working with the activation profiles
- Viewing the processors in Tree Style view
- Locating reserved LPARs
- Console Messenger facility
- Performing screen captures on the HMC or SE
- Using the System I/O Configuration Analyzer (SIOA)

9.1 Using a naming standard when defining a CPC

Having meaningful naming standards can be important when many System z servers are in your complex.

Also, having a name that can penetrate the boundaries of hardware definition, documentation, and asset management can successfully link a device across these separate areas, and therefore help to remove any confusion.

See 5.3, “Design: Planning the IODF configuration” on page 53 for examples of naming standards we have suggested.

9.2 Associating SNA addresses (network and CPC name)

When defining a processor in HCD or HCM, we can specify two network parameters (network name and CPC name) that allow us to access the Support Element when, for example, viewing or updating an IOCDS.

These network parameters must correlate with how the processor’s Support Element has been named by the IBM support representative.

This section shows where these settings are made in HCD, HCM, and the Support Element.

9.2.1 Processor IDs, CPC names, and local system names

In an IODF, you may give a different name to the hardware (CPC) than the logical processor (PROC ID) definition. The CPC name equates to the physical processor, the processor ID equates to the logical processor definition, and the local system name equates to the name that is used by the CPC to identify itself when establishing a coupling facility connection using CIB channel paths.

Unless you plan to have multiple logical processor definitions for your CPC, be sure that these three values are equal.

9.2.2 Checking the SNA address by using HCD

To check the SNA address by using HCD, perform the following steps:

1. From the main HCD panel, select option **1.3, Processor List**.
2. Scroll to the right (click **F20** if available or press Shift+F8) to see all the network, CPC, and local names for the processors in the IODF. You may also type v (view) next to a specific processor ID to see the names only for that processor. See Figure 9-1 on page 287.

```
                                Processor List       Row 1 of 7 More: <
Command ===> _______________________________________________ Scroll ===> PAGE

Select one or more processors, then press Enter. To add, use F11.

                                     ----SNA Address + ---- ---Local---
/ Proc. ID Type +   Model +  Mode +  Network Name  CPC Name System Name
_ ISGSYN   2064     1C7      LPAR    ________      ________ ________
_ ISGS11   2064     1C7      LPAR    ________      ________ ________
_ SCZP101  2094     S18      LPAR    USIBMSC       SCZP101  SCZP101
_ SCZP202  2097     E26      LPAR    USIBMSC       SCZP202  SCZP202
_ SCZP901  2084     C24      LPAR    USIBMSC       SCZP901  ________
_ TESTFLR1 2097     E26      LPAR    ________      ________ ________
_ TESTFLR2 2097     E26      LPAR    ________      ________ ________
```

Figure 9-1 HCD: Processor list after pressing F20

In a work IODF, you may type over and change the values, keeping in mind that what they are changed to must match with what has been set in the Support Element.

9.2.3 Checking the SNA address by using HCM

To check the SNA address by using HCM, perform the following steps:

1. Start HCM, select **File** → **Open**, and select the desired `IODF##.hcm` file.
2. Select **Edit** → **Processor.** HCM displays a summary of the defined processors for that IODF. See Figure 9-2.

Locate One or More Processors

ID	Short name	Type	Mode	Serial number	Network name	CPC name	Local sysname	Description
ISGS11	11	2064-1C7	LPAR					
ISGSYN	YN	2064-1C7	LPAR					
SCZP101	11	2094-S18	LPAR	02991E2094	USIBMSC	SCZP101	SCZP101	
SCZP201	21	2097-E26	LPAR	01DE602097	USIBMSC	SCZP201	SCZP201	
SCZP901	91	2084-C24	LPAR	026A3A2084	USIBMSC	SCZP901		
TESTFLR1	R1	2097-E26	LPAR					H40(T13A)
TESTFLR2	R2	2097-E26	LPAR					K04(T13J)

Figure 9-2 HCM: Processor list

3. Double-click the processor that you want to display or change, and then click **Edit**. See Figure 9-3 on page 288.

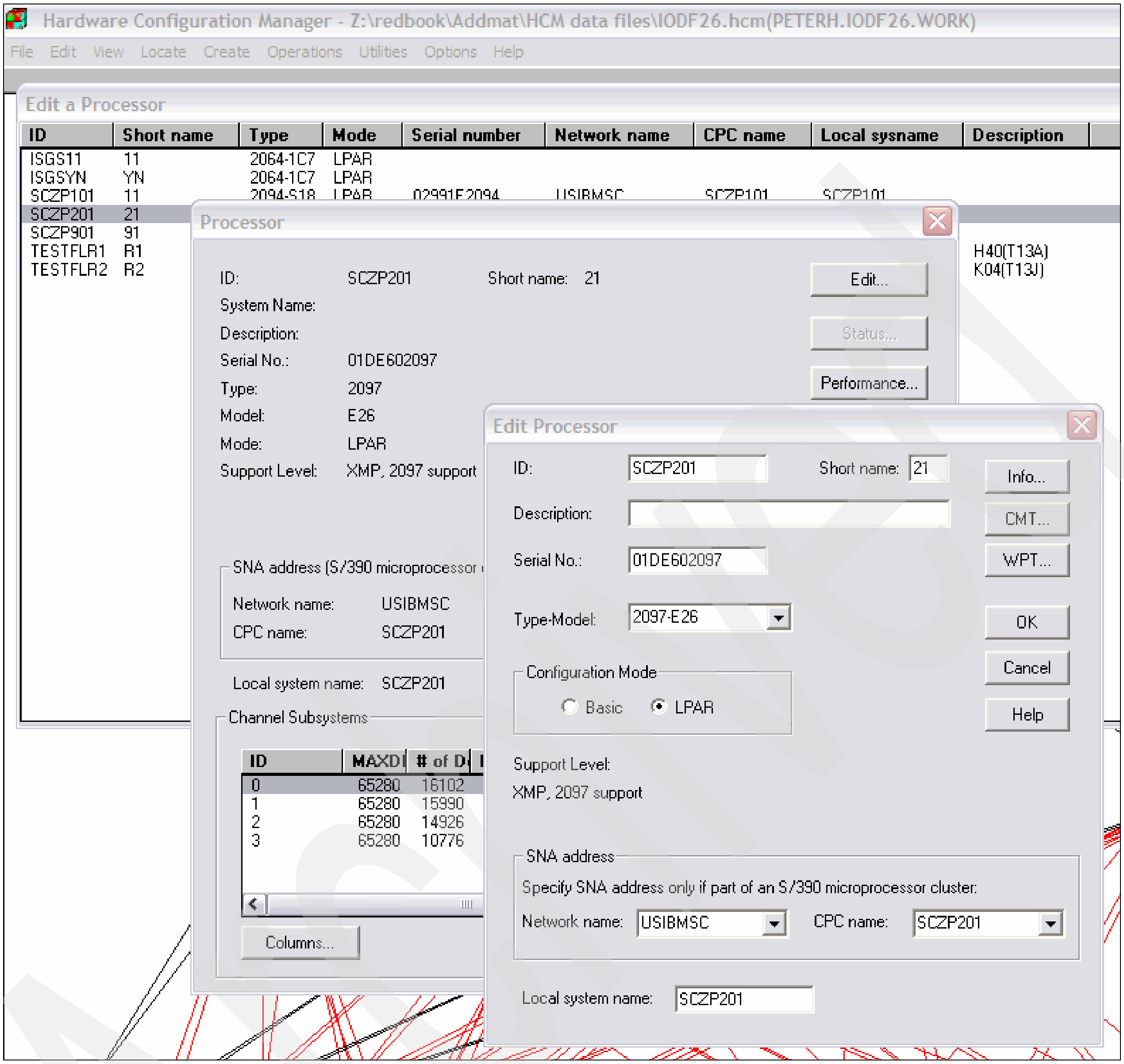


Figure 9-3 HCM: Edit Processor

9.2.4 Accessing the Support Element (SE)

To access the SE, perform the following steps:

1. Log on to the Hardware Management Console (HMC) with the Service logon.
2. Connect to the **SE** by using Single Object Operations.
3. In the Support Element window, click **SE Management**. See Figure 9-4 on page 289.

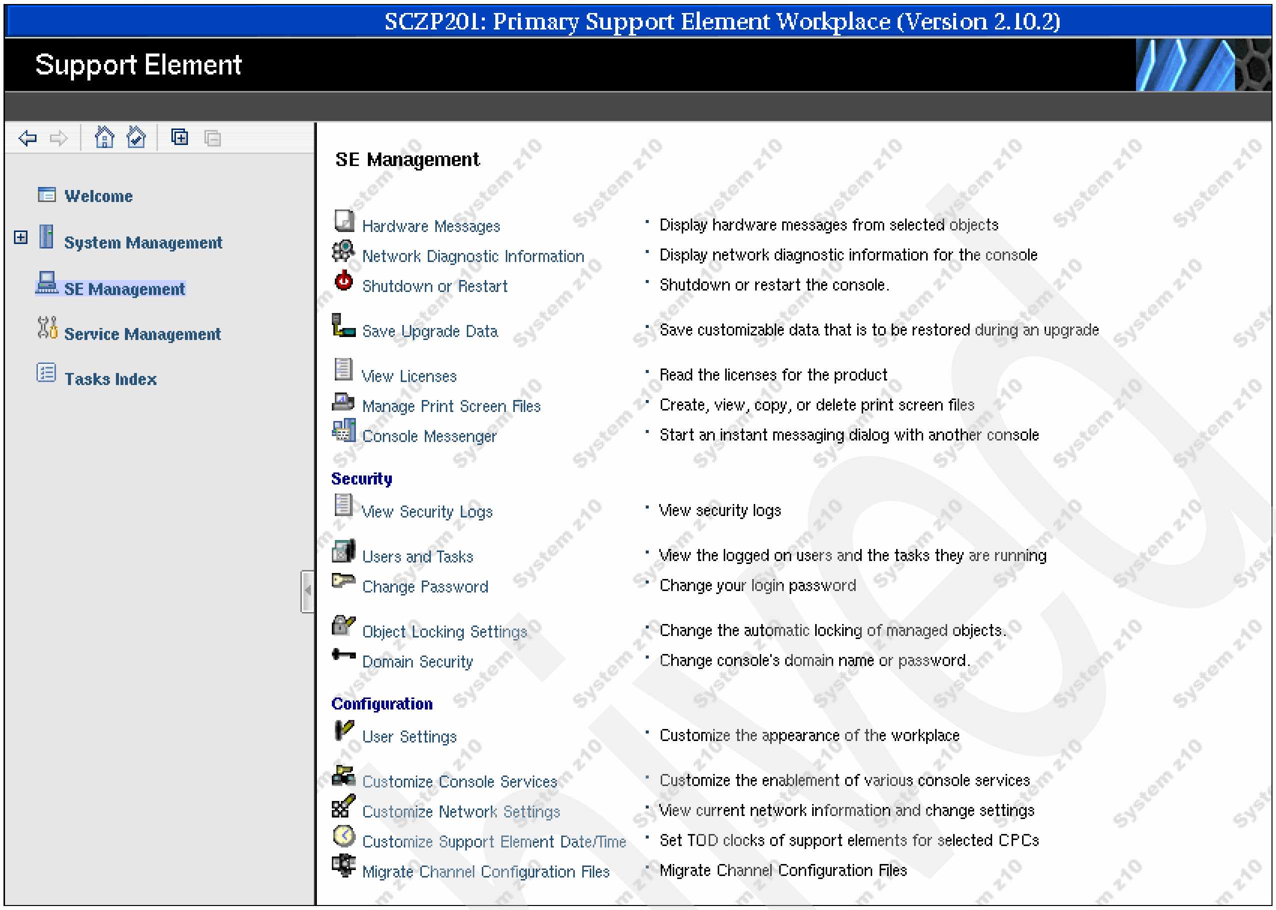


Figure 9-4 HMC: SE Management

4. Click **Customize Network Settings**.

   Use the Customize Network Settings task (shown in Figure 9-5 on page 290) to view the current network information for the Support Element console and to change the network settings.

   Depending on the type of change that you make, the network or SE console automatically restarts or the SE console automatically reboots.

   These procedures do not affect the operation of the CPC.

   Note the following information about Figure 9-5 on page 290:

   – The Netid equals the Network Name in HCD and HCM.

   – The Console name equals the CPC Name in HCD and HCM. The CPC is also the name that shows in the HMC, under the Server list, instead of the Processor ID.

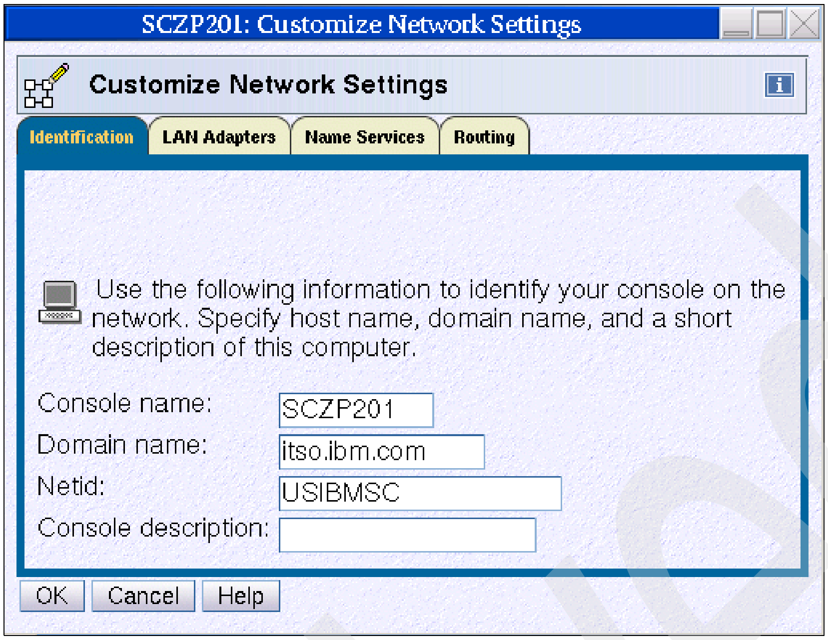


Figure 9-5 HMC: SE Customize Network Settings panel

9.3 Adding a CPC to the HMC network with ACSADMIN logon

After a CPC has been installed, customized, and connected to the HMC network, the CPC Support Element still must be added to HMCs that require access to that CPC, as follows:

1. Log on to the HMC by using the ACSADMIN logon. See Figure 9-6 on page 291.
2. Select **Systems Management** → **Unmanaged Resources** → **Servers**.

   The Unmanaged Resources node represents the servers, directors and timers, and fiber savers that are not defined to this HMC.

   Servers that are listed under Unmanaged Resources have the following characteristics:

   – They are physically installed.

   – Their Support Elements are powered on.

   – They have the same domain name and domain security as the hardware management console.

   – They are not managed by your hardware management console.

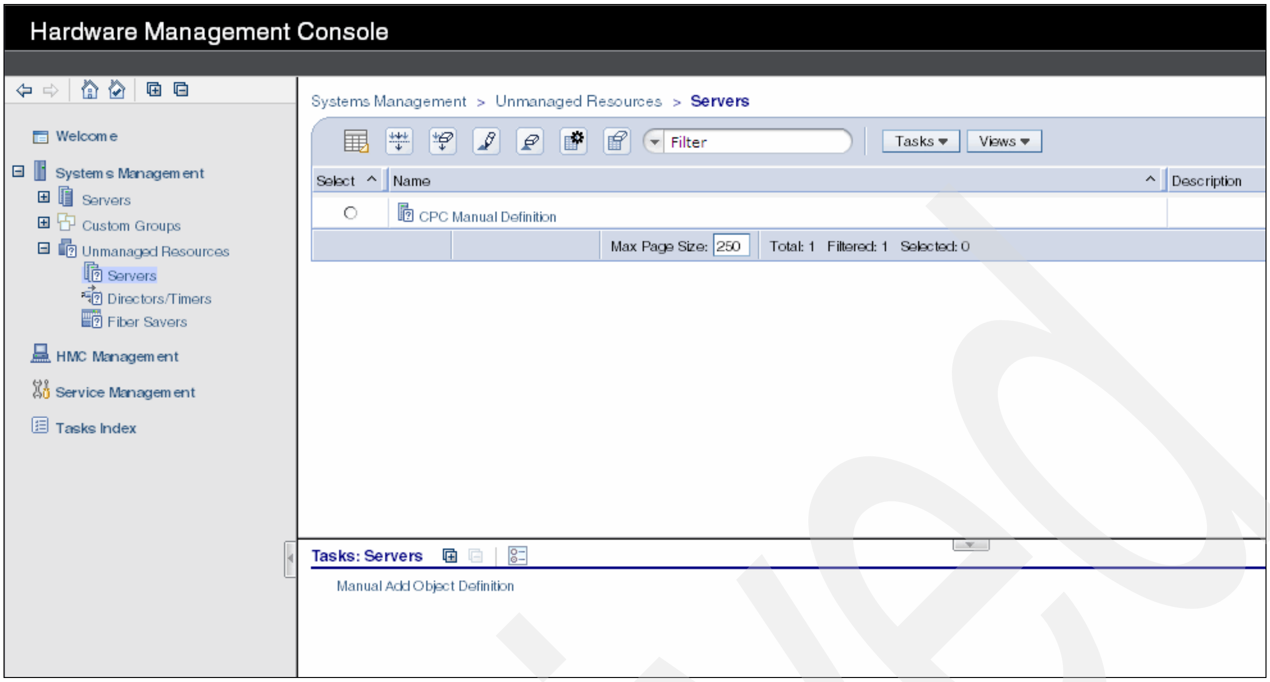


Figure 9-6 HMC: Unmanaged Resources - Servers

3. Look for any CPCs that are currently unmanaged. Figure 9-7 shows that CPC SCZP901 is listed in the display for our example.

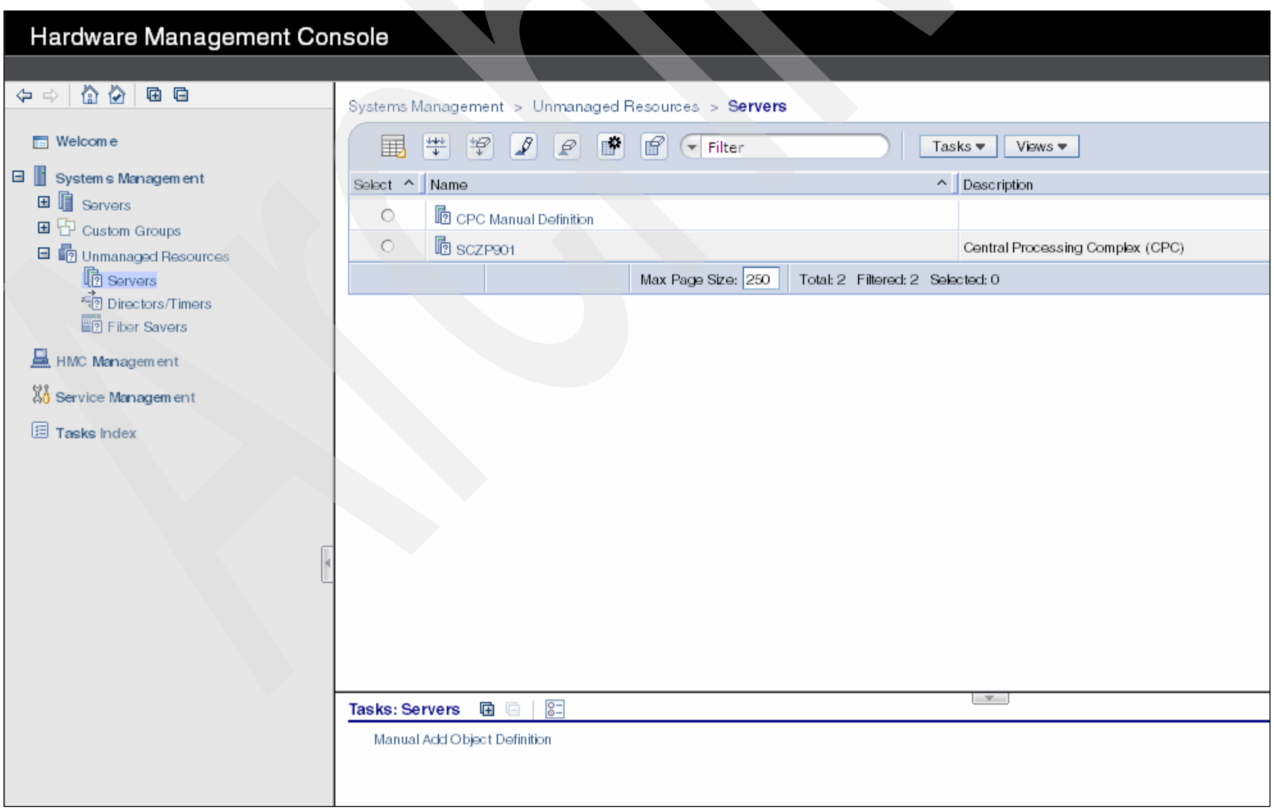


Figure 9-7 HMC: Unmanaged Resources found

4. In the Select column, shown in Figure 9-8, select the name of the CPC, and then in the Tasks section, select **Object Definition** → **Add Object Definition** under.

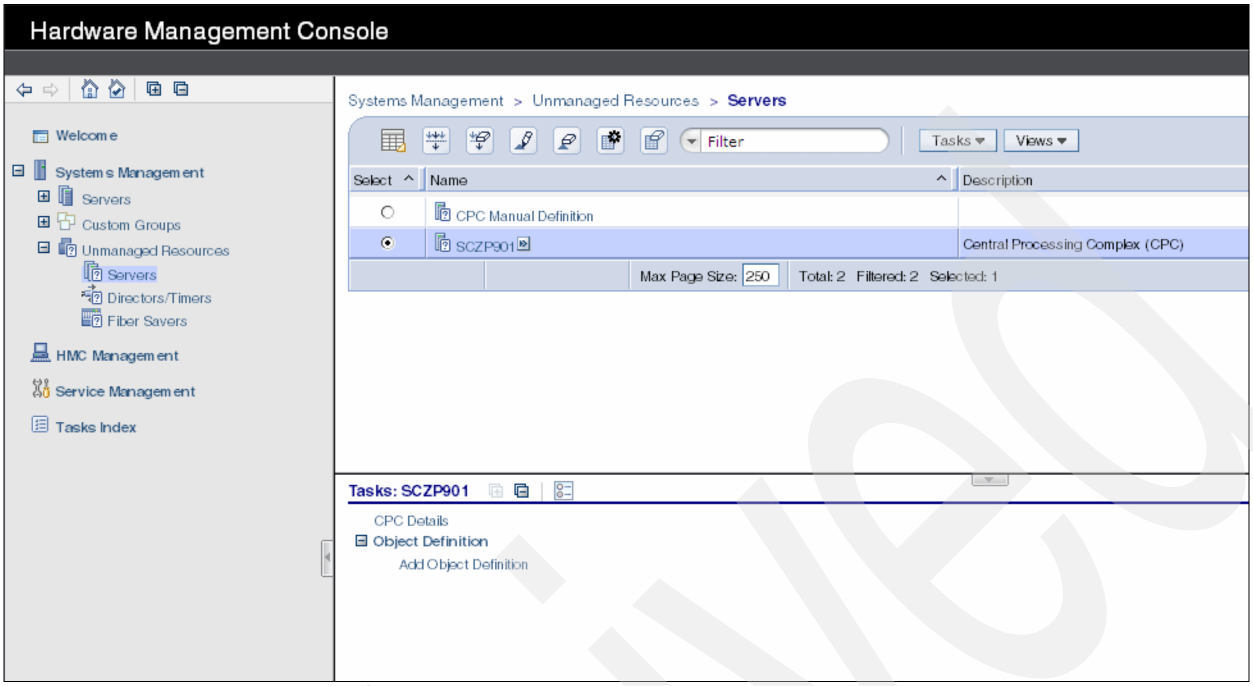


Figure 9-8 HMC: Add Object Definition

The Add or Change Object Definition window opens, as shown in Figure 9-9. Use it to verify or change information about the CPC definitions.

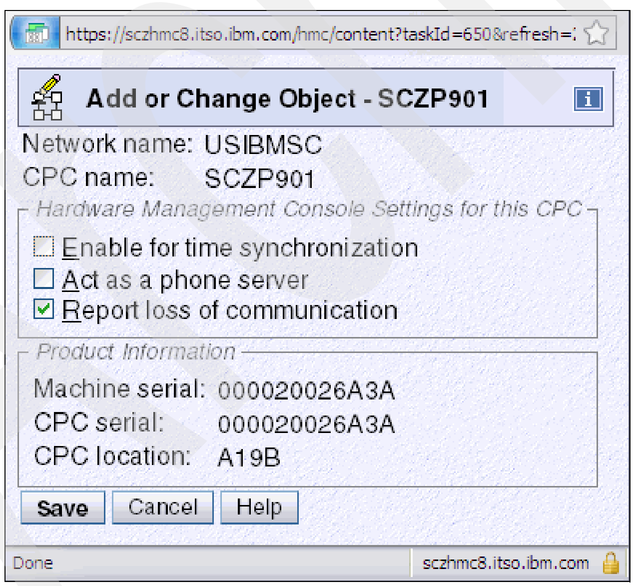


Figure 9-9 HMC: Add or Change Object

5. After you are satisfied with the settings, click **Save** to complete the Add Object Definition task.

One final warning message is issued. See Figure 9-10. The warning advises that the Support Element for the CPC will be temporarily unavailable while this operation completes.

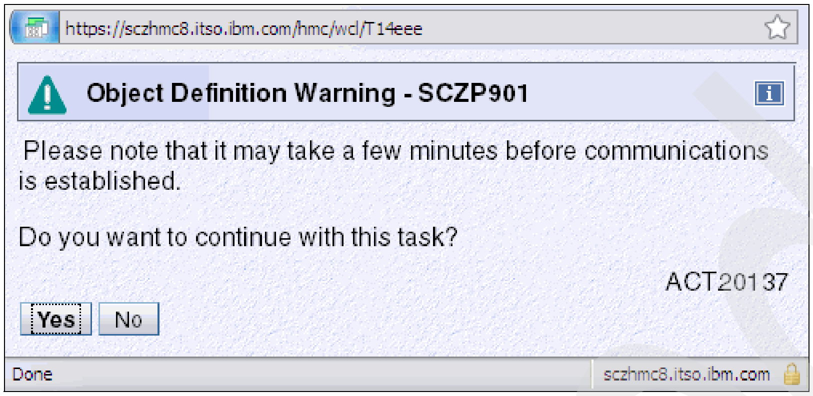


Figure 9-10 HMC: Object Definition Warning

6. Click **Yes** to continue. Shortly, the CPC is added to the Server list on this HMC.

9.4 Writing the IODF (IOCP deck) to an IOCDS by using HCD Option 2.11

Now that the network and CPC names have been defined in the IODF by using HCD or HCM and the Support Element, you may access the CPCs IOCDS information with HCD Option 2.11, as follows:

1. Log on to the HCD running on a processor that is attached to the HMC network of the CPC, where you want to access the production IOCDS.
2. Select the HCD **Option 2.11** (Build and manage S/390 microprocessor IOCDSs and IPL attributes). See Figure 9-11.

```
                      S/390 Microprocessor Cluster List              Row 1 of 5
Command ===> _______________________________________________ Scroll ===> PAGE

Select one or more CPCs, then press Enter.

  --------------CPC--------------   IODF
/ SNA Address          Type   Model   Processor ID
# IBM390PS.H40
# IBM390PS.TC8M
_ USIBMSC.SCZP101     2094   S18     SCZP101
s USIBMSC.SCZP201     2097   E26     SCZP201
_ USIBMSC.SCZP901     2084   C24     SCZP901
```

Figure 9-11 HCD: Option 2.11 Microprocessor Cluster List

3. Type the **S** line-command next to the processor you want to inquire about. In our example, we use SCZP201. See Figure 9-12 on page 294.

```
 IOCDS List          Row 1 of 4 More:
Command ===> ________________________________________________ Scroll ===> PAGE

Select one or a group of IOCDSs, then press Enter.

                                         -----Token Match----- Write
/ IOCDS       Name     Type   Status     IOCDS/HSA IOCDS/Proc. Protect
_ A0.SCZP201  IODF23   LPAR   Alternate  No        No          No
_ A1.SCZP201  IODF24   LPAR   Alternate  No        No          No
_ A2.SCZP201  IODF26   LPAR   POR        Yes       Yes         Yes-POR
u A3.SCZP201  IODF22   LPAR   Alternate  No        No          No
```

Figure 9-12 HCD: Option 2.11 IOCDS List

4. Type **U** line-command next to the IOCDS you want to update with a new IODF (IOCP deck). See Figure 9-13.

   Do not release the write-protection on the current active IOCDS and do not overwrite the active IOCDS with a new one.

   A 209x processor can call home if you choose to have it do so.

```
+------------------------------- Build IOCDSs --------------------------------+
|                                                                   Row 1 of 1 |
| Command ===> ___________________________________________ Scroll ===> PAGE   |
|                                                                              |
| Specify or revise the following values.                                     |
|                                                                              |
| IODF name . . . . . . . . . : 'SYS6.IODF26'                                 |
|                                                                              |
| Title1 . _________________________________________________________________  |
| Title2 : SYS6.IODF26 - 2009-10-04 19:36                                     |
|                                                                              |
|                           Write IOCDS in                                     |
| IOCDS        Switch IOCDS  preparation of upgrade                           |
| A3.SCZP201   No            No                                               |
| **************************** Bottom of data ****************************** |
```

Figure 9-13 HCD: Option 2.11 Build IOCDS

5. Update the Title1 field with a meaningful name for the IOCDS; use something such as IODF26 or 09100426, which is YYMMDDIO (the year, month, day, and IODF). See Figure 9-14 on page 295.

```
+------------------------------- Build IOCDSs --------------------------------+
|                                                                             |
+------------------------- Job Statement Information -------------------------+
|                                                                             |
|                                                                             |
| Specify or revise the job statement information.                            |
|                                                                             |
|                                                                             |
| Job statement information                                                   |
| //WIOCDS  JOB (ACCOUNT),'NAME'                                              |
| //*                                                                         |
| //*                                                                         |
| //*                                                                         |
| //*                                                                         |
| //*                                                                         |
|  F1=Help       F2=Split      F3=Exit       F5=Reset      F6=Previous        |
|  F9=Swap      F12=Cancel                                                    |
+-----------------------------------------------------------------------------+
|                                                                             |
```

Figure 9-14 HCD: Option 2.11 Job Statement Information

HCD then generates generic JCL so that a batch job is submitted to write the IOCDS in batch mode.

6. Leave the production IODF after submitting the batch job. Message CBDA695I is issued if the batch job cannot update the IODF because a user is still holding an enqueue on the production IODF.

Figure 9-15 shows that IOCDS `A3.SCZP201` has been updated with name of 09100426.

```
                                  IOCDS List        Row 1 of 4 More:       >
Command ===> ______________________________________________ Scroll ===> PAGE

Select one or a group of IOCDSs, then press Enter.

                                         -----Token Match----- Write
/ IOCDS       Name     Type   Status     IOCDS/HSA IOCDS/Proc. Protect
_ A0.SCZP201  IODF23   LPAR   Alternate  No        No          No
_ A1.SCZP201  IODF24   LPAR   Alternate  No        No          No
_ A2.SCZP201  IODF26   LPAR   POR        Yes       Yes         Yes-POR
  A3.SCZP201  09100426 LPAR   Alternate  Yes       Yes         No
```

Figure 9-15 HCD Option 2.11 IOCDS List updated

9.5 Working with the activation profiles

Activation profiles are required for CPC (processor) and CPC image (partition) activation. They are used to tailor the operation of a CPC and are stored in the Support Element associated with the CPC. The three types of activation profiles are:

- Reset: Every CPC in the processor cluster requires a reset profile to determine the mode in which the CPC licensed internal code will be loaded and how much central storage and expanded storage will be used. The maximum number of reset profiles allowed for each CPC is 26.
- Image: If LPAR mode is selected in the reset profile, each partition can have an image profile. The image profile determines the number of CPs that the image will use and whether these CPs will be dedicated to the partition or shared. It also allows you to assign the amount of central storage and expanded storage that will be used by each partition. The maximum number of image profiles allowed for each CPC is 64. The image profile also includes cryptographic configuration data and all data corresponding to the data in the load profile.
- Load: A load profile is needed to define the channel address of the device that the operating system will be loaded from. The maximum number of load profiles allowed for each CPC is 64.

9.5.1 Reset profiles

To use the reset profile, perform the following steps:

1. Log on to the Hardware Management Console with the SYSPROG logon.

   In our example, we continue working with processor SCZP201 and show how the new IOCDS we wrote in the previous steps is shown in the reset profile.

2. Select processor **SCZP201** and select **Operational Customization** → **Customize/Delete Activation Profiles**. See Figure 9-16 on page 297.

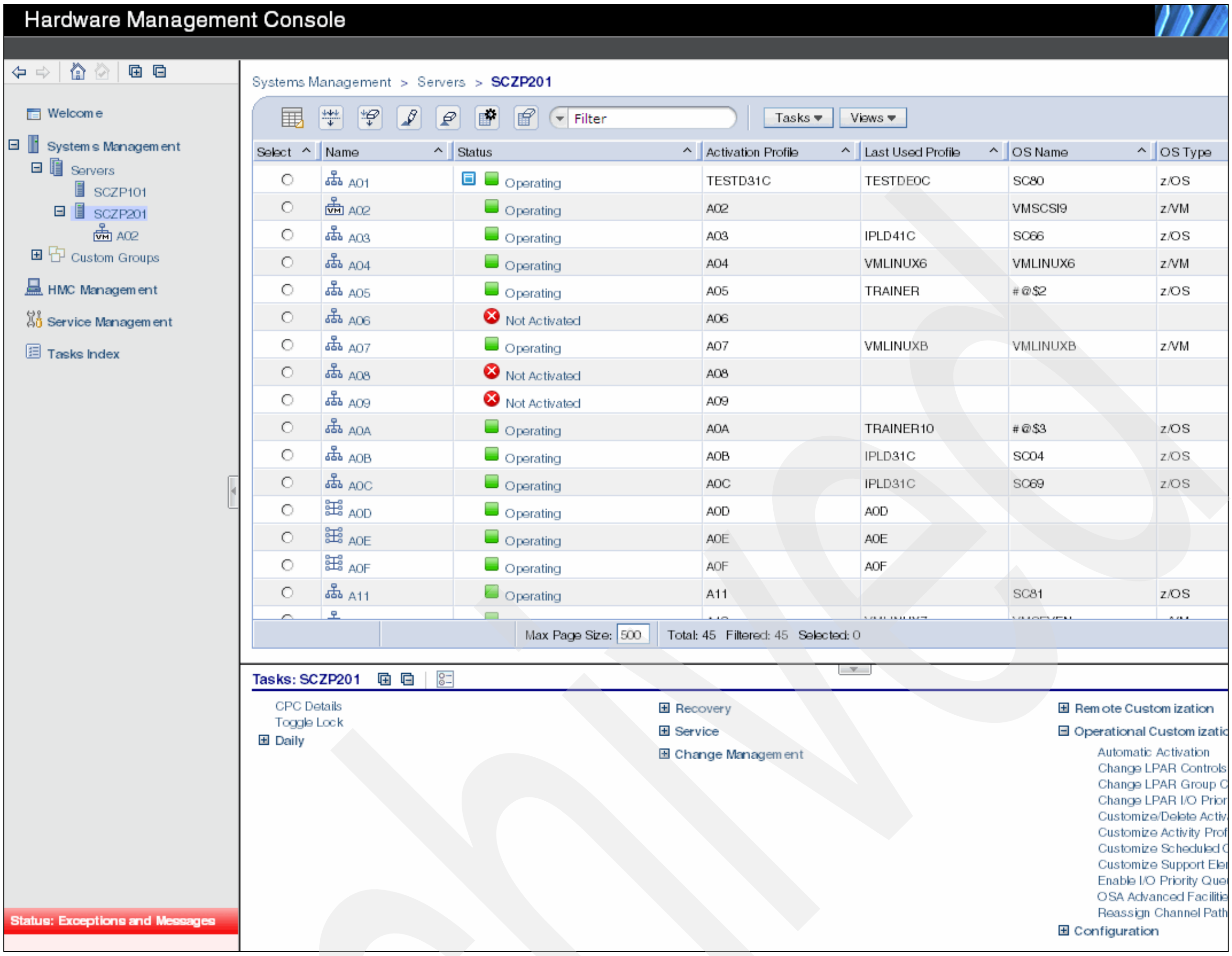


Figure 9-16 HMC: Operational Customization

3. We use the reset profile SCZP201 in our example. In the Select column, shown in Figure 9-17 on page 298, select the **Reset** profile type.

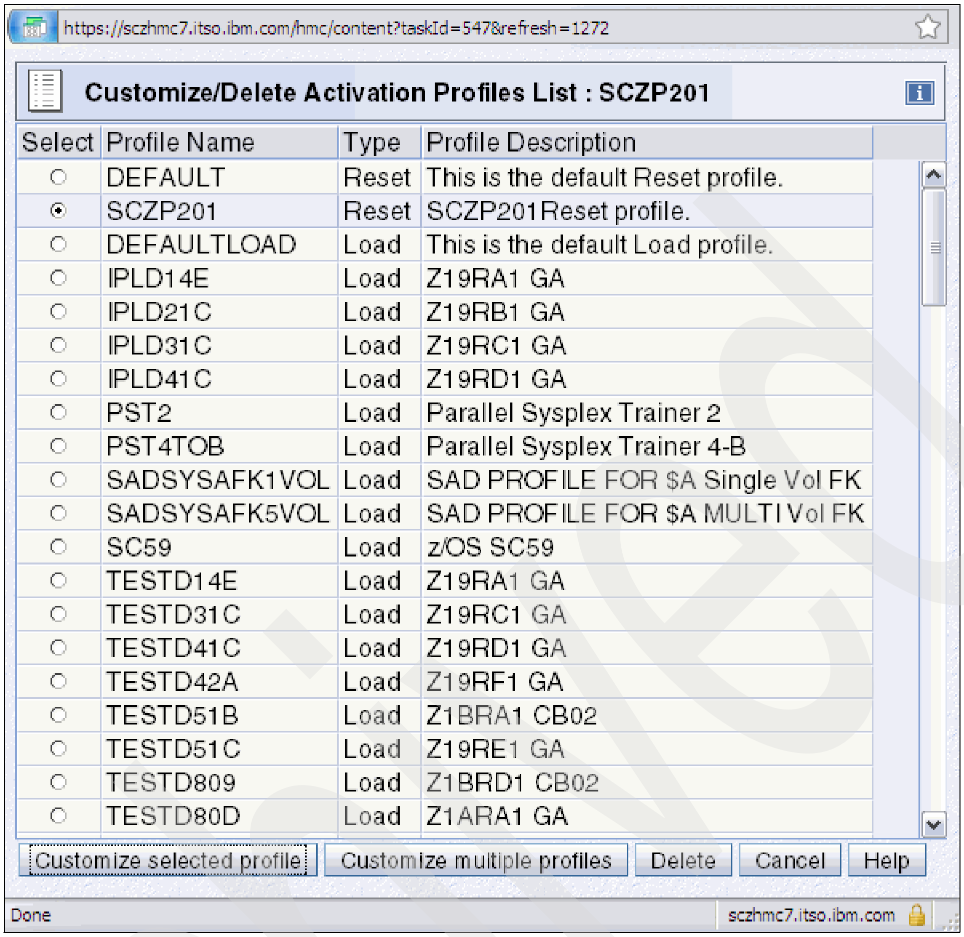


Figure 9-17 HMC: Customize/Delete Activation Profile

4. Click **Customize selected profile**.

Figure 9-18 on page 299 shows how HCD has updated IOCDS A3.SCZP201 using our IODF with Title1 of 09100426.

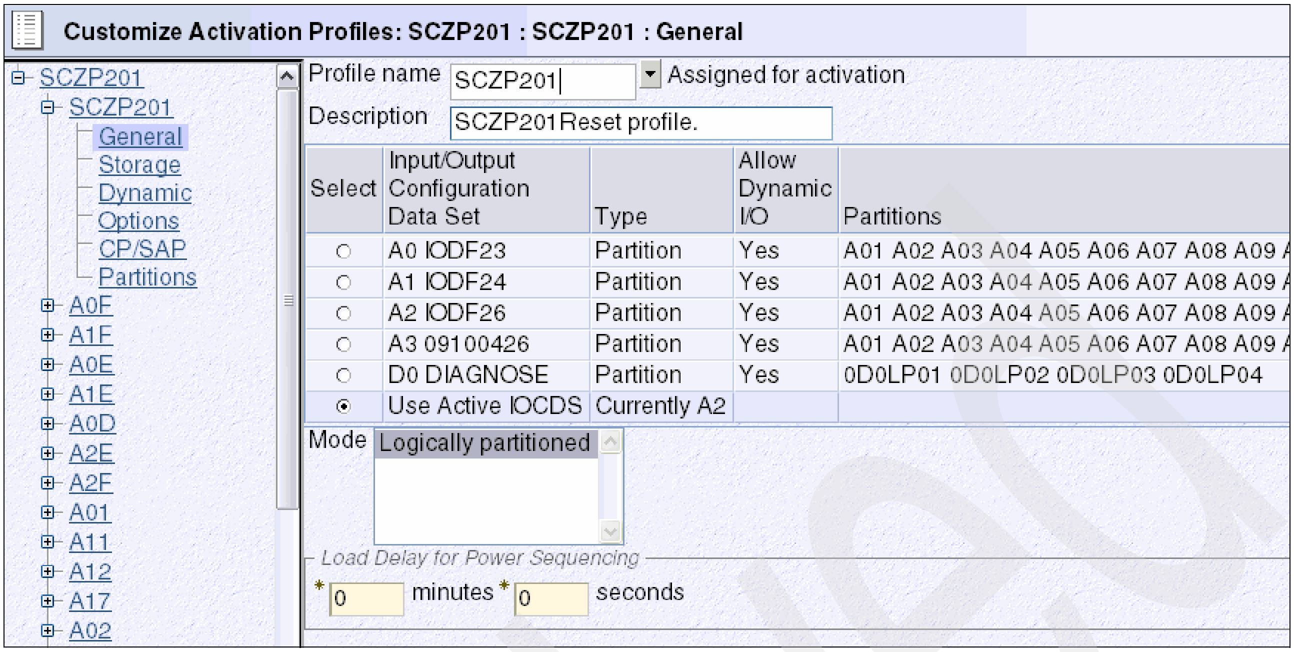


Figure 9-18 HMC: Customize Activation Profiles

9.5.2 Image profiles

If the new IODF is defining new LPAR (image) definitions, or unreserving LPARs (images), new Image profiles have to be created by using one of the following processes:

- Open the default image profile and save it with the name of the new LPAR.
- Click the button next to the new IOCDS. HMC can detect new LPARs and add them automatically.

If you select the automatic process, HMC opens the panel shown in Figure 9-19.

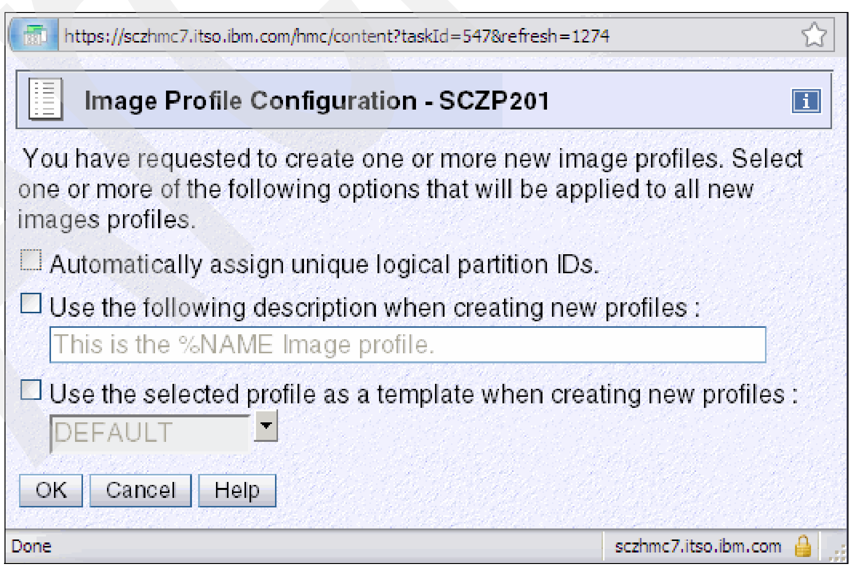


Figure 9-19 HMC: Image Profile Configuration

Use the panel to customize the LPAR name, if you want. Follow these steps:

1. Select **Automatically assign unique logical partition IDs**.

   Our example uses LPAR (Image) A01.

2. Click the plus sign (**+**) next to the image profile (AO1 in our example in Figure 9-20) to expand the list of options, and then click **General**.

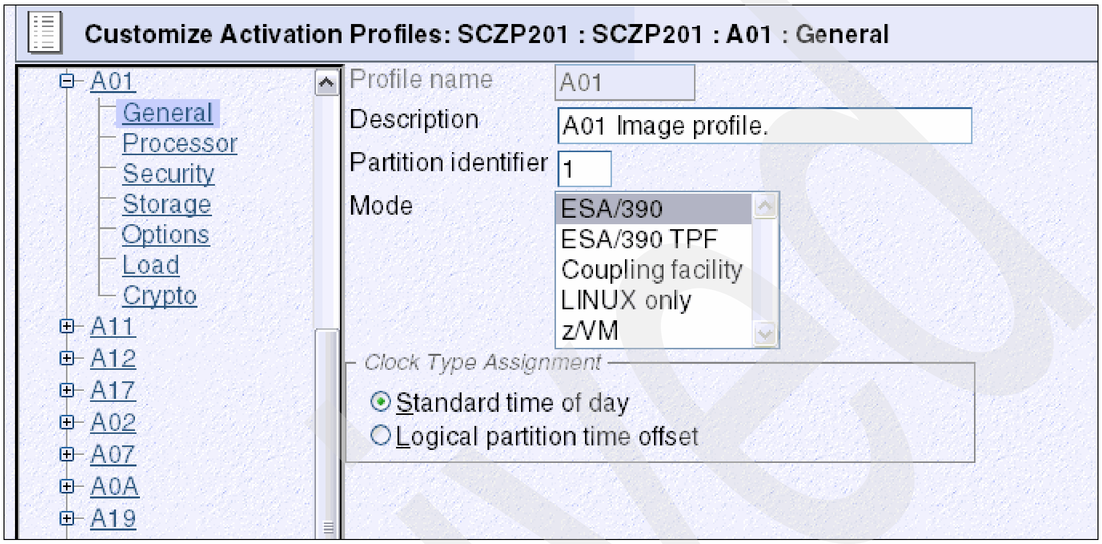


Figure 9-20 HMC: Image Profile General tab

3. Select **Processor** (under A01) to display the LPAR's processor settings.

4. Pay particular attention to the buttons in the "Not Dedicated Processor Details for" section, as shown in Figure 9-21 on page 301.

   The figure shows that we can set the weight values for individual engine types (such as CP, zAAP, and zIIP) for this LPAR, however you must click the appropriate button to be able to view or change the weight value for these individual engine types.

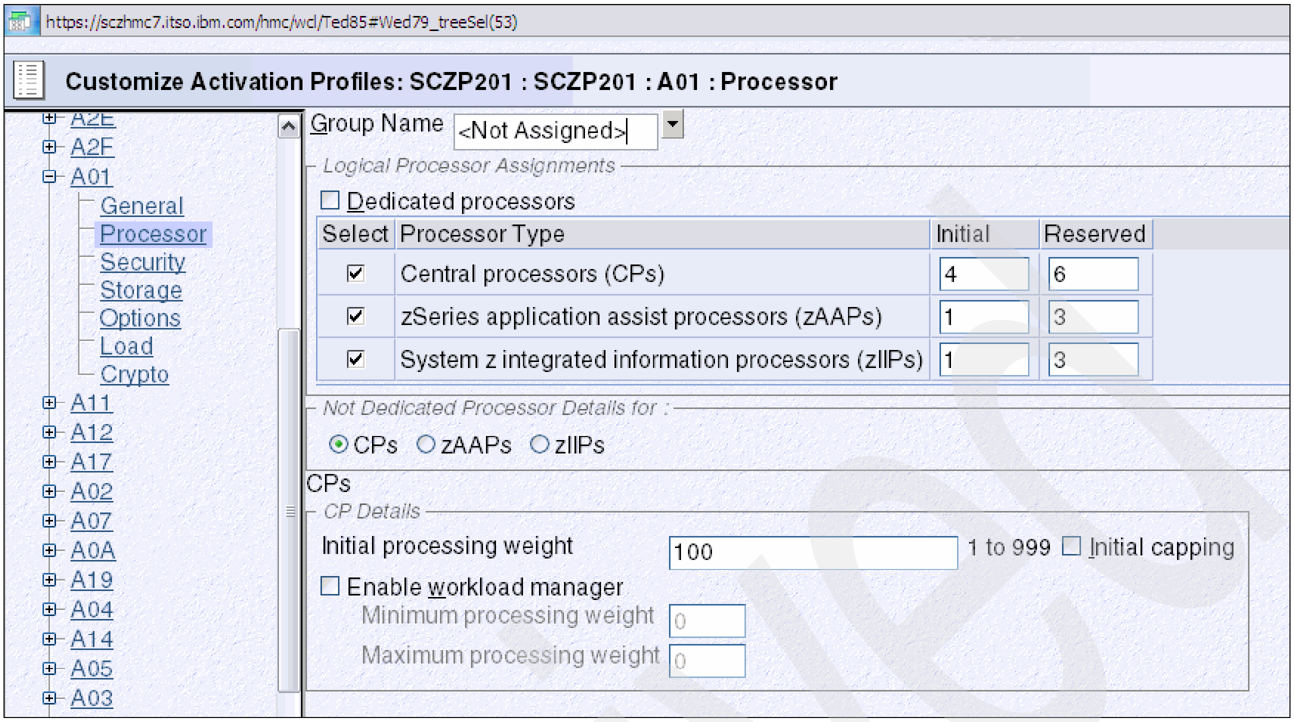


Figure 9-21 HMC: Image Profile Processor tab

9.5.3 Load profiles

In our example, we show load profile TESTDE0C (Figure 9-22) and discuss several parameters.

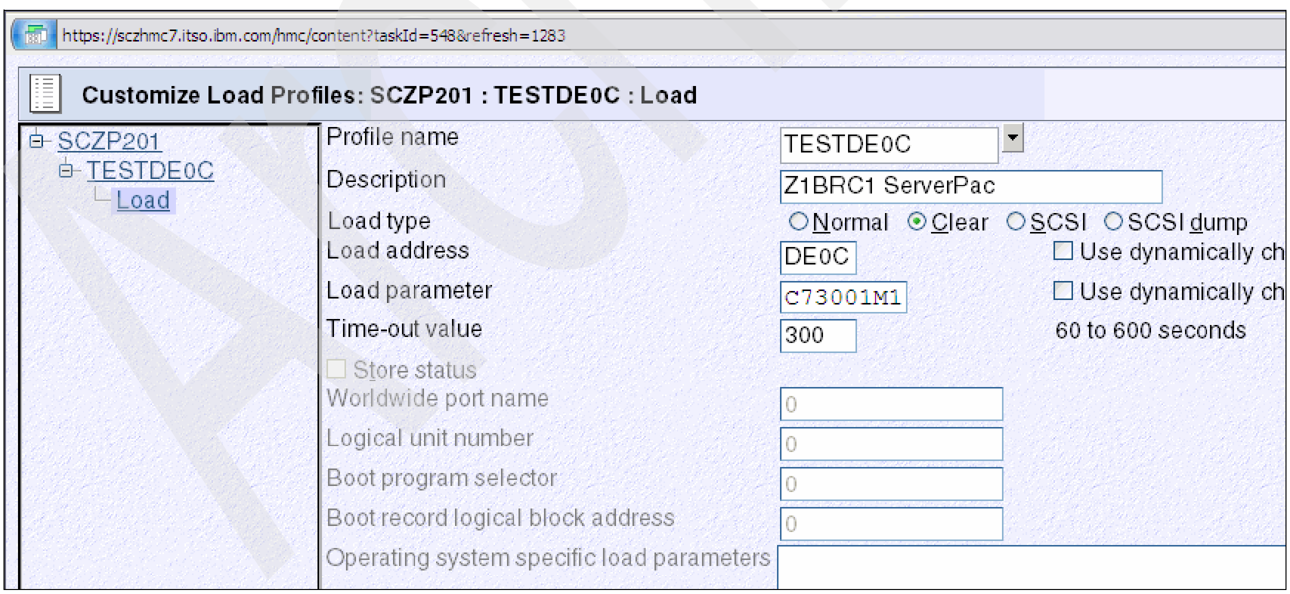


Figure 9-22 HMC: Customize Load Profiles

In the load profile, we focus on the Load address and Load parameter data fields:

- The Load address equals DE0C, which is the channel address of the device that the operating system will be loaded (an IPL) from.

- The Load parameter equals C73001M1, which indicates the following information:
  - **C730**

    Equals the device number that contains the IODF and also the `SYS#.IPLPARM` data set
  - **01**

    Equals the suffix value of the LOADxx member in SYS#.IPLPARM on device C730.
  - **M**

    Equals the initialization message suppression indicator (IMSI).
  - **1**

    Equals alternate nucleus number (IEANUC0n).

A sample Load member in `SYS#.IPLPARM` is shown in Figure 9-23.

```
 BROWSE    SYS0.IPLPARM(LOAD01) - 01.55             Line 00000000 Col 001 080
 Command ===>                                                Scroll ===> PAGE
******************************** Top of Data **********************************
NUCLEUS  1
NUCLST   XX
IEASYM   XX
*-----------DEFINITION FOR SC80-------------*
HWNAME   SCZP201
LPARNAME A01
SYSPLEX  WTSCPLX8 Y
IODF     ** SYS6     TEST2094 01 Y
SYSCAT   BH8CAT133CMCAT.BH8CAT
PARMLIB  SYS1.PARMLIB
PARMLIB  CPAC.ZOSR1B.PARMLIB
PARMLIB  SYS1.IBM.PARMLIB
```

Figure 9-23 SYS#.IPLPARM Loadxx member

In this Loadxx member (LOAD01), note the following information:

- HWNAME = SCZP201

  Equals the Processor ID as defined in the IODF (not to be confused with the CPC name).
- LPARNAME = A01

  Equals the LPAR name or Image Profile name as defined in the IODF and the HMC
- IODF = **

  Means that the system uses the descriptor fields to find the current IODF. Alternatively, you may specify a two-digit hexidecimal number that is part of the IODF name. For example, 26 is the IODF suffix for IODF26. If you do not specify a suffix, the system searches for an IODF sequentially in a numerically ascending order, starting with the IODF suffix of 00.

The MVS `D IPLINFO` display command, in Figure 9-24 on page 303, shows how more of these parameters tie together.

```
D IPLINFO
IEE254I  18.23.19 IPLINFO DISPLAY 066
 SYSTEM IPLED AT 20.30.22 ON 10/11/2009
 RELEASE z/OS 01.11.00    LICENSE = z/OS
 USED LOAD01 IN SYS0.IPLPARM ON C730
 ARCHLVL = 2   MTLSHARE = N
 IEASYM LIST = XX
 IEASYS LIST = (00) (OP)
 IODF DEVICE: ORIGINAL(C730) CURRENT(C730)
 IPL DEVICE: ORIGINAL(DE0C) CURRENT(DE0C) VOLUME(Z1BRC1)
```

Figure 9-24 D IOS,CONFIG display command

The figure shows the following information:

- `LOAD01 in SYS0.IPLPARM on C730`

  Equals LOAD01 member in `SYS0.IPLPARM` data set on device C730.

- `IODF DEVICE: ORIGINAL(C730) CURRENT(C730)`

  `ORIGINAL` equals the device number where the I/O configuration resided when the system was originally loaded (IPL). `CURRENT` equals the device number of the volume where the I/O configuration now resides. These device numbers can be the same and relate to HiperSwap.

- `IPL DEVICE: ORIGINAL(DE0C) CURRENT(DE0C) VOLUME(Z1BRC1)`

  `ORIGINAL` equals the SYSRES device number from which the system was originally loaded (IPL). `CURRENT` equals the current SYSRES device number. These device numbers can be the same and also relate to HiperSwap.

9.6 Viewing the processors in Tree Style view

For the HMC, a good practice is to use the Tree Style view.

The view or User Interface (UI) style is set in the UI Style tab in the User Settings panel, under HMC Management. See Figure 9-25 on page 304. These setting are unique at a user profile level.

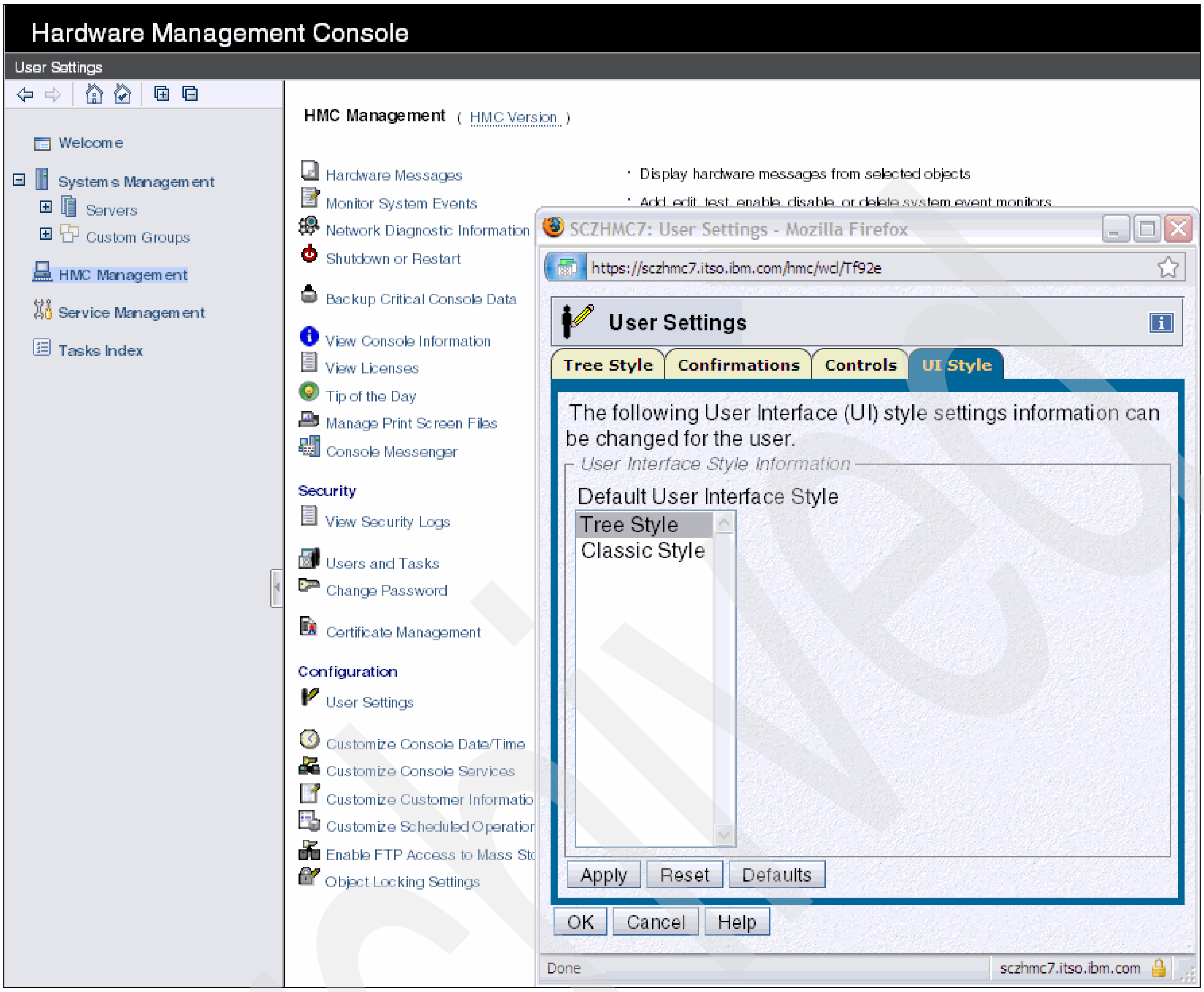


Figure 9-25 HMC: User Settings UI style

Although servers and LPARs, by default, are sorted in alphabetic ascending order, you can customize our own sort order by clicking the Edit Sort icon () shown in Figure 9-26 on page 305.

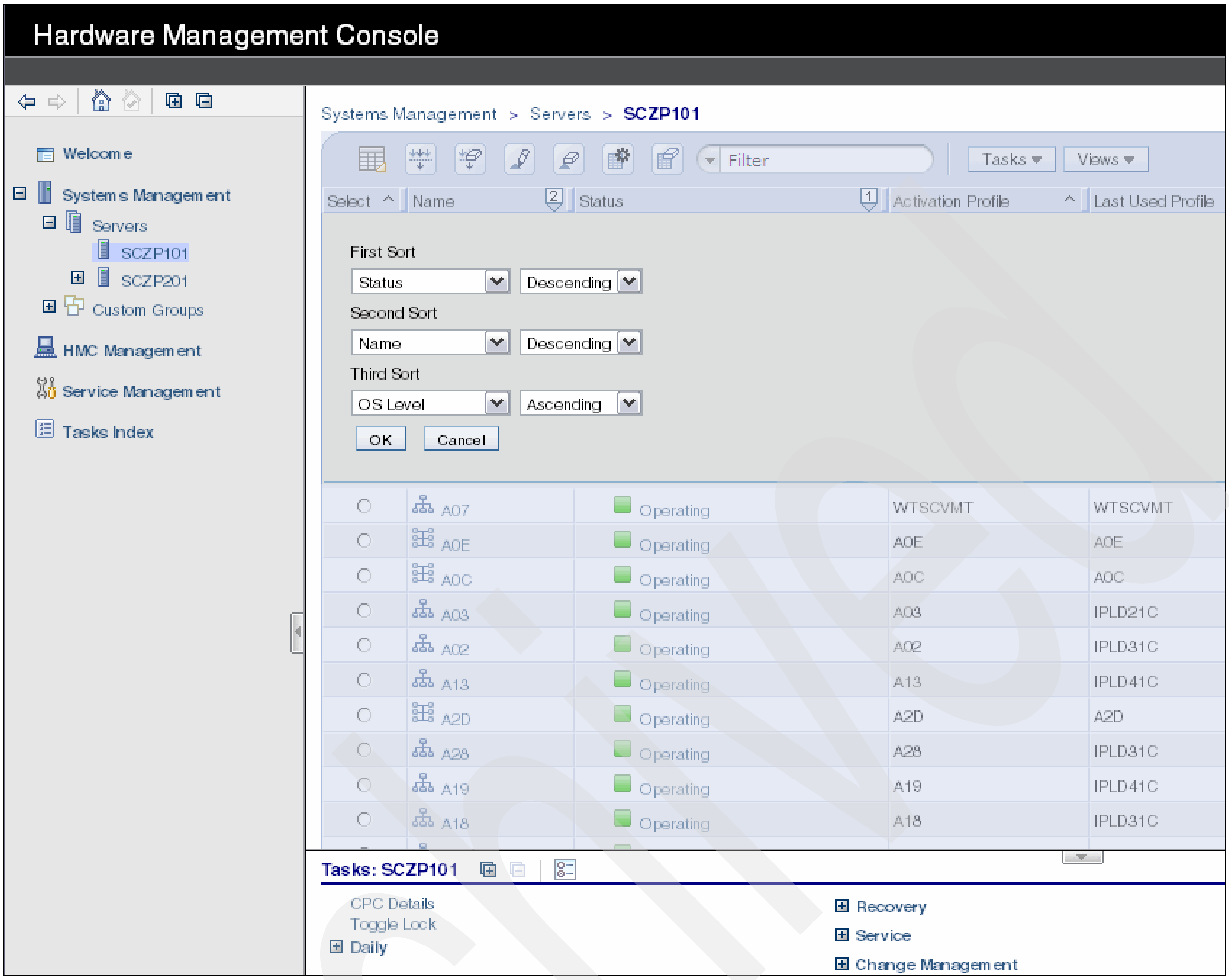


Figure 9-26 HMC: Edit Sort

9.7 Locating reserved LPARs

For XMP processors, HCD provides the capability to add or remove logical partitions through dynamic I/O configuration. In an IODF that is used to create the initial IOCDS for power-on reset (POR), you can define *reserved partitions*, which you plan to add dynamically at a later time. In the Add Partition dialog box, you specify an asterisk (*) as the placeholder partition name for reserved partitions. Reserved partitions are listed with this asterisk (*) at the end of the Partition List. You specify a partition number, a usage type and optionally a description.

Reserved partitions are not listed in the access or candidate lists of channel paths or devices. Also, they are not in the IOCDS, therefore when an IOCDS is selected that contains reserved LPARs, no image profile is created.

To activate a partition dynamically, change the asterisk (*) name to a valid partition name in the IODF, and define the appropriate partition configuration before building a new production IODF.

Note: You cannot change the partition name dynamically.

9.8 Console Messenger facility

Sometimes, you might want to access the Support Element of a processor using Single Object Operation but someone else has already logged on to that Support Element.

Figure 9-27 shows the window that opens during your logon operation, indicating who already has the connection.

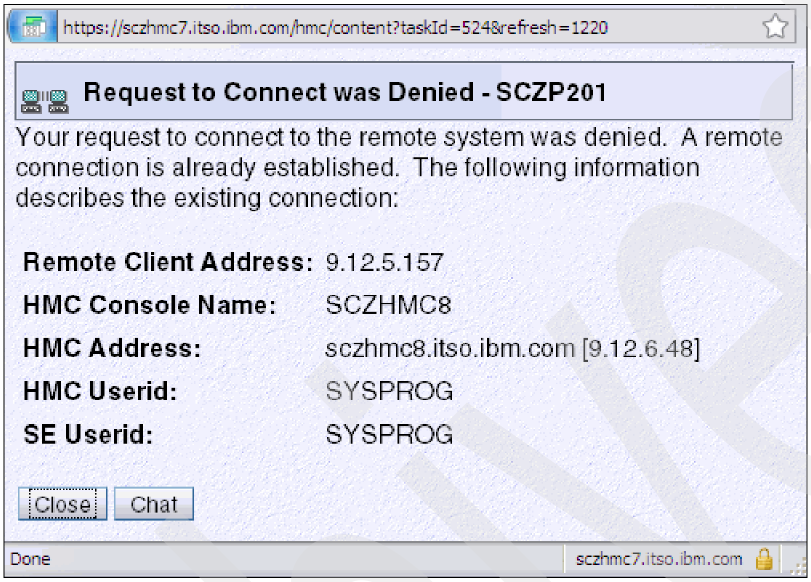


Figure 9-27 HMC: Single Object Connect Denied

HMC version 2.10.1 (driver 76) introduced a Console Messenger facility with the following capabilities:

- Interactive chats between two users
- Broadcast message to all sessions on a selected console
- Plain text messages in chats and broadcast messages

By clicking **Chat**, an interactive chat opens between two users. See Figure 9-28 on page 307.

You might use the chat to inquire how long the users will be logged on or perhaps ask if they require assistance.

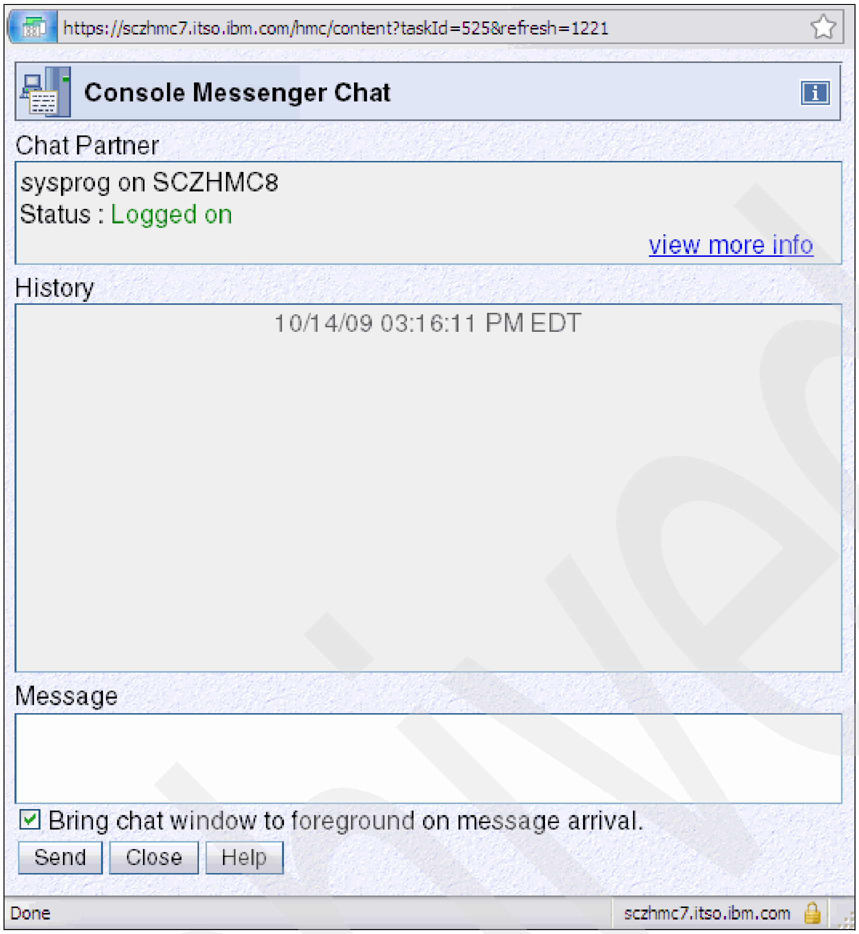


Figure 9-28 HMC: Connect Denied Chat window

9.9 Performing screen captures on the HMC or SE

A feature introduced with HMC version 2.10.1 (driver 76) enables you to perform screen captures at the HMC. The Manage Print Screen Files function is available to all HMC, TKE, and SE users. The function enables you to perform the following tasks:

- Capture full screens or specific windows to PNG, JPG, or GIF file formats.
- View previously captured files.
- Copy captured files to removable media in any form such PNG, JPG, or GIF format.
- Delete any captured files that are no longer needed.

9.9.1 Invoking the print screen function

Use either of the following methods to perform a print screen capture:

- Press Shift+PrtSc to capture the entire desktop view. See Figure 9-29 on page 308.
- Press Alt+PrtSc to capture a particular window in the view. See Figure 9-30 on page 308.

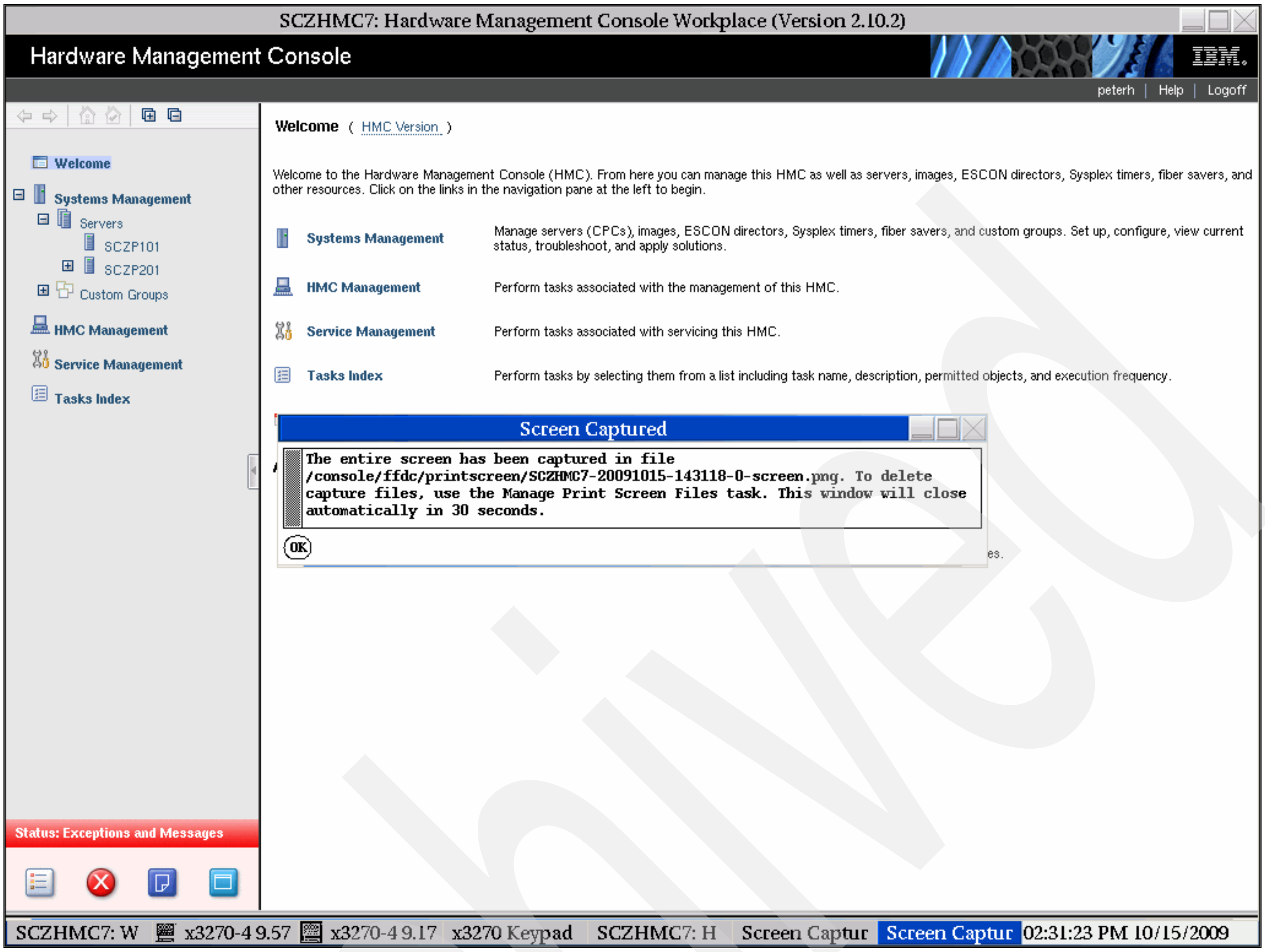


Figure 9-29 HMC: Capture entire desktop

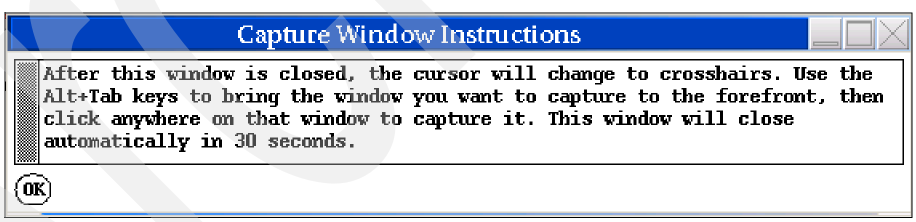


Figure 9-30 HMC: Capture window instructions

After the window is captured, a message is displayed, as shown in Figure 9-31.

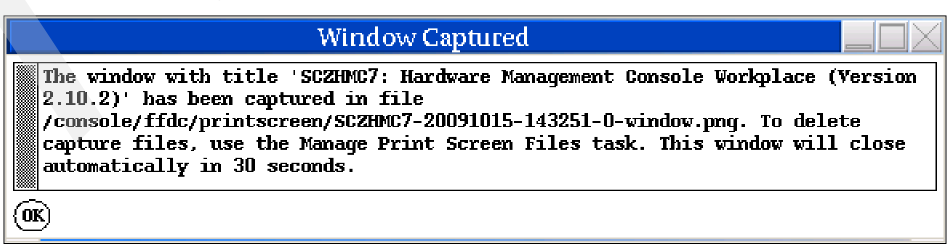


Figure 9-31 HMC: Window captured

9.9.2 Viewing the captured files

To view the captured files, perform the following steps:

1. Under HMC Management, click **Manage Print Screen Files**.

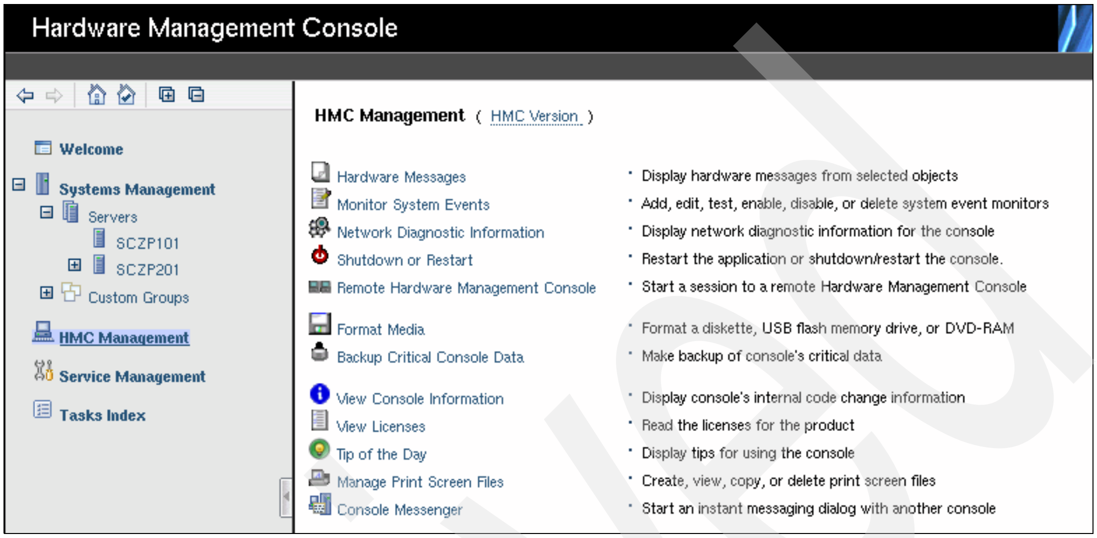


Figure 9-32 HMC: Manage print screen files

2. In the next window that opens, shown in Figure 9-33 on page 310, select the check box next to the image file you want to preview, and then click **View**.

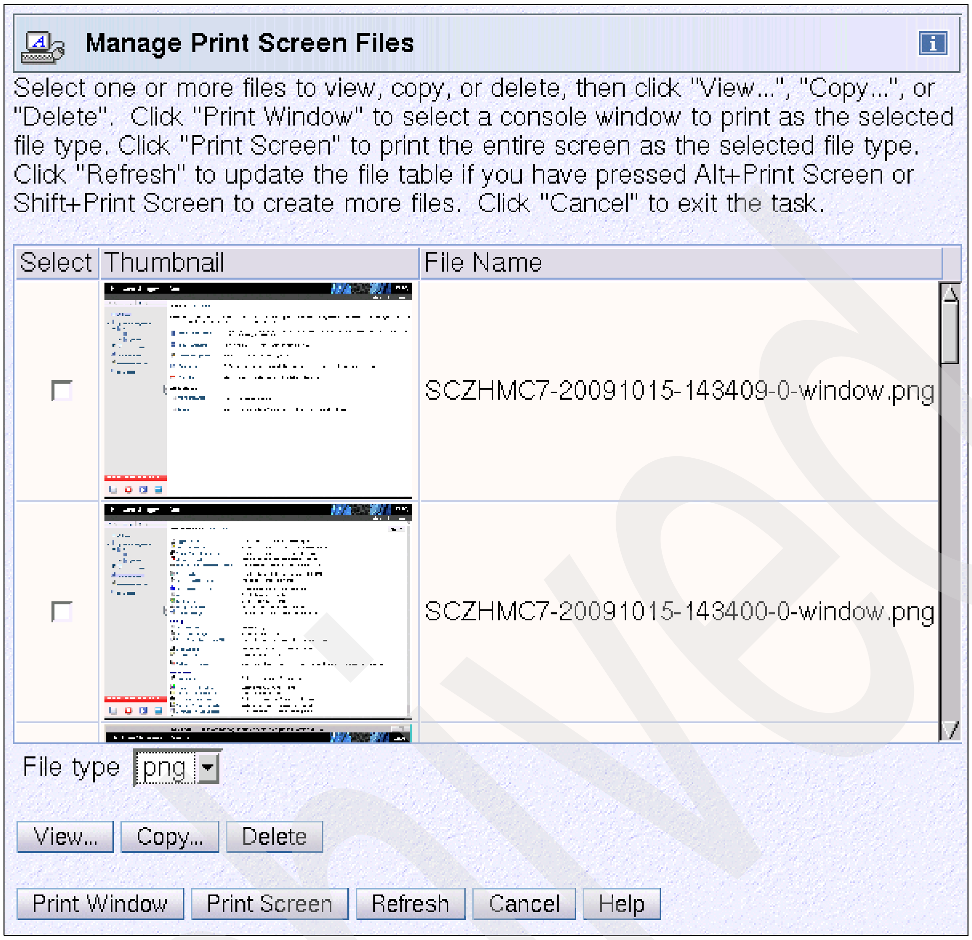


Figure 9-33 HMC: Manage print screen files panel

9.9.3 Copying captured image files to removable media

To copy the captured image files, perform the following steps:

1. Select the check box next to the captured images files you want to save, and click **Copy**.
2. Select a media device, as shown in Figure 9-34 on page 311, and then click **OK**.

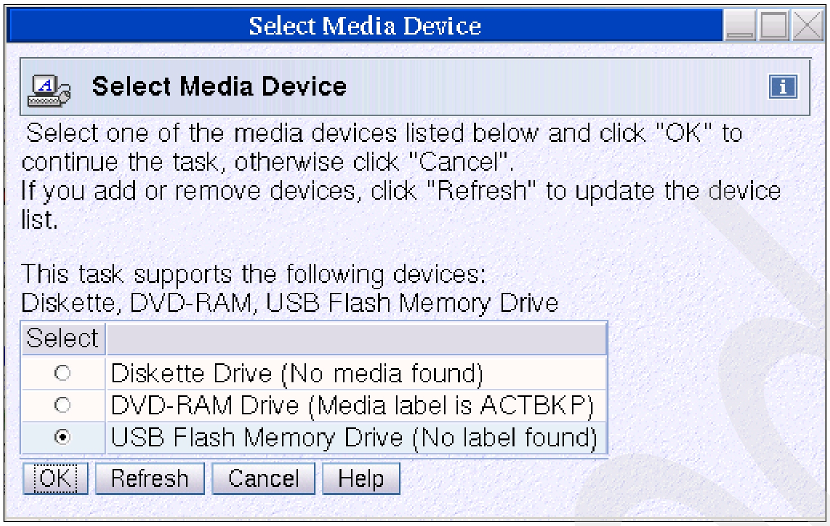


Figure 9-34 HMC: Select Media Device

The files are copied successfully, as shown in Figure 9-35.

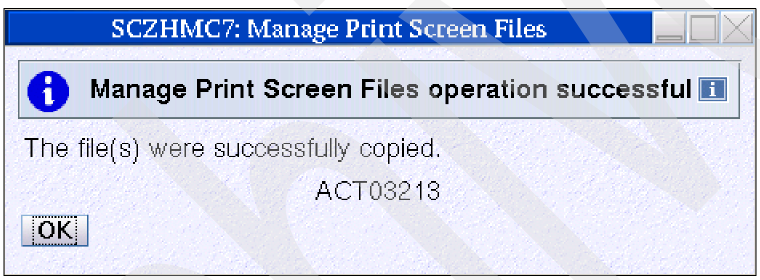


Figure 9-35 HMC Print screen files successfully copied

9.10 Using the System I/O Configuration Analyzer (SIOA)

Prior to HMC version 2.10.1, the information needed to perform system I/O configuration analysis had to be obtained from several sources.

The SIOA is a *view-only* tool that helps you to analyze I/O configuration and provides summary information for load balancing.

Information can be exported to removable media and saved in the CSV format, making it easy to import into a spreadsheet program to produce reports and do further analysis.

SIOA analyzes the current active IOCDS on the SE and also probes the channels for their node ID information.

SIOA tool is available on both the HMC and SE but must be authorized by the Access Administrator:

1. Select CPC to be analyzed under Servers, under Systems Management. In our example we have chosen SCZP201. See Figure 9-36 on page 312.
2. Select **Configuration** → **System Input/Output Configuration Analyzer**.

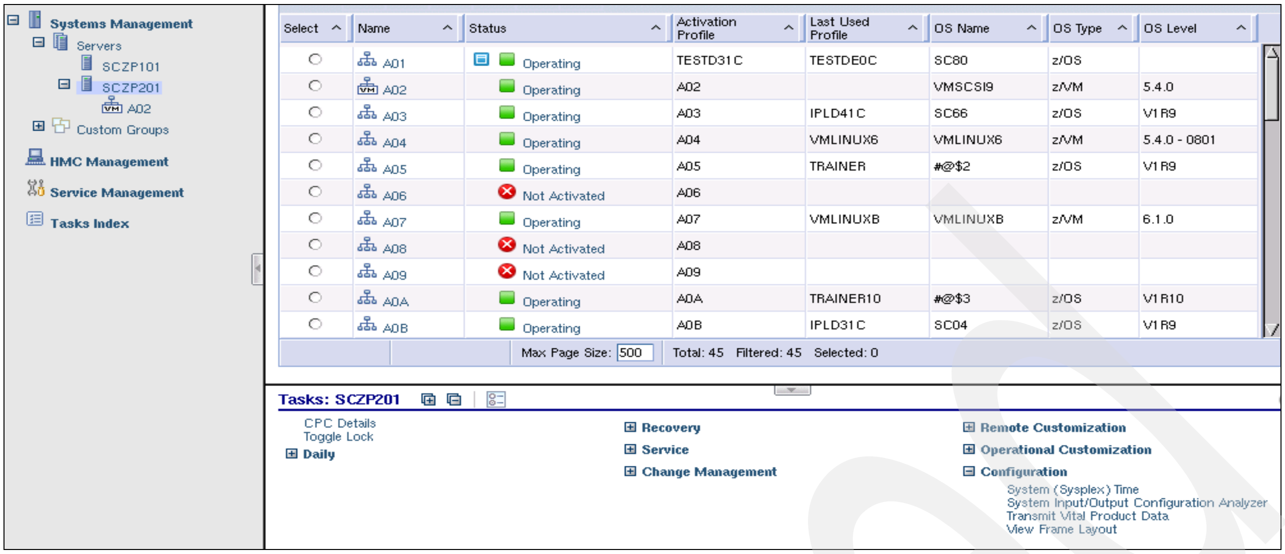
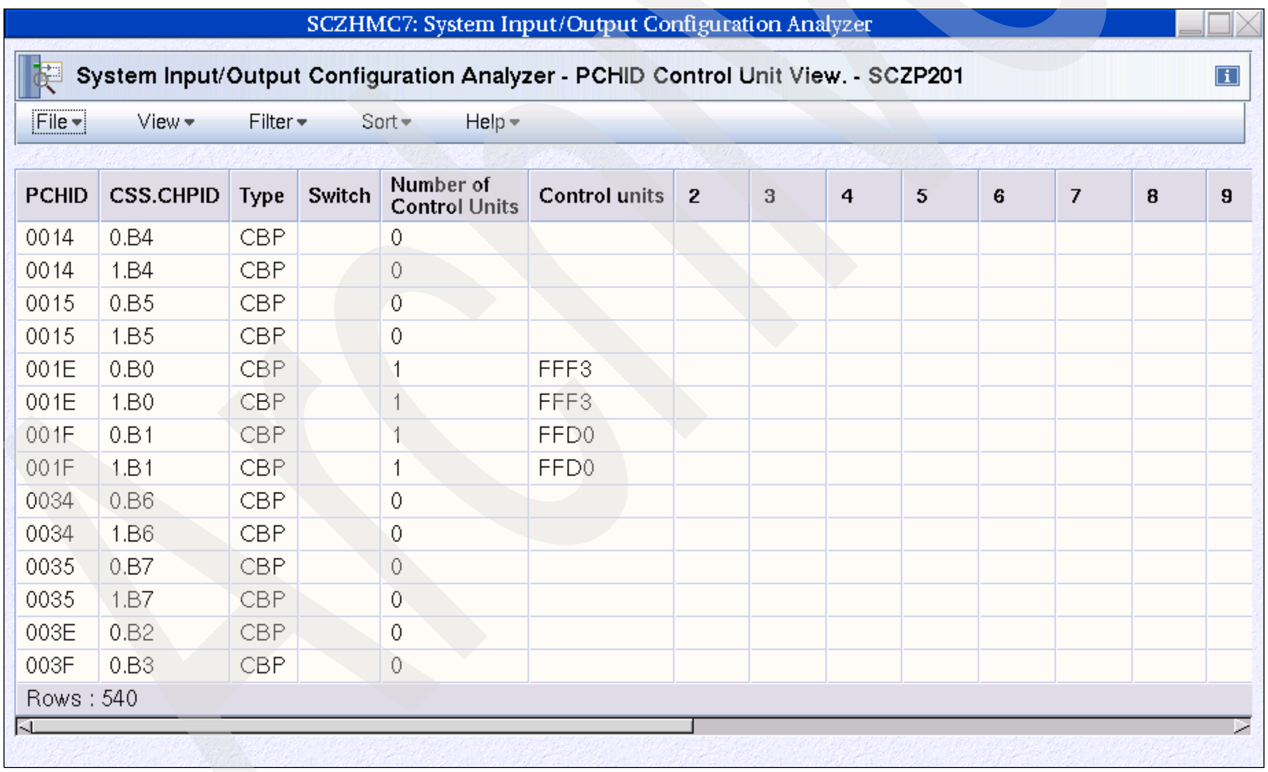


Figure 9-36 HMC: System IO Configuration Analyzer SIOA

Initially, the PCHID Control Unit View window is displayed, as shown in Figure 9-37.



PCHID	CSS.CHPID	Type	Switch	Number of Control Units	Control units	2	3	4	5	6	7	8	9
0014	0.B4	CBP		0									
0014	1.B4	CBP		0									
0015	0.B5	CBP		0									
0015	1.B5	CBP		0									
001E	0.B0	CBP		1	FFF3								
001E	1.B0	CBP		1	FFF3								
001F	0.B1	CBP		1	FFD0								
001F	1.B1	CBP		1	FFD0								
0034	0.B6	CBP		0									
0034	1.B6	CBP		0									
0035	0.B7	CBP		0									
0035	1.B7	CBP		0									
003E	0.B2	CBP		0									
003F	0.B3	CBP		0									

Figure 9-37 HMC: SIOA PCHID Control Unit View

From the View menu, you may select the following items, shown in Figure 9-38 on page 313:

- PCHID Control Unit
- PCHID Partition
- Control Unit
- Link Load
- Node ID

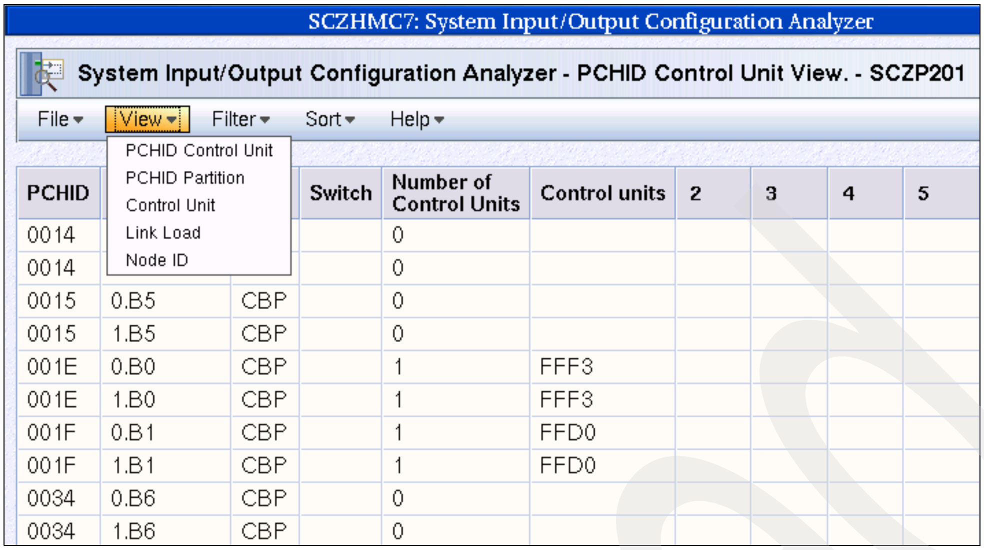


Figure 9-38 HMC: SIOA View menu pull-down

From the Filter menu, you may select the following items, shown in Figure 9-39:

- PCHID
- CSS.CHPID
- Switch
- Partition
- Control Unit
- Show All

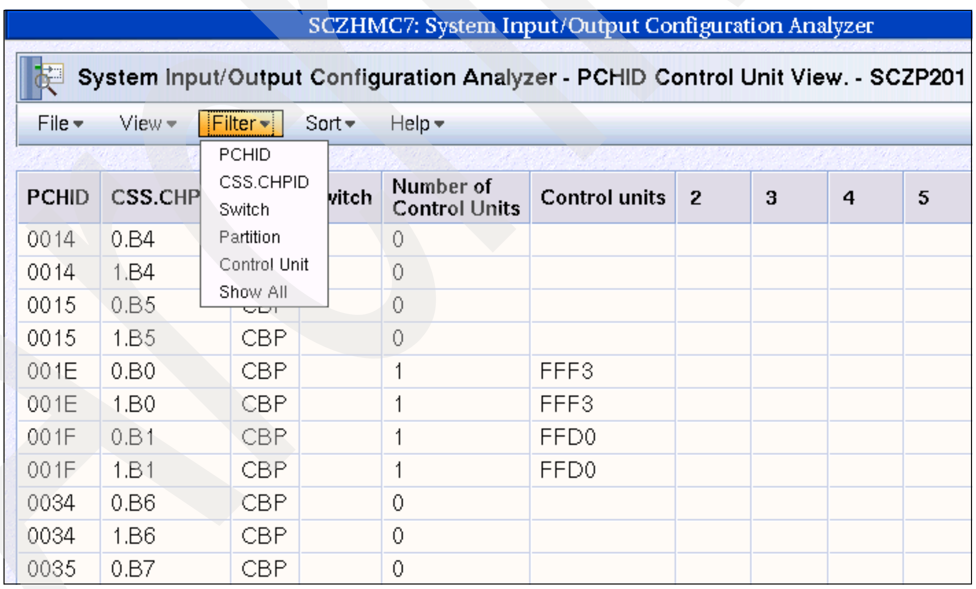


Figure 9-39 HMC: SIOA Filter menu pull-down

From the File menu, you may select the following items, shown in Figure 9-40 on page 314:

- Save Data to USB Memory Drive
- Refresh
- Exit

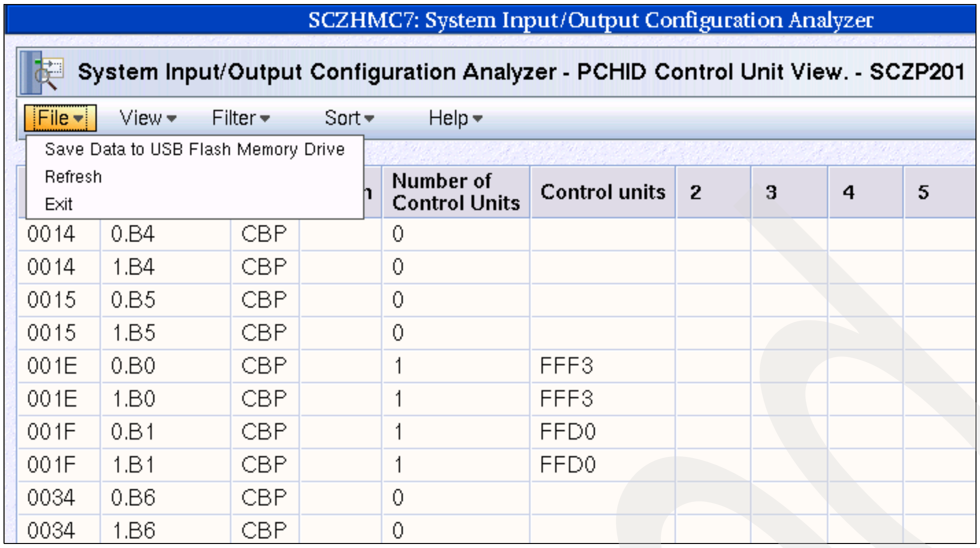


Figure 9-40 HMC: SIOA File menu pull-down

Data is saved in the *filename*.CSV format for easy import into a spreadsheet program. See Figure 9-41.

```
PCHID,Link,Validity,Node Type,Protocol,Class, Logical Interface,Type #,Model #,Manufacture,Plant,Sequence Number,Tag,CU Name, LCU #
'0014,'0000,Valid,CPC,Reserved,Coupling-facility channel,'B6,'002097,'E26,IBM,'02,'00000001DE50,'C0B6,'Nnode
'0015,'0000,Valid,CPC,Reserved,Coupling-facility channel,'B7,'002097,'E26,IBM,'02,'00000001DE50,'C0B7,'Nnode
'001E,'0000,Valid,CPC,Reserved,Channel Path - not CTC capable,'BA,'002094,'S18,IBM,'02,'00000002991E,'40BA,'Nnode
'0034,'0000,Valid,CPC,Reserved,Coupling-facility channel,'B4,'002097,'E26,IBM,'02,'00000001DE50,'C0B4,'Nnode
'0035,'0000,Valid,CPC,Reserved,Coupling-facility channel,'B5,'002097,'E26,IBM,'02,'00000001DE50,'C0B5,'Nnode
'0110,'0000,Valid,CPC,Reserved,Coupling-facility channel,'A4,'002097,'E26,IBM,'02,'00000001DE50,'40A4,'Nnode
'0111,'0000,Valid,CPC,Reserved,Coupling-facility channel,'BE,'002094,'S18,IBM,'02,'00000002991E,'60BE,'Nnode
'0118,'0000,Valid,CPC,Reserved,Coupling-facility channel,'A6,'002097,'E26,IBM,'02,'00000001DE50,'40A6,'Nnode
'0119,'0000,Valid,CPC,Reserved,Coupling-facility channel,'BE,'002084,'C24,IBM,'02,'000000026A3A,'40BE,'Nnode
'0120,'0001,Valid,Device,Reserved,Communications Controller,'00,'001730,'004,IBM,'02,'00000001DE50,'0120,'Nnode
'0121,'0001,Valid,Device,Reserved,Communications Controller,'00,'001730,'004,IBM,'02,'00000001DE50,'0121,'Nnode
'0130,'0001,Valid,Device,Reserved,Communications Controller,'00,'001730,'004,IBM,'02,'00000001DE50,'0130,'Nnode
'0131,'0001,Valid,Device,Reserved,Communications Controller,'00,'001730,'004,IBM,'02,'00000001DE50,'0131,'Nnode
'0140,'0001,Valid,Device,Reserved,Communications Controller,'00,'001730,'004,IBM,'02,'00000001DE50,'0140,'Nnode
'0141,'0001,Valid,Device,Reserved,Communications Controller,'00,'001730,'004,IBM,'02,'00000001DE50,'0141,'Nnode
'0150,'641B,Valid,Device,FC-SB-2,Switch,'1B,'006064,'001,MCD,'01,'00000001054C,'3017,'Nnode
'0150,'000A,Valid,Device,FC-SB-2,DASD,'00,'002107,'922,IBM,'75,'0000000BALB1,'0301,'D000,'00
'0150,'000A,Valid,Device,FC-SB-2,DASD,'00,'002107,'922,IBM,'75,'0000000BALB1,'0301,'D200,'02
'0150,'000A,Valid,Device,FC-SB-2,DASD,'00,'002107,'922,IBM,'75,'0000000BALB1,'0301,'D400,'04
'0150,'0016,Valid,Device,FC-SB-2,DASD,'00,'002105,'F20,IBM,'13,'000000016603,'00A4,'6C00,'04
```

Figure 9-41 HMC: SIOA sample CSV file

10

CHPID Mapping Tool (CMT)

This chapter discusses the CMT and explains how its functions relate to the configuration process. This chapter contains the following topics:

- Function of the CMT in the process flow
- Obtaining the CFReport from Resource Link
- Installing the CMT
- I/O configuration data, CCN
- Availability Mapping
- CMT process

10.1 Function of the CMT in the process flow

The CMT provides a mechanism to map CHPIDs to PCHIDs as required on a System z server. Although the CMT is optional, using it is good practice compared to manually mapping the CHPIDs to PCHIDs. Using the CMT provides the best availability recommendations for a particular configuration.

The process flow for a new System z server installation is illustrated in Figure 10-1.

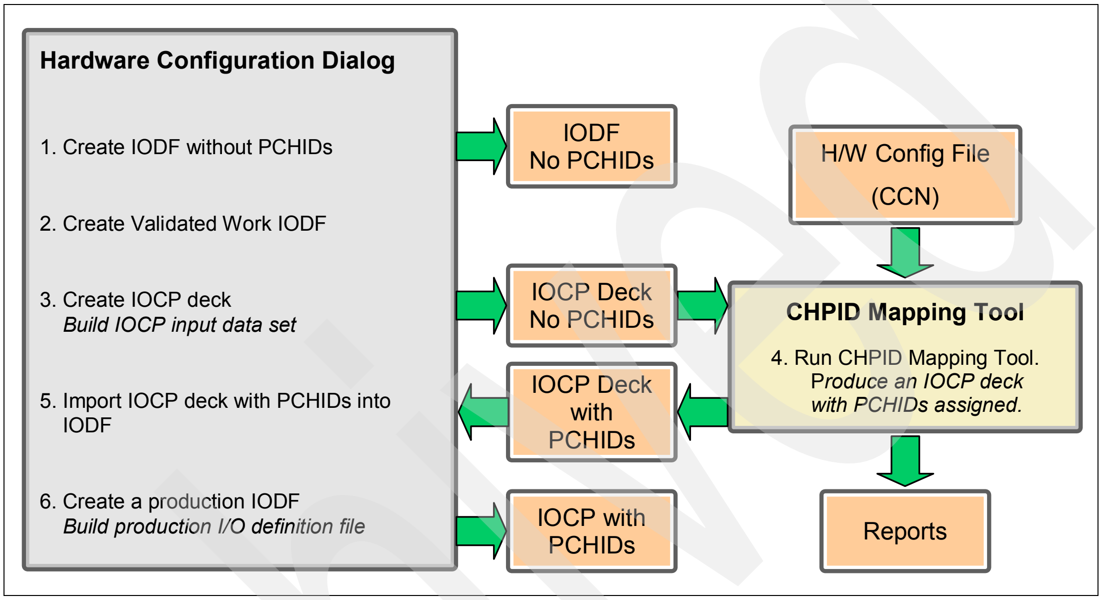


Figure 10-1 CMT: I/O configuration definition flow for a new installation

10.2 Obtaining the CFReport from Resource Link

To obtain the CFReport from Resource Link, follow these steps:

1. Go to the Resource Link Web site and click **Sign in**:

   `http://www.ibm.com/servers/resourcelink`

2. On the Tools page, select **CHPID Mapping Tool**, which is under the Servers column.

> **Note:** Always verify that the latest version of the CHPID Mapping Tool is installed on your computer.

For reference, download the PDF version of the publication *CHPID Mapping Tool User's Guide*, GC28-6825.

10.3 Installing the CMT

To install the CMT, perform the following steps at the Resource Link Web site:

1. Go to the Resource Link Web site and sign in:

   `http://www.ibm.com/servers/resourcelink`

2. Under Downloads, click **CHPID Mapping Tool**. You are then given the option of downloading either the complete CMT program or a file that upgrades an existing CMT program you may already have installed on your workstation.
3. Click the appropriate link and install or upgrade the CHPID Mapping Tool program.

10.4 I/O configuration data, CCN

The Customer Control Number (CCN) is generated by your IBM support representative when building your configuration order. You enter this number into the Resource Link to download a CFReport file, which is used as input into the CMT. Ensure that you have the most current CCN and incorporates any change that might have been made to your System z server order.

To enter the CCN and download the CFReport, under Servers in the Tools panel:

1. Sign in to the Resource Link:

   `http://www.ibm.com/servers/resourcelink`

2. Select **CHPID Mapping Tool**.
3. Under Downloads, click **I/O Configuration Data (CCN)**. The CFReport download page opens.
4. At the CFReport download page, perform the following steps:
   a. Enter your 8-digit CCN in the panel, then click **Submit**.

      You are prompted to save the *nnnnnnnn*.CFR file to your workstation.

   b. Save the file for later input into the CHPID Mapping Tool.

If you have any problems or require more information, click **Help about CFReport download**.

10.5 Availability Mapping

When planning and configuring the System z server, you must plan for maximum server and device availability in the event of a channel failure or multiple channel failures.

To help you configure the System z server to ensure maximum availability based on the characteristics of the server, the CHPID Mapping Tool has an Availability Mapping option that assigns channel paths to avoid a single point of failure. You also have the option of switching to manual mapping. In addition, you can map CHPIDs with the availability option and manually make changes afterwards.

When using the availability option, you must first provide a copy of the system's IOCP source. Then, by using the CHPID Mapping Tool, define priorities for the control units. The CMT can assign CHPIDs to the I/O ports (PCHIDs) and produce a new CHPID report that has maximum availability. This result is achieved by distributing channel paths across separate channel cards and host channel adapters (HCAs) or on previous servers, the STI links.

The PCHIDs are fixed on the System z servers and CHPIDs are mapped by the CMT and assigned in the IOCP deck. The output from the CMT consists of tailored reports for your reference and for the IBM support representative.

There is also an IOCP deck with PCHIDs mapped to CHPIDs by CSS. This IOCP is migrated back into HCD and a production IODF can be built.

10.6 CMT process

In the following process, we take the output from the previous set of HCD steps (IOCP; described in Chapter 7, "Configuration with HCD" on page 83), and the output from the 2097 order process (CFReport). We then use the CMT to assign PCHIDs to channels in the configuration.

Download and install the CHPID Mapping Tool. See 10.3, "Installing the CMT" on page 316, for information about obtaining and installing the CMT. If you already have the CHPID Mapping Tool installed, verify that you have the latest updates installed.

This section discusses the following steps:

1. Exporting the IOCP file for CMT for a selected processor using HCM
2. Launching CMT with HCM and importing the CFReport
3. Resolving hardware issues
4. Assigning PCHIDs to CHPIDs
5. Checking for intersects
6. Assigning control unit priority manually
7. Reviewing CHPIDs that are not connected to control units
8. Creating reports for the hardware team
9. Creating the updated IOCP file
10. Migrating the PCHIDs back into the IODF using HCM
11. Manually launching CMT and importing the CFReport and IOCP file

10.6.1 Exporting the IOCP file for CMT for a selected processor using HCM

In our example, we export the IOCP file for processor SCZP201 to the following workstation file:

```
C:\HCMCFG\SCZP201in.iocp
```

To export, perform the following steps:

1. Select **Utilities** → **CHPID Mapping Tool Support**. A dialog box opens, as shown in Figure 10-2 on page 319.
2. In the Processor field, select **SCZP201**
3. Select **Export IOCP File for CMT** to ensure the file is selected. If you want to change the default file name, click the browse (**...**) button.

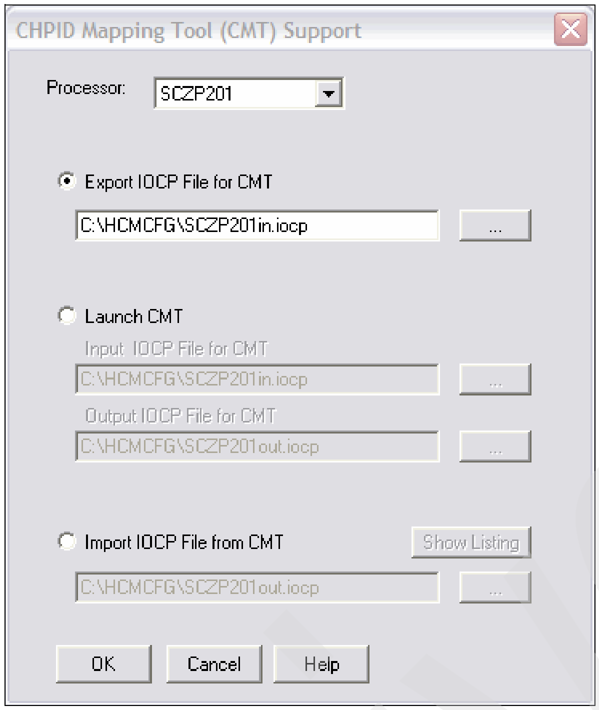


Figure 10-2 HCM CHPID Mapping Tool support

4. Click **OK**.

When the operation is successful, HCM displays the following message:

```
Message ID: CBDA675I IOCP deck successfully written for SCZP201
```

10.6.2 Launching CMT with HCM and importing the CFReport

In our example, we use the following files:

- `C:\HCMCFG\SCZP201in.iocp` as the "Input IOCP File for CMT"
- `C:\HCMCFG\SCZP201out.iocp` as "Output IOCP File for CMT"

To launch the CMT with HCM, perform the following steps:

1. Select **Utilities** → **CHPID Mapping Tool Support**.
2. Select **Launch CMT** to ensure the file is selected. If you want to change the default file names, click the browse (**...**) button.
3. Click **OK**.

   The CHPID Mapping Tool is launched and the Open Select CFReport File window opens. See Figure 10-3 on page 320.
4. Click **Browse** to find and select the CFR file on the workstation.

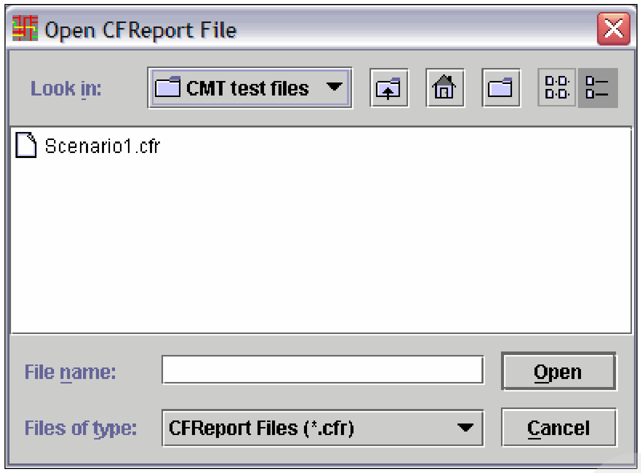


Figure 10-3 HCM: Select CFReport file

5. Click **Open**, and then click **Continue**.

Now, you may resolve hardware issues. However, to manually launch the CMT, see 10.6.11, “Manually launching CMT and importing the CFReport and IOCP file” on page 335.

10.6.3 Resolving hardware issues

The CHPID Mapping Tool prompts you to resolve issues that might arise from importing the IOCP file. In our example, the CHPID Mapping Tool requests clarification on the TYPE=OSD, TYPE=FCP, and TYPE=FC channels.

In each case, perform the following steps:

1. In the Hardware resolution window, select the check boxes to indicate what each of the channels is used for. The window on the bottom right of Figure 10-4 on page 321 shows what we have selected for the FC channels on the FC tab.

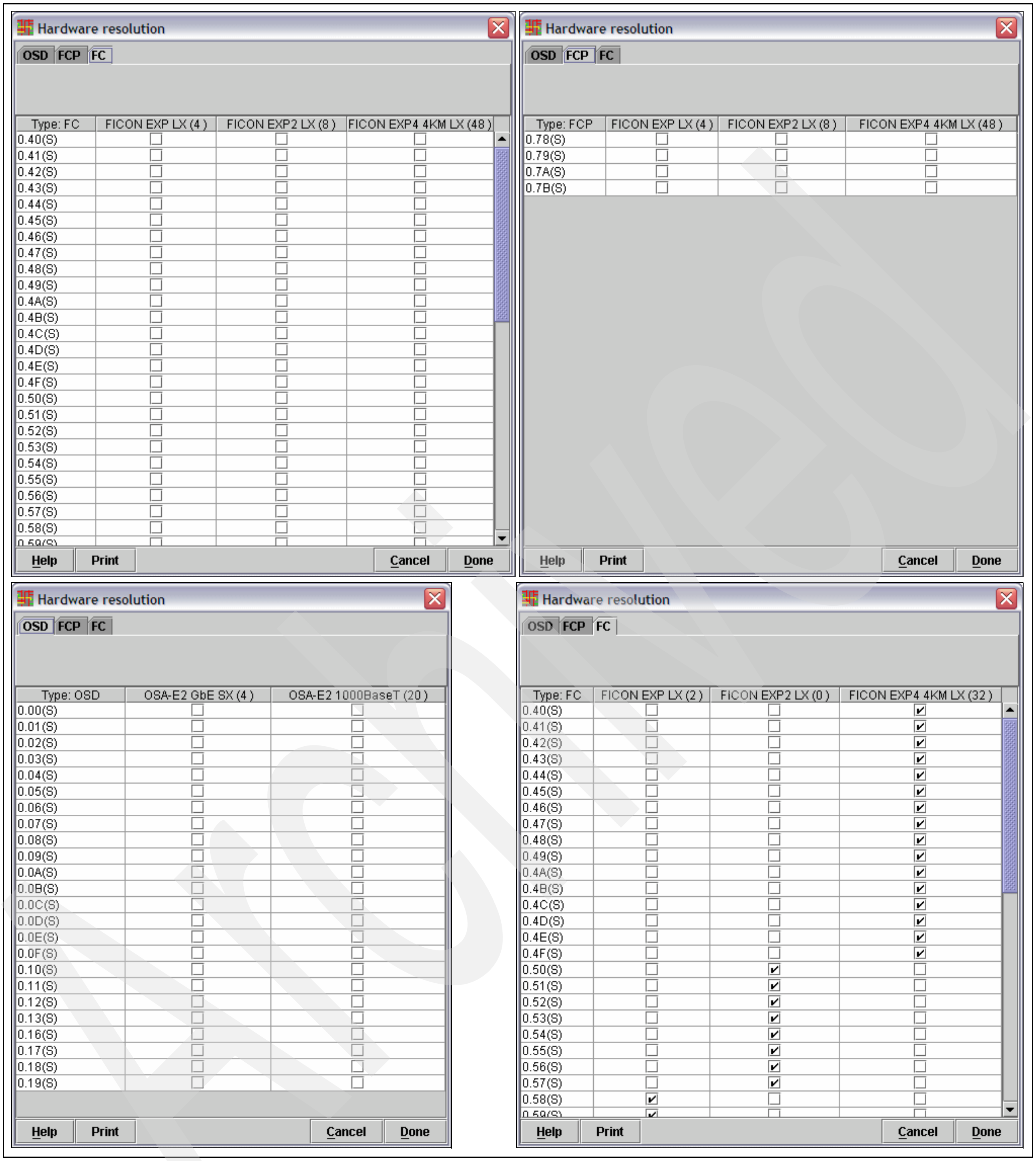


Figure 10-4 CMT: Hardware resolution after IOCP import

2. Select one tab at a time. Click the appropriate check boxes and move to the next tab until all CHPID definitions have hardware selected.

The CHPID Mapping Tool displays all of the currently known information. Note that the CHPID column and the CHPID Origin column are blank because the CHPID Mapping Tool has not yet assigned the CHPIDs to PCHIDs. See Figure 10-5 on page 322.

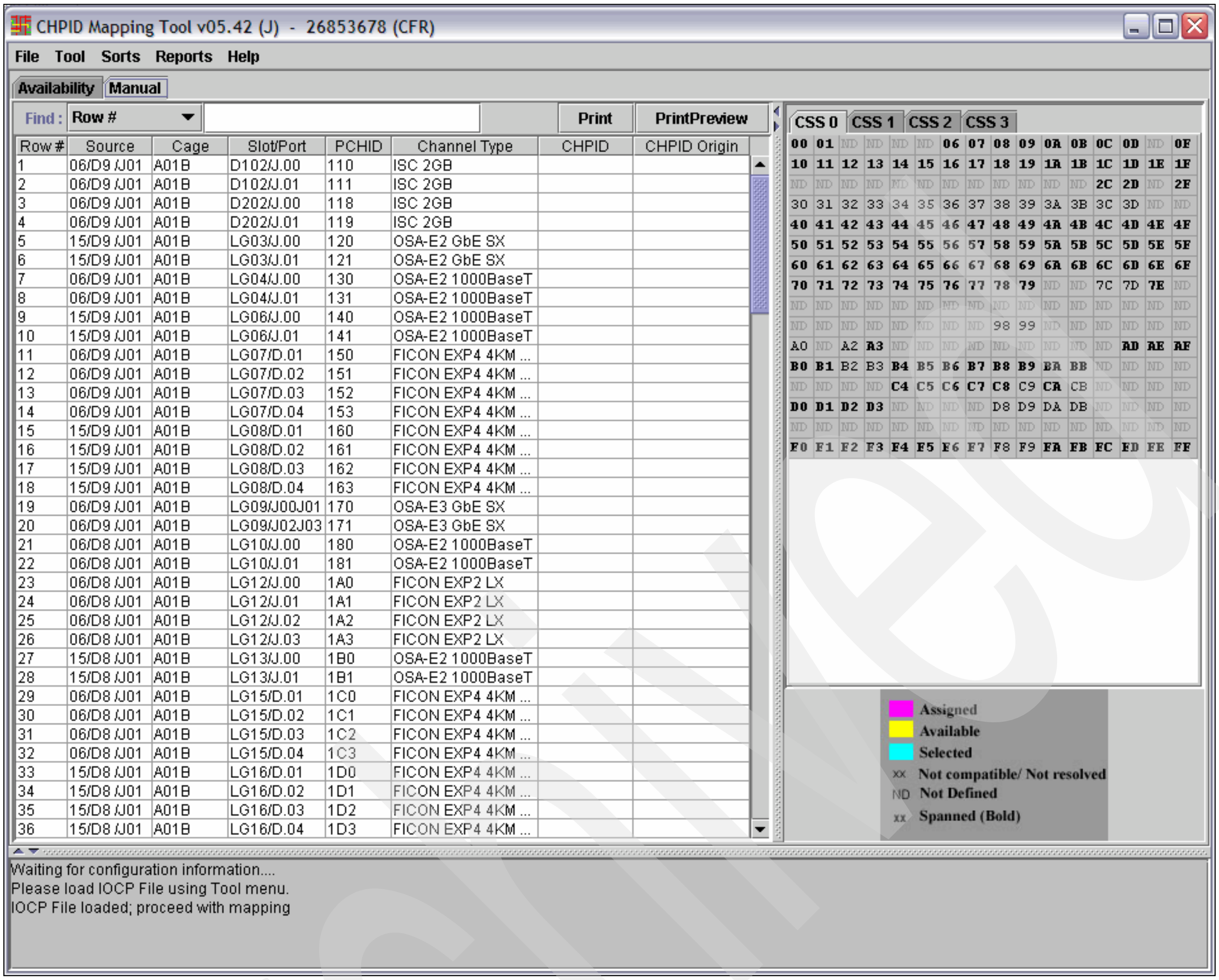


Figure 10-5 CMT: Manual tab

10.6.4 Assigning PCHIDs to CHPIDs

To assign PCHIDs to CHPIDs, perform the following steps:

1. Click the **Availability** tab.
2. Click **Process CU Priority**. The Reset CHPID Assignments dialog box opens. See Figure 10-6 on page 323. Change the CHPID values by selecting one of the following options:
   - Reset CHPIDs assigned by Availability
   - Reset CHPIDs assigned by Manual Remap
   - Reset CHPIDs assigned by IOCP

   In our example, we selected **Reset CHPIDs assigned by Availability** because no PCHIDs were defined in the IOCP input and we did not assign any in the manual panel.
3. Click **Process.**

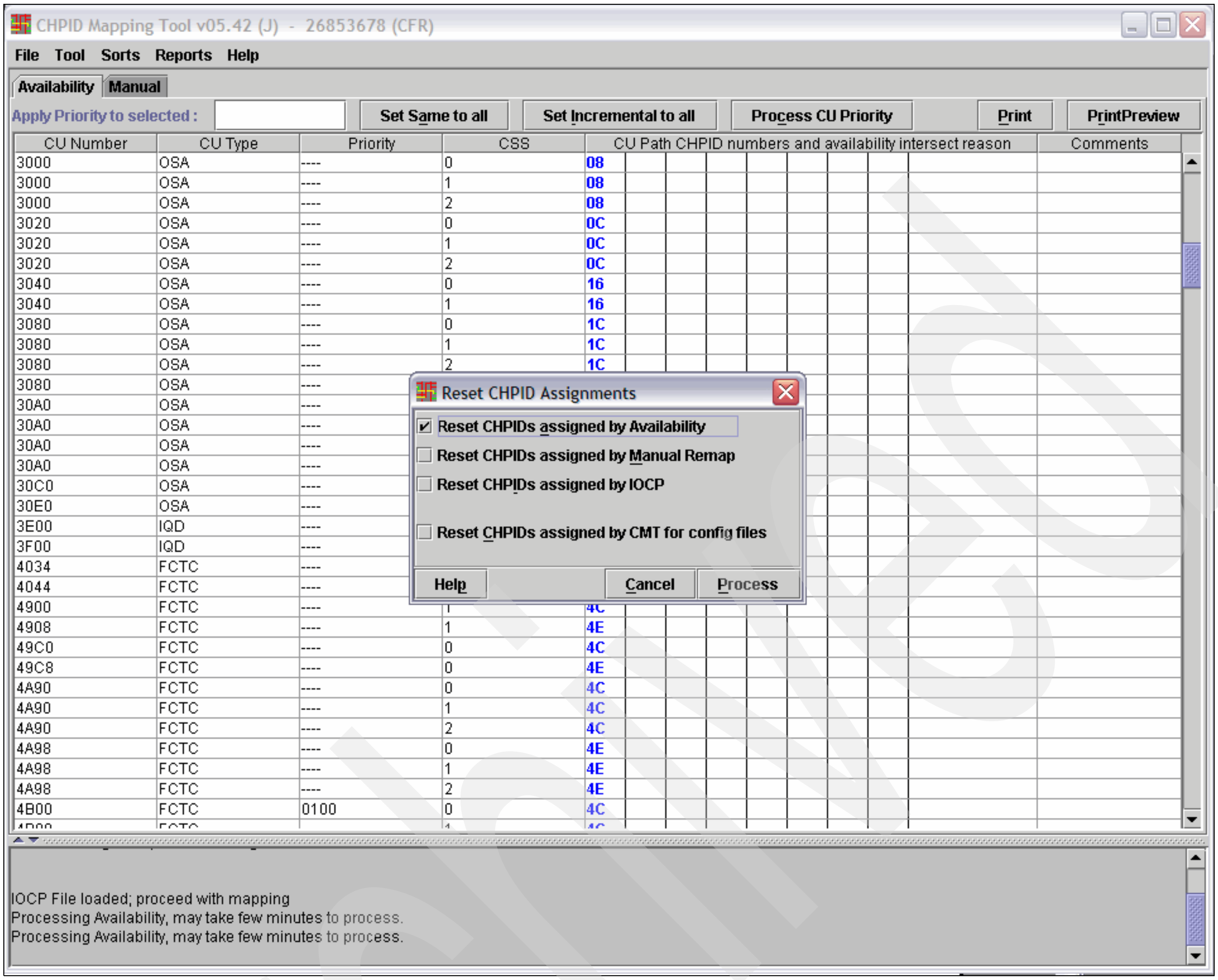


Figure 10-6 CMT: Reset CHPID Assigned by Availability

10.6.5 Checking for intersects

After the CHPID Mapping Tool has assigned the CHPIDs, a message indicating the results of the process is displayed. See Figure 10-7.

Figure 10-7 CMT: Process CU Priority completion message

Our example returned only "C" intersects.

The possible intersect types are defined as follows:

C Two or more assigned channels use the same channel card.

S Greater than half the assigned channels use the same STI.

M All assigned channels are supported by the same MBA group.

B More than half the assigned channels are supported by the same book.

D Assigned channels are on the same daughter card.

> **Note:** Intersect messages inform you of a potential availability problem that is detected by the CMT, but do not necessarily indicate an error. *You are responsible for evaluating whether the condition should be corrected.*

4. Click **OK**. Figure 10-8 shows the "C" intersects under the availability tab.

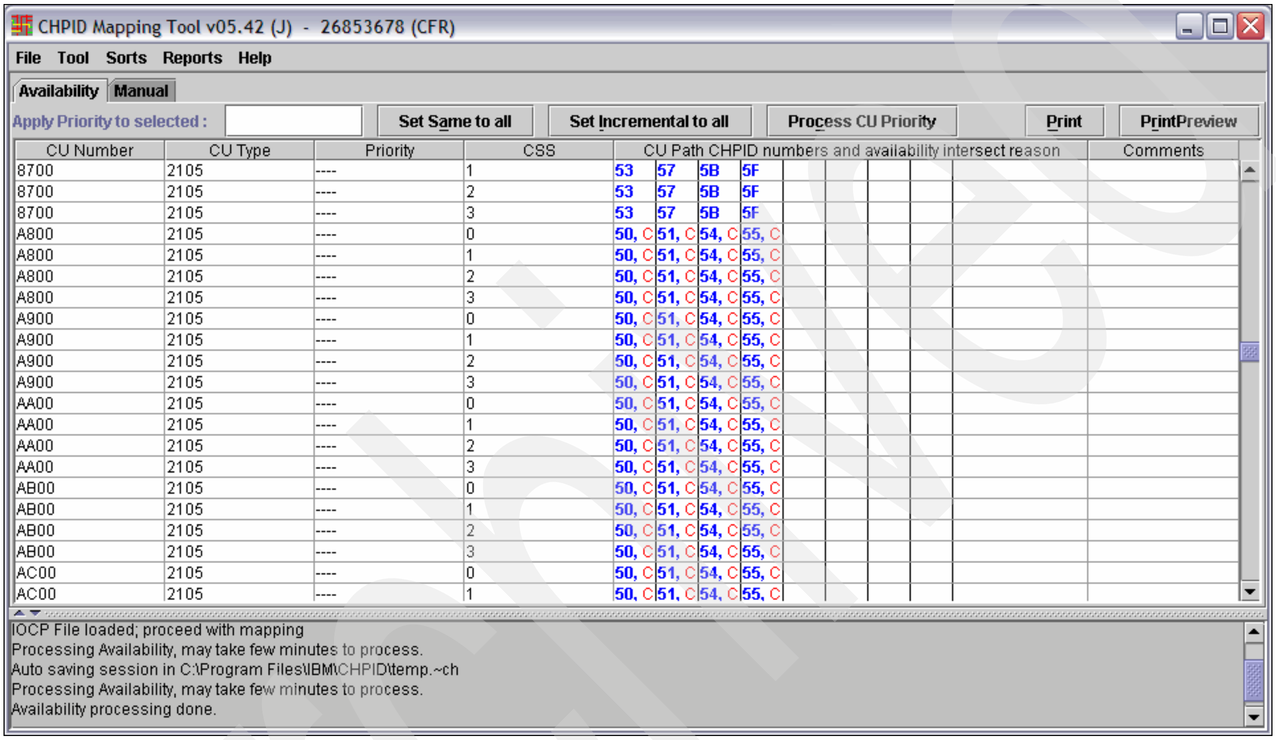


Figure 10-8 CMT: C type intersects on the Availability tab

5. Click the **Manual** tab and notice the “**C**” intersects. See Figure 10-9.

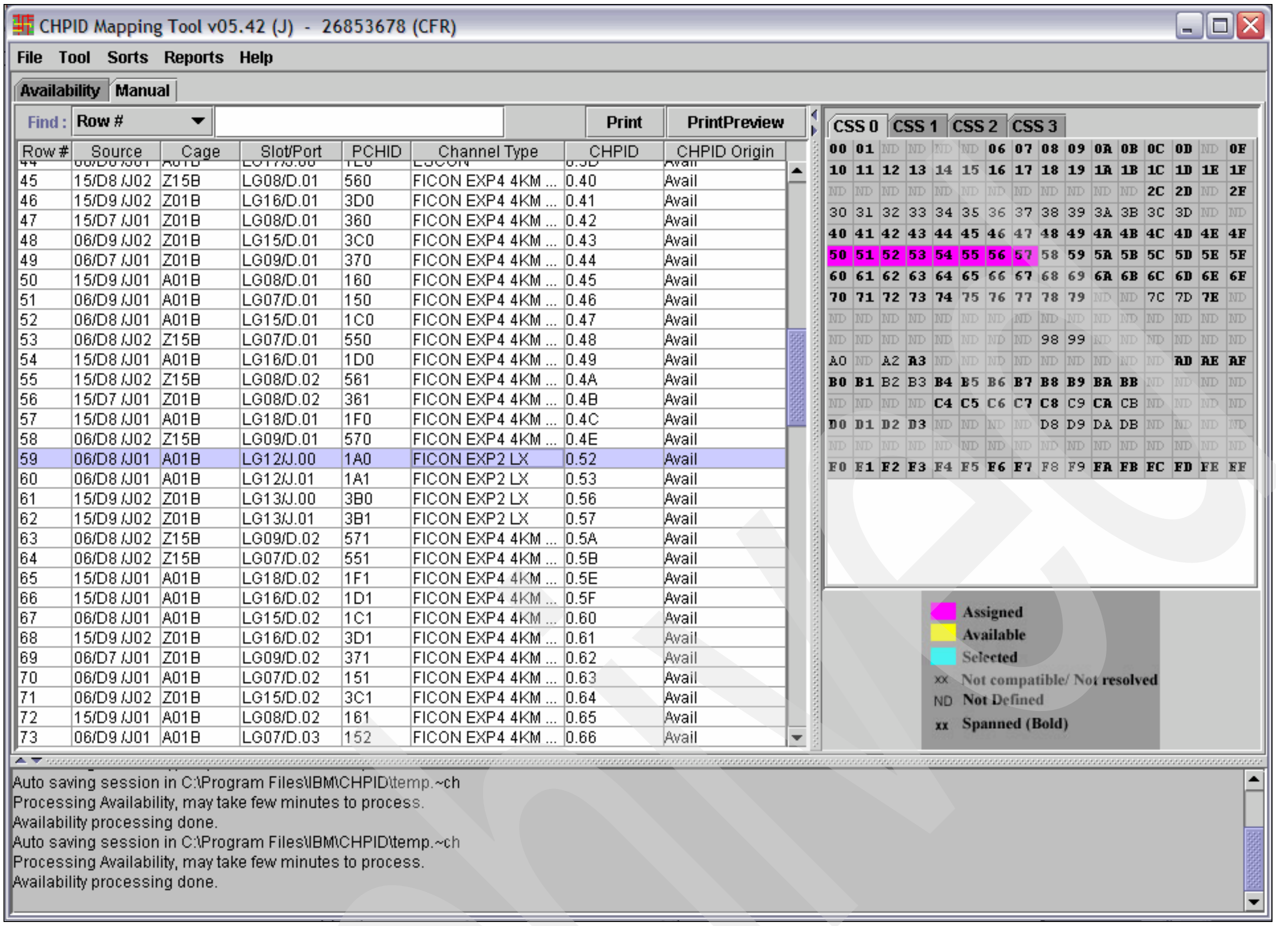


Figure 10-9 CMT: C type intersects on the Manual tab

The CHPID Mapping Tool can identify these intersects, go back into HCD and redefine the FC connections over separate HCAs, run another validate and import the IOCP statements into CMT, and run the Process CU function again.

10.6.6 Assigning control unit priority manually

CMT cannot distinguish which DASD controller, for example, has higher priority to us. Therefore it treats all DASD equal when processing for availability unless we set a control unit priority value in the CMT. Additionally, we might want to set, for example, the OSC CHPIDs that are for the master consoles a higher priority than the alternate console OSC CHPIDs.

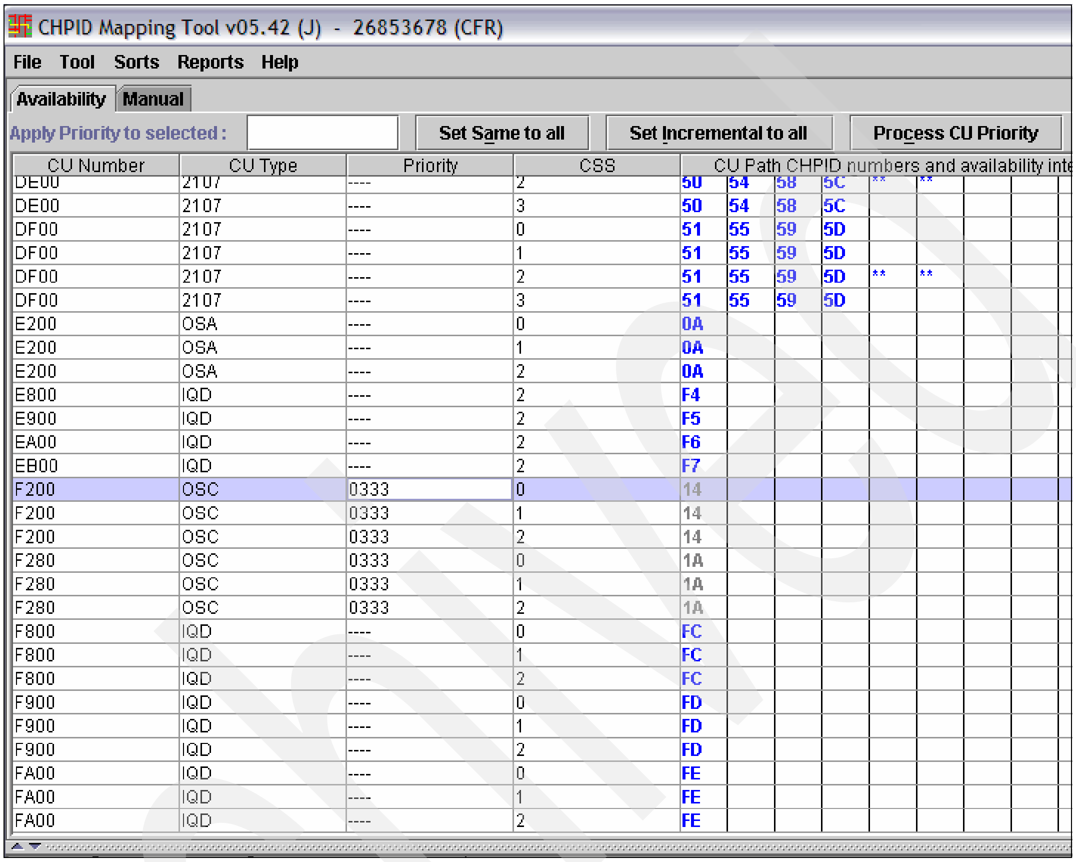
CMT takes these priorities into account when processing for availability; setting a CU priority value allows us to override some of the availability processing for our own particular installation requirements. Note the following information:

- You can display the results of the channel mapping. You can also sort the report in various ways. For example, to see how the CHPID Mapping Tool ranked the control units, select **Sorts → By CU Priority**.

  Our example does not contain any control units set with CU Priority, but we do need to check and set values for items such as OSA-ICC CHPIDs and CTC CHPIDs, to ensure that the CHPID Mapping Tool allocates these CHPIDs with high PCHID availability.

- Go through the listing and search through the CU Number column for any control units you want to set priority for.

  In our example, we set the OSC type CU Numbers F200 and F280 to priority 0333. See Figure 10-10.



CU Number	CU Type	Priority	CSS	CU Path CHPID numbers and availability inte					
DE00	2107	----	2	50	54	58	5C	**	**
DE00	2107	----	3	50	54	58	5C		
DF00	2107	----	0	51	55	59	5D		
DF00	2107	----	1	51	55	59	5D		
DF00	2107	----	2	51	55	59	5D	**	**
DF00	2107	----	3	51	55	59	5D		
E200	OSA	----	0	0A					
E200	OSA	----	1	0A					
E200	OSA	----	2	0A					
E800	IQD	----	2	F4					
E900	IQD	----	2	F5					
EA00	IQD	----	2	F6					
EB00	IQD	----	2	F7					
F200	OSC	0333	0	14					
F200	OSC	0333	1	14					
F200	OSC	0333	2	14					
F280	OSC	0333	0	1A					
F280	OSC	0333	1	1A					
F280	OSC	0333	2	1A					
F800	IQD	----	0	FC					
F800	IQD	----	1	FC					
F800	IQD	----	2	FC					
F900	IQD	----	0	FD					
F900	IQD	----	1	FD					
F900	IQD	----	2	FD					
FA00	IQD	----	0	FE					
FA00	IQD	----	1	FE					
FA00	IQD	----	2	FE					

Figure 10-10 CMT Set CU Priority

If there are coupling links used by a CF image, group these links.

Each set of CHPIDs that is going to a separate CPC, must be grouped with a common priority. For example, suppose the CF image has four links (CHPIDs 40, 41, 42, and 43) and that 40 and 41 go to one CPC, and 42 and 43 go to a separate CPC. In this case, give CHPIDs 40 and 41 one priority and CHPIDs 42 and 43 another priority. The concept is the same regardless of the number of connecting CPCs or the number of links to each CPC.

Perform the following steps:

1. Click the **Availability** tab.
2. Click **Process CU Priority**. The Reset CHPID Assignments dialog box opens. Change the CHPID values by selecting one of the following options:
   - Reset CHPIDs assigned by Availability
   - Reset CHPIDs assigned by Manual Remap
   - Reset CHPIDs assigned by IOCP

   In our example, we selected **Reset CHPIDs assigned by Availability**.
3. Click **Process**.
4. Select **Sorts** → **By CU Priority**. Notice that the OSC type control units with priority of 333 have been sorted to the top of the list.

5. Select the **Manual** tab to view the results of mapping the CHPIDs. See Figure 10-11.

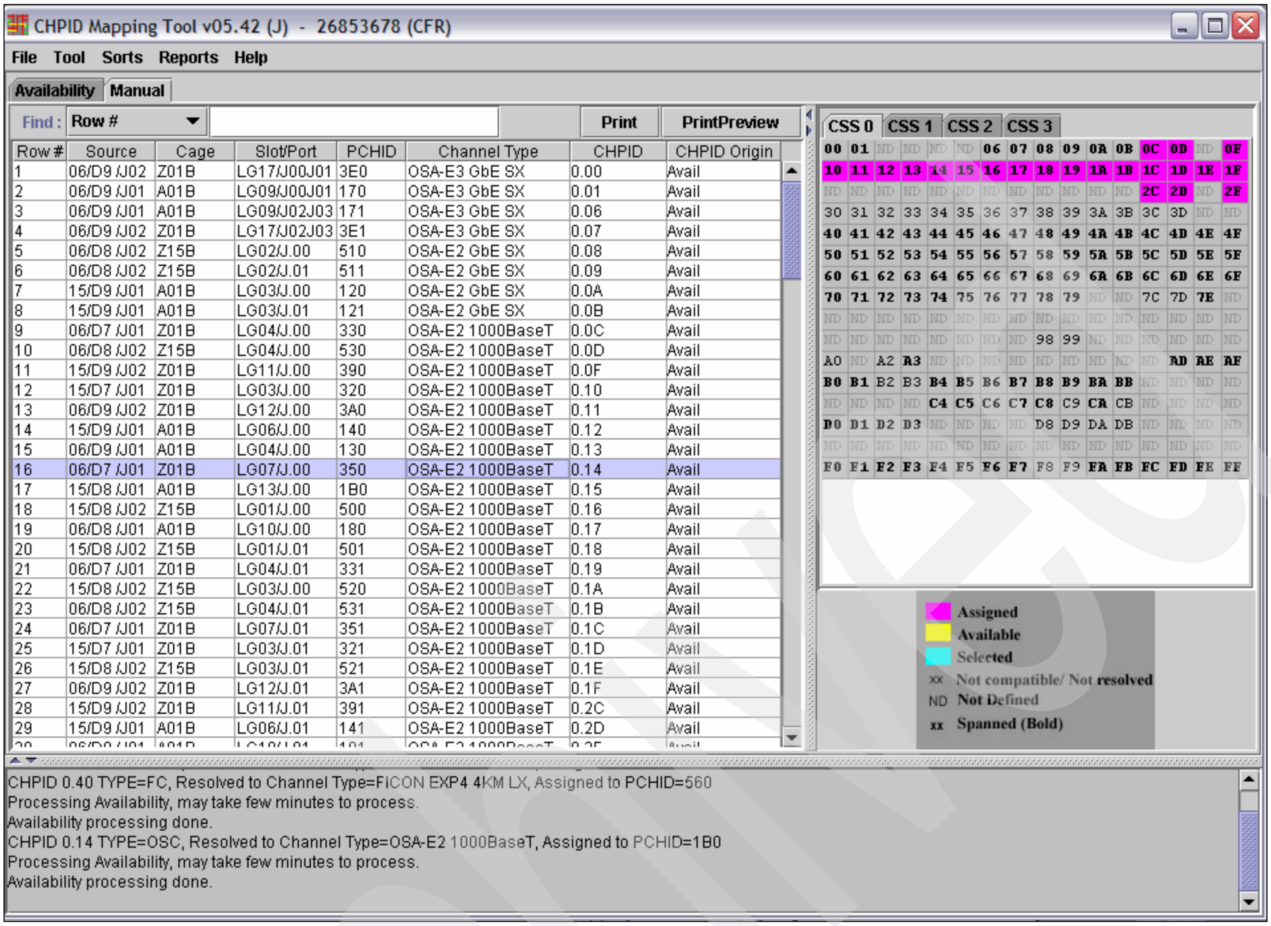


Figure 10-11 CMT: Manual (CHPIDs assigned)

Note that the CHPID column and the CHPID Origin column are no longer blank. The CMT has assigned CHPIDs to PCHIDs, and placed the value "Avail" in the CHPID Origin column, indicating that the CHPID values were assigned based on availability.

10.6.7 Reviewing CHPIDs that are not connected to control units

To review the CHPIDs, perform the following steps:

1. Under the **Availability** tab, select **Sorts** → **By Control Unit**.

   The CMT displays, at the end of the list, all CHPIDs that are defined in the IOCP input and that are not connected to control units. All coupling CHPIDs in this list are preceded with an "S" in the CU Number column. All non-coupling CHPIDs are preceded with a "P" (shown in Figure 10-12 on page 328).

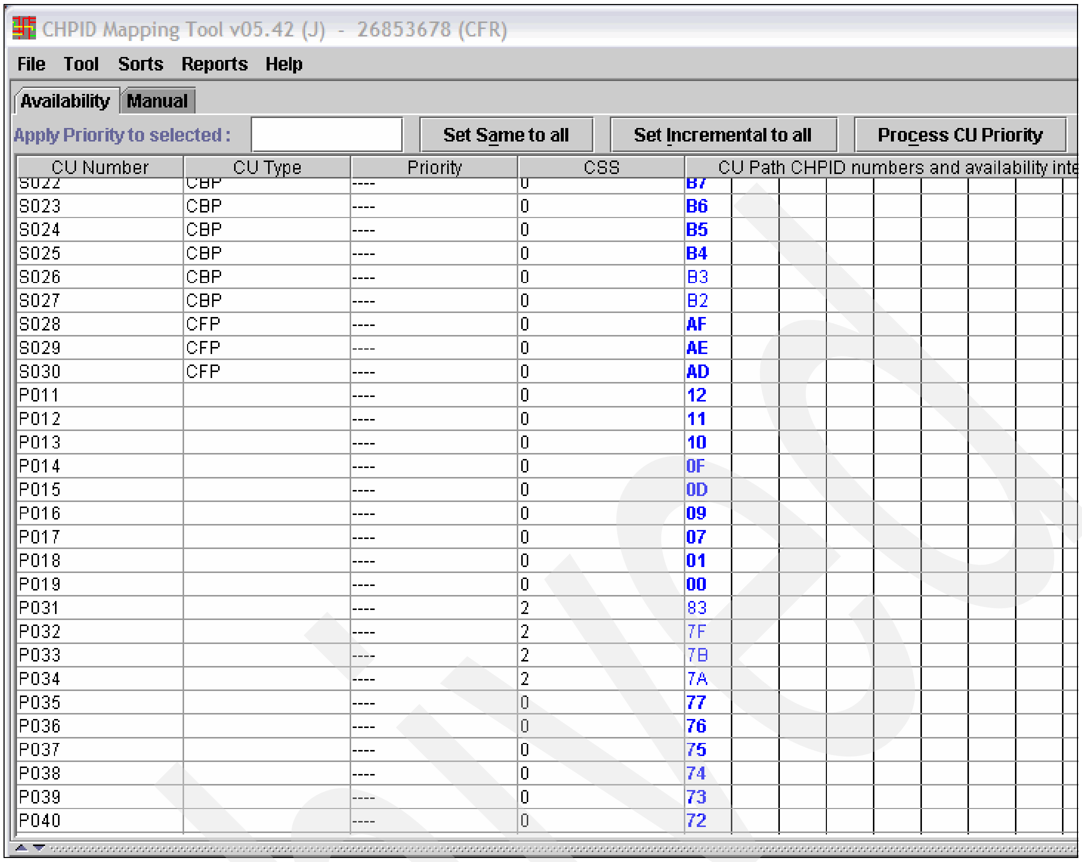


Figure 10-12 CMT: Sort by Control Unit

2. Review the list for the following reasons:
   - You might have forgotten to add a CHPID to a control unit and may need to update the IOCP source before continuing in the CHPID Mapping Tool.
   - The unconnected CHPIDs might be extra channels that you are ordering in anticipation of new control units.
   - The unconnected CHPIDs might be coupling links that are being used in coupling facility (CF) images (these do not require control units).

If there are extra CHPIDs for anticipated new control units, you might want to group these CHPIDs with a common priority. By grouping them, the availability mapping function can pick PCHIDs that will afford your new control unit good availability.

10.6.8 Creating reports for the hardware team

The CMT has built-in reports, which are available from the Reports menu.

You may also print the information about the Availability tab or the Manual tab by clicking the **Print** button. In the Availability tab, you can also enter information in the Comments column that might be useful at a later date.

For simplicity in this example, we describe how to create only three reports:

- CHPID Report
- CHPID to Port Report sorted by location
- CHPID to Control Unit Report

However, all built-in reports are printed in the same way, as explained here.

The person who will install the I/O cables during system installation needs one of these reports. The Port Report, sorted by location, is recommended. The installer can use this to help with labelling the cables. The labels must include the PCHID or cage/slot/port information before system delivery.

CHPID Report

To view the CHPID Report, perform the following steps:

1. Select **Reports** → **CHPID Report**. See Figure 10-13.

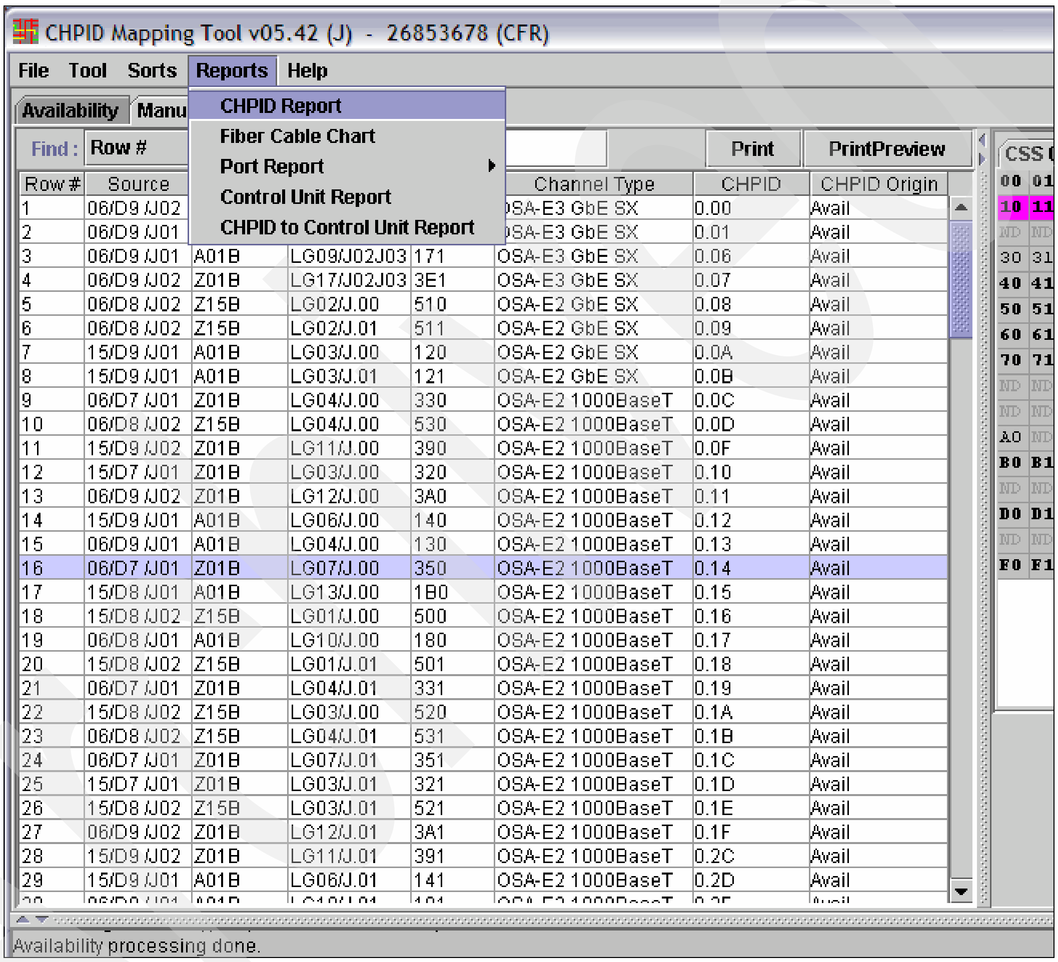


Figure 10-13 CMT: select CHPID Report

2. Enter the report File name, or accept the name that the CHPID Mapping Tool enters and click **Save**. See Figure 10-14 on page 330.

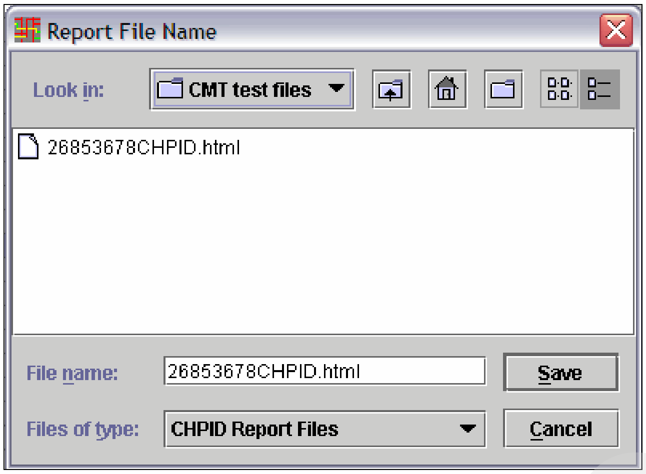
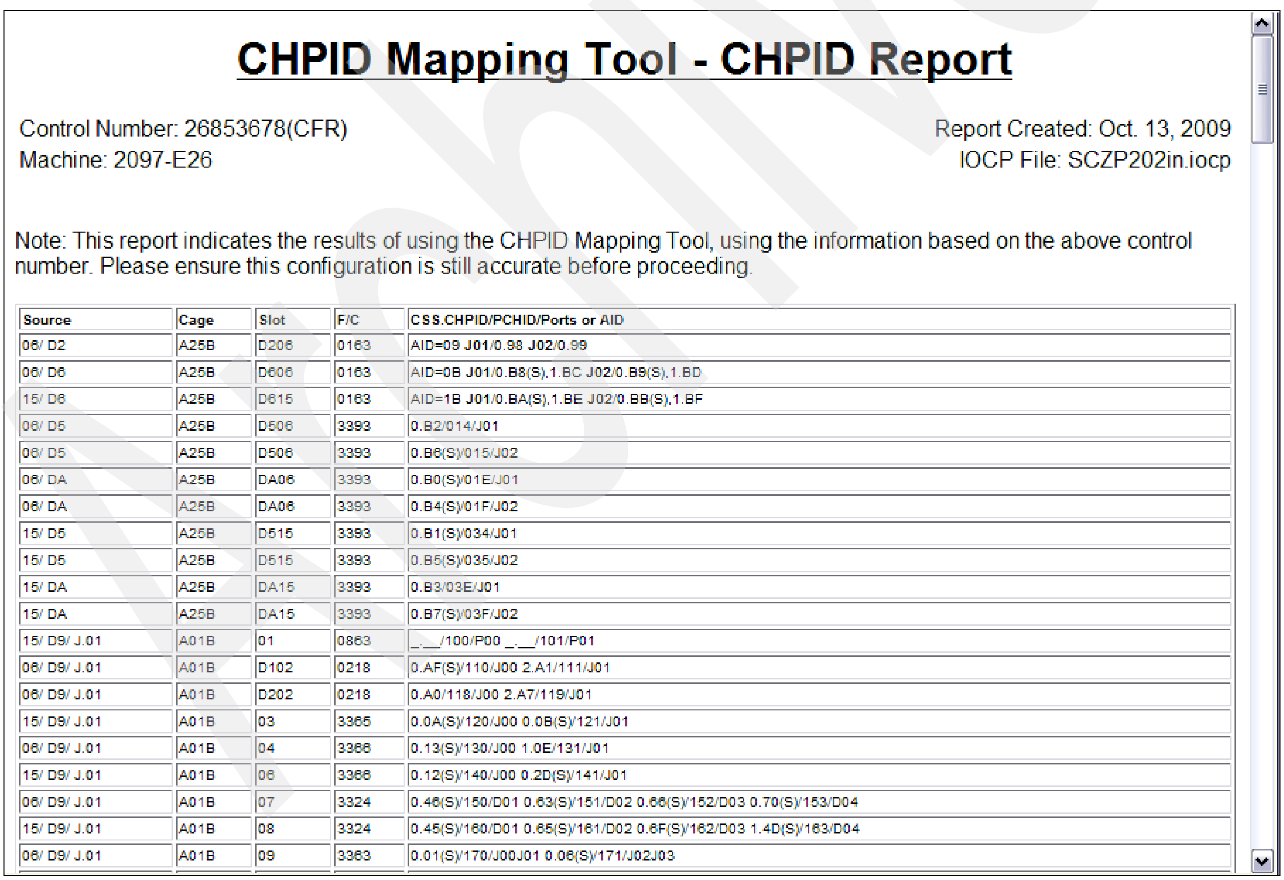


Figure 10-14 CMT: Report File Name

The CHPID Mapping Tool opens a browser window, containing the CHPID report. See Figure 10-15.

Note that you might be prompted to accept active content. Accept the active content in order to display the report in your browser.



CHPID Mapping Tool - CHPID Report

Control Number: 26853678(CFR)
Machine: 2097-E26

Report Created: Oct. 13, 2009
IOCP File: SCZP202in.iocp

Note: This report indicates the results of using the CHPID Mapping Tool, using the information based on the above control number. Please ensure this configuration is still accurate before proceeding.

Source	Cage	Slot	F/C	CSS.CHPID/PCHID/Ports or AID
06/ D2	A25B	D206	0163	AID=09 J01/0.98 J02/0.99
06/ D6	A25B	D606	0163	AID=0B J01/0.B8(S),1.BC J02/0.B9(S),1.BD
15/ D6	A25B	D615	0163	AID=1B J01/0.BA(S),1.BE J02/0.BB(S),1.BF
06/ D5	A25B	D506	3393	0.B2/014/J01
06/ D5	A25B	D506	3393	0.B6(S)/015/J02
06/ DA	A25B	DA06	3393	0.B0(S)/01E/J01
06/ DA	A25B	DA06	3393	0.B4(S)/01F/J02
15/ D5	A25B	D515	3393	0.B1(S)/034/J01
15/ D5	A25B	D515	3393	0.B5(S)/035/J02
15/ DA	A25B	DA15	3393	0.B3/03E/J01
15/ DA	A25B	DA15	3393	0.B7(S)/03F/J02
15/ D9/ J.01	A01B	01	0863	_.__/100/P00 _.__/101/P01
06/ D9/ J.01	A01B	D102	0218	0.AF(S)/110/J00 2.A1/111/J01
06/ D9/ J.01	A01B	D202	0218	0.A0/118/J00 2.A7/119/J01
15/ D9/ J.01	A01B	03	3365	0.0A(S)/120/J00 0.0B(S)/121/J01
06/ D9/ J.01	A01B	04	3366	0.13(S)/130/J00 1.0E/131/J01
15/ D9/ J.01	A01B	06	3366	0.12(S)/140/J00 0.2D(S)/141/J01
06/ D9/ J.01	A01B	07	3324	0.46(S)/150/D01 0.63(S)/151/D02 0.66(S)/152/D03 0.70(S)/153/D04
15/ D9/ J.01	A01B	08	3324	0.45(S)/160/D01 0.65(S)/161/D02 0.6F(S)/162/D03 1.4D(S)/163/D04
06/ D9/ J.01	A01B	09	3363	0.01(S)/170/J00J01 0.06(S)/171/J02J03

Figure 10-15 CMT: CHPID Report

CHPID to Port Report, sorted by location

To view the CHPID to Port Report, perform the following steps:

1. Select **Reports** → **Port Report** → **Sorted by Location**.
2. Click **Save** (assuming that you accept the CHPID Mapping Tool report name).

   The CHPID Mapping Tool opens a browser window with the CHPID to Port Report. See Figure 10-16.

   Note that you might be prompted to accept active content. Accept the active content in order to display the report in your browser.

CHPID Mapping Tool - CHPID to Port Report

Control Number: 26853678(CFR) Report Created: Oct. 13, 2009
Machine: 2097-E26

Note: This report indicates the results of using the CHPID Mapping Tool, using the information based on the above control number. Please ensure this configuration is still accurate before proceeding.

Frame/Cage	Slot or Fanout	AID or PCHID/Port	Source	Channel Type	Assigned CHPID	CHPID Origin
A01B	LG01	100/ P.00	15/ D9/ J.01	Crypto Exp2		
A01B	LG01	101/ P.01	15/ D9/ J.01	Crypto Exp2		
A01B	D102	110/ J.00	06/ D9/ J.01	ISC 2GB	0.AF(S)	Avail
A01B	D102	111/ J.01	06/ D9/ J.01	ISC 2GB	2.A1	Avail
A01B	D202	118/ J.00	06/ D9/ J.01	ISC 2GB	0.A0	Avail
A01B	D202	119/ J.01	06/ D9/ J.01	ISC 2GB	2.A7	Avail
A01B	LG03	120/ J.00	15/ D9/ J.01	OSA-E2 GbE SX	0.0A(S)	Avail
A01B	LG03	121/ J.01	15/ D9/ J.01	OSA-E2 GbE SX	0.0B(S)	Avail
A01B	LG04	130/ J.00	06/ D9/ J.01	OSA-E2 1000BaseT	0.13(S)	Avail
A01B	LG04	131/ J.01	06/ D9/ J.01	OSA-E2 1000BaseT	1.0E	Avail
A01B	LG06	140/ J.00	15/ D9/ J.01	OSA-E2 1000BaseT	0.12(S)	Avail
A01B	LG06	141/ J.01	15/ D9/ J.01	OSA-E2 1000BaseT	0.2D(S)	Avail
A01B	LG07	150/ D.01	06/ D9/ J.01	FICON EXP4 4KM LX	0.46(S)	Avail
A01B	LG07	151/ D.02	06/ D9/ J.01	FICON EXP4 4KM LX	0.63(S)	Avail
A01B	LG07	152/ D.03	06/ D9/ J.01	FICON EXP4 4KM LX	0.66(S)	Avail
A01B	LG07	153/ D.04	06/ D9/ J.01	FICON EXP4 4KM LX	0.70(S)	Avail
A01B	LG08	160/ D.01	15/ D9/ J.01	FICON EXP4 4KM LX	0.45(S)	Avail
A01B	LG08	161/ D.02	15/ D9/ J.01	FICON EXP4 4KM LX	0.65(S)	Avail

Figure 10-16 CMT: CHPID to Port Report

CHPID to Control Unit Report

To view the CHPID to Control Unit Report, perform the following steps:

1. Select **Reports** → **CHPID to Control Unit Report**.
2. Click **Save** (assuming that you accept the CHPID Mapping Tool report name).

   The CHPID Mapping Tool opens a browser window with the CHPID to Control Unit Report. See Figure 10-17 on page 332.

   Note that you might be prompted to accept active content. Accept the active content in order to display the report in your browser.

CHPID Mapping Tool - CHPID to CU Report

Control Number: 26853678(CFR) Report Created: Oct. 13, 2009
Machine: 2097-E26

IOCP file: SCZP202in.iocp

Note: This report indicates the results of using the CHPID Mapping Tool, using the information based on the above control number and the supplied IOCP file. Please ensure this configuration is still accurate before proceeding.

CSS	CHPID	Type	Source	Port	PCHID / AID-Port	CU Number	CU Type	Priority
0	06	OSD	1/ 1/ 9	A01B LG09 J02J03	171	2280	OSA	----
0	08	OSD	1/ 2/ 8	Z15B LG02 J.00	510	3000	OSA	----
0	0A	OSD	2/ 1/ 9	A01B LG03 J.00	120	E200	OSA	----
0	0B	OSD	2/ 1/ 9	A01B LG03 J.01	121	2D80	OSA	----
0	0C	OSD	1/ 1/ 7	Z01B LG04 J.00	330	3020	OSA	----
0	14	OSC	1/ 1/ 7	Z01B LG07 J.00	350	F200	OSC	0333
0	16	OSD	2/ 2/ 8	Z15B LG01 J.00	500	3040	OSA	----
0	1A	OSC	2/ 2/ 8	Z15B LG03 J.00	520	F280	OSC	0333
0	1C	OSD	1/ 1/ 7	Z01B LG07 J.01	351	3080	OSA	----
0	1E	OSD	2/ 2/ 8	Z15B LG03 J.01	521	30A0	OSA	----
0	3A	CNC	1/ 1/ 8	A01B LG17 J.04	1E4	001E	9032-5	----
0	3B	CNC	1/ 1/ 8	A01B LG17 J.05	1E5	001F	9032-5	----
						0B91	3590	----
0	4C	FC	2/ 1/ 8	A01B LG18 D.01	1F0	0061	2032	----
						49C0	FCTC	----
						4A90	FCTC	----
						4B00	FCTC	----

Figure 10-17 CMT: CHPID to CU Report

10.6.9 Creating the updated IOCP file

Create an IOCP statements file for input back to the IODF with HCD. This IOCP statements file now has the CHPIDs assigned to PCHIDs.

> **Note:** You might prefer to use HCM to transfer the updated IOCP statements file back to the host. Before doing so however, perform the following procedure in the CHPID Mapping Tool to create the updated IOCP file.

To create the updated IOCP file, perform the following steps:

1. Select **Tool** → **Create Updated IOCP File**. See Figure 10-18.

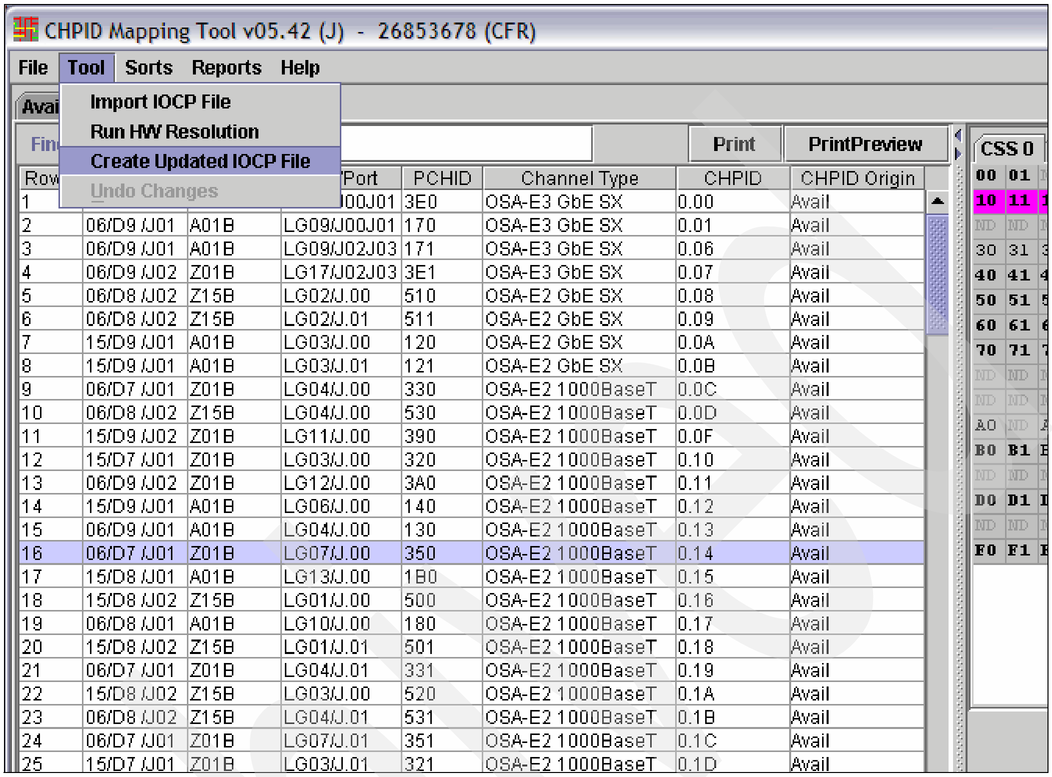


Figure 10-18 CMT: Create Updated IOCP File

2. Enter the file name and location for the IOCP output file, and then click **Save**. See Figure 10-19 on page 334.

> **Note:** After saving the IOCP output file to the workstation, upload it to the z/OS host, and then migrate it to the work IODF by using HCD or HCM.

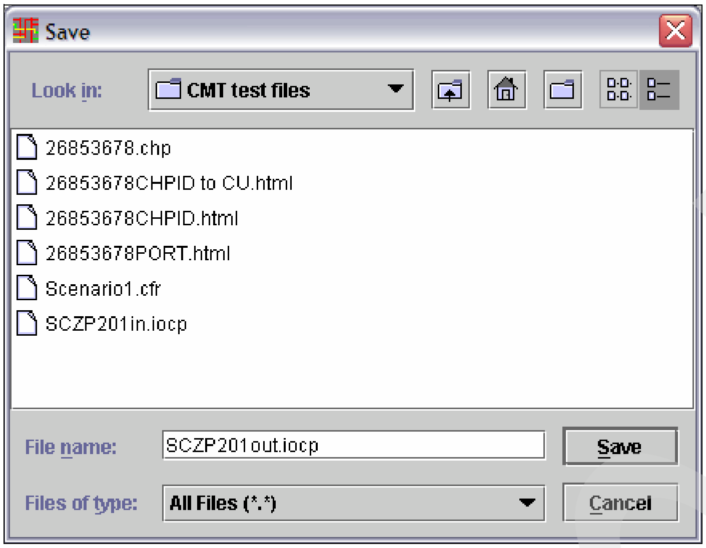


Figure 10-19 CMT: Save IOCP output file

The CHPID Mapping Tool displays an informational message, shown in Figure 10-20, regarding what to do for the final execution of the tool.

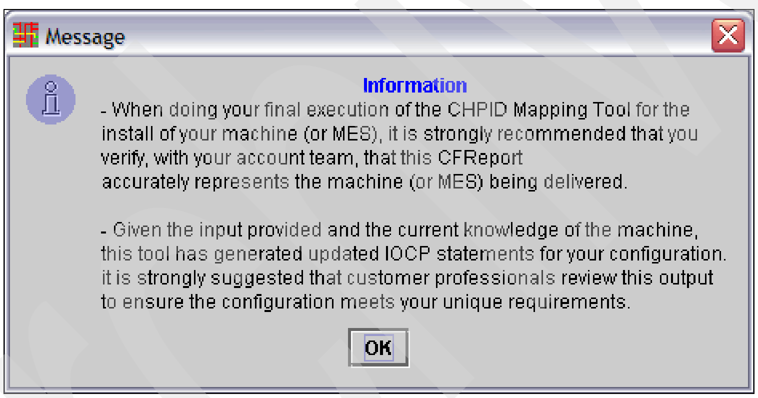


Figure 10-20 CMT: informational message

3. Click **OK**.

You may now close the CHPID Mapping Tool program by selecting on **File** → **Exit**.

10.6.10 Migrating the PCHIDs back into the IODF using HCM

After the *updated IOCP file* has been created and saved to the workstation, by using the CHPID Mapping Tool, you may return to HCM to import the updated IOCP file, which contains the PCHIDs, back into the IODF.

Note: The IOCP deck that is produced from the CHPID Mapping Tool must be migrated back into HCD. It cannot be used directly by IOCP. Any attempt to use the IOCP source created by the CHPID Mapping Tool in the IOCP program will fail.

In our example, we import the following IOCP file:

```
C:\HCMCFG\SCZP201out.iocp
```

To import the file, perform the following steps:

1. Select **Utilities** → **CHPID Mapping Tool Support**.
2. Click **Import IOCP File from CMT** to ensure the file is selected. If you want to change the default file name, click the browse (**...**) button.
3. Click **OK**.

When the operation is successful, HCM displays the following message ID and text:

```
CBDA517I I/O configuration successfully written to the IODF.
```

See Figure 10-21.

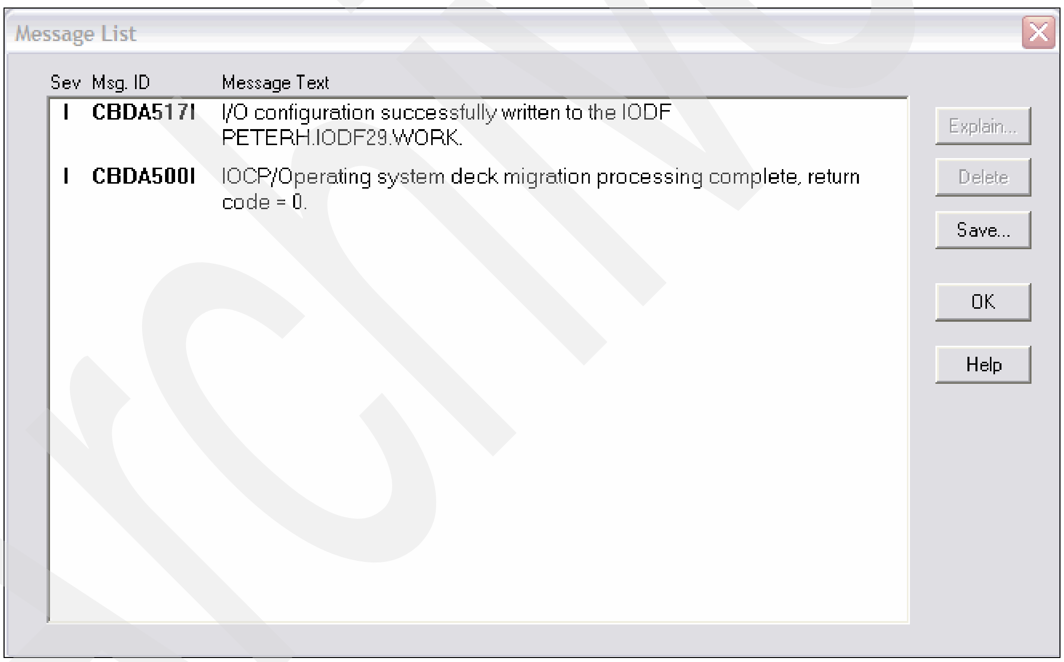


Figure 10-21 CMT: IOCP successfully imported back into the IODF

4. Click **OK**.

The production IODF is now ready to be built.

10.6.11 Manually launching CMT and importing the CFReport and IOCP file

Section 10.6.1, “Exporting the IOCP file for CMT for a selected processor using HCM” on page 318 shows how to initiate this processing HCM. Alternatively, the CMT can be launched manually and the CFReport and IOCP files can be loaded. This process is described here.

Manually launching CMT

To manually launch CMT and import CFReport, perform the following steps:

1. Start the CMT program on your workstation.
2. Import the CFReport order file into the CMT by selecting **File** → **Import CFReport File**. See Figure 10-22.

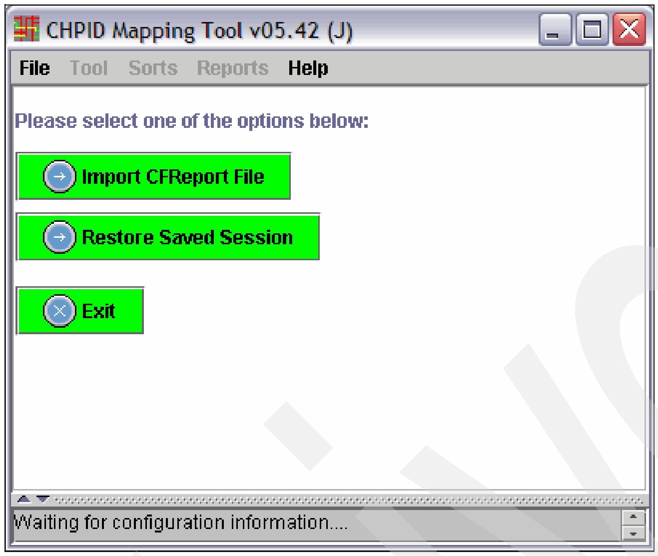


Figure 10-22 CMT: Import CFReport File

3. Select the CFReport file (on your workstation) to import into the CMT and click **Open**. See Figure 10-23.

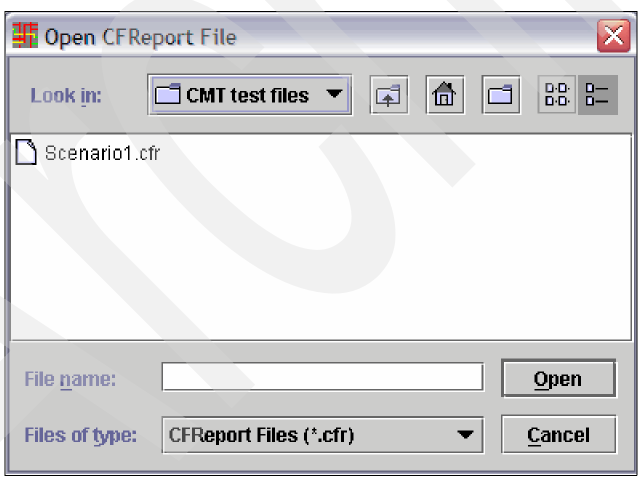


Figure 10-23 CMT: Open CFReport File

The CHPID Mapping Tool displays the information from the CFReport on the left side of the window. See Figure 10-24 on page 337.

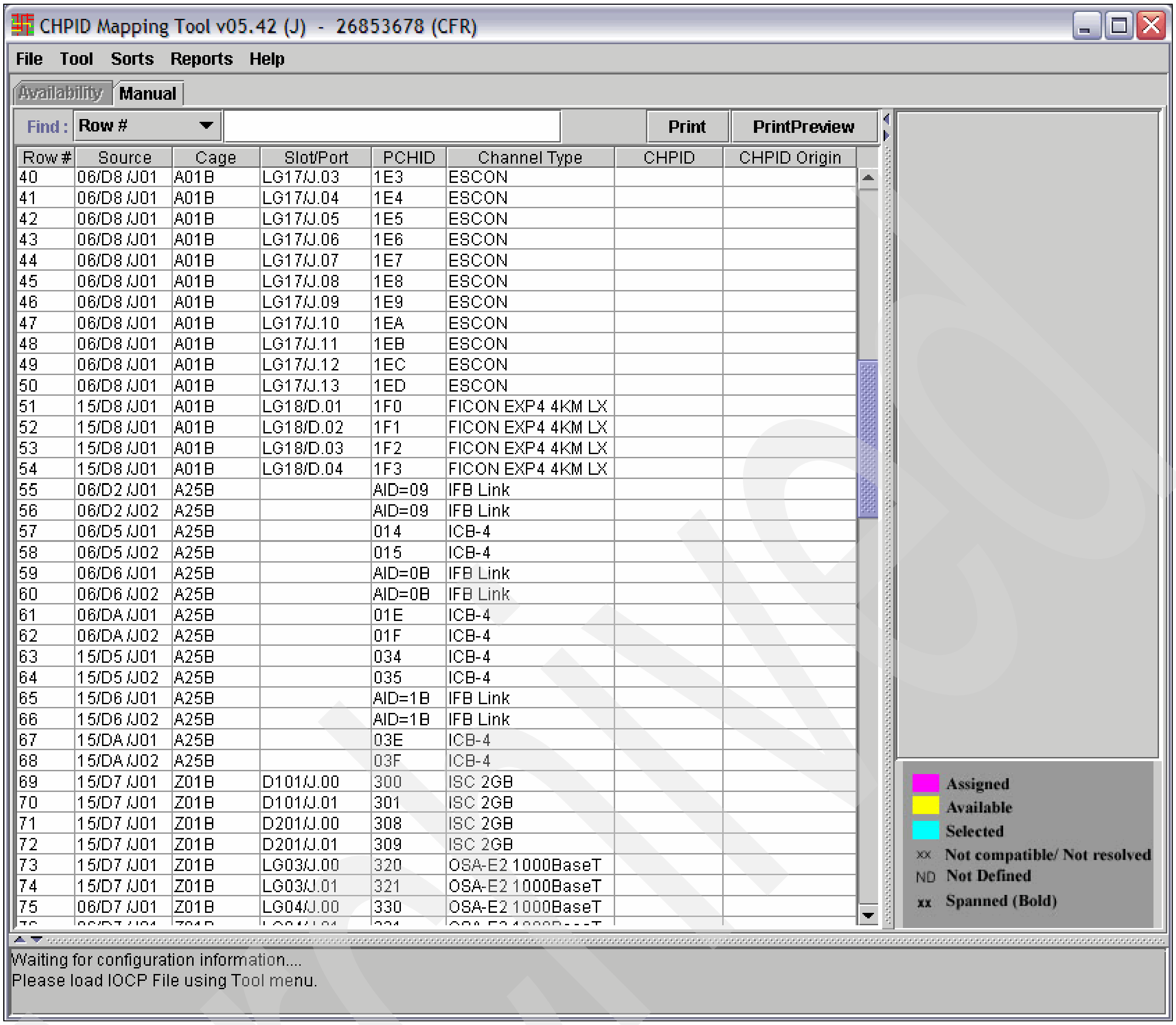


Figure 10-24 CMT: Importing CFReport File

Importing IOCP file into the CMT

To import the IOCP file into CMT, perform the following steps:

1. Select **Tool** → **Import IOCP File**. See Figure 10-25.

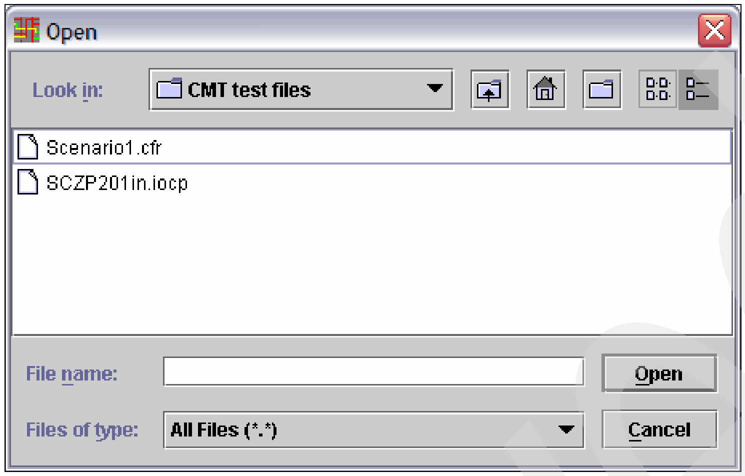


Figure 10-25 CMT: Import IOCP files

2. Select the IOCP file (on your workstation) to import into the CHPID Mapping Tool and click **Open**.

11

Build and activate the production IODF

In this chapter, we describe how to build a production IODF, how to activate it dynamically, and how to activate an IODF using power-on reset (POR).

This chapter contains the following topics:

11.1 Building a production IODF

Before the channel subsystem and the operating system can use the I/O configuration that is updated using HCD or HCM, you must build a production IODF from the updated work IODF.

The production IODF defines one or more valid I/O configurations. Although you can build multiple production IODFs, only the one that is selected during IPL or is activated during dynamic configuration is the active production IODF on a system.

11.1.1 IODF tokens

This section discusses the IOCDS, HSA, and processor tokens. These tokens are not related to EDT tokens, which are described in Chapter 7, “Configuration with HCD” on page 83.

The token is used for matching the production IODF to the current IOCDS. The token includes the processor name, date and time of the production IODF build, and name of the production IODF data set. See Figure 11-1.

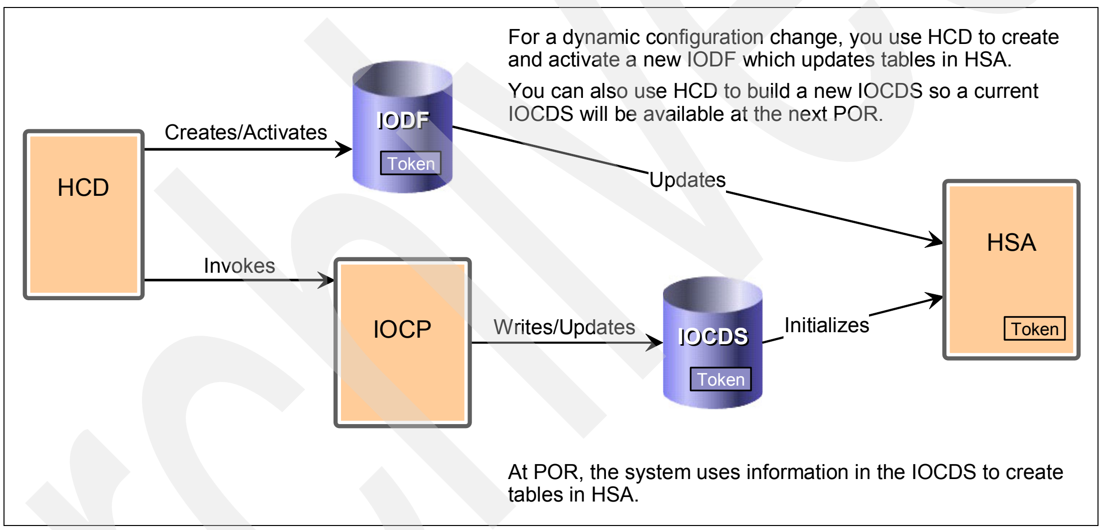


Figure 11-1 Build production IODF: Token Overview

When building a production IODF, the date and time of the build is stored in the production IODF that is built. Dynamic hardware and software production IODF activation stores the token in HSA. When writing an IOCDS, the production IODF token that is used for the write operation is stored in the IOCDS. During power-on reset, the token in the IOCDS is stored in the HSA.

The token in the IOCDS is updated when writing the IOCDS. The token in HSA is updated by dynamic software and hardware activation or by power-on reset.

If the token in the IOCDS matches the token in HSA (the currently active production IODF), dynamic hardware and software updates are allowed.

When building more than one production IODF, the IODFs will get separate tokens although the work IODF has not been updated in between builds. The reason is because the token includes a date and time stamp.

To view the token of IOCDSs on a processor or any production IODF, use HCD.

To view the token of the currently active production IODF use HCD or the **D IOS,CONFIG** system command.

To view the token of the current production IODF, specify any IODF on the HCD entry panel, then select option **2, Activate or process configuration data**. See Figure 11-2.

```
+----- Activate or Process Configuration Data ------+
|                                                    |
| Select one of the following tasks.                 |
|                                                    |
| 5_  1.  Build production I/O definition file       |
|     2.  Build IOCDS                                |
|     3.  Build IOCP input data set                  |
|     4.  Create JES3 initialization stream data     |
|     5.  View active configuration                  |
|     6.  Activate or verify configuration           |
|         dynamically                                |
|     7.  Activate configuration sysplex-wide        |
|     8.  Activate switch configuration              |
|     9.  Save switch configuration                  |
|     10. Build I/O configuration data               |
|     11. Build and manage S/390 microprocessor      |
|         IOCDSs and IPL attributes                  |
|     12. Build validated work I/O definition file   |
|                                                    |
+----------------------------------------------------+
```

Figure 11-2 Build production IODF: Activate or Process Configuration Data

Select option **5, View active configuration.** See Figure 11-3.

```
+------------------------- View Active Configuration -------------------------+
|                                                                              |
| Currently active IODF  . . : SYS6.IODF26                                     |
|    Creation date . . . . . : 09-10-04                                        |
|    Volume serial number  . : IODFPK                                          |
|                                                                              |
| Configuration ID . . . . . : TEST3287     Test 3287 devices                  |
| EDT ID . . . . . . . . . . : 01                                              |
|                                                                              |
| HSA token  . . . . . . . . : SCZP101  09-10-04 20:31:13 SYS6     IODF26      |
|                                                                              |
| Activation scope:                                                            |
| Hardware changes allowed . : Yes                                             |
| Software changes allowed . : Yes                                             |
|                                                                              |
| ENTER to view details on the activation scope.                               |
+------------------------------------------------------------------------------+
```

Figure 11-3 Build production IODF: View Active Configuration

The View Activate Configuration panel displays the HSA token: Processor name, date and time of production IODF build, and the name of the production IODF build. HCD compares the

HSA token to the token of the currently active production IODF, and if the comparison is a match, dynamic hardware and software updates are allowed.

Press the Enter key to display detailed information about limitations to the activation scope. A Message List panel is displayed containing the messages about the reasons for the restrictions. If no restrictions apply the CBDA781I message is displayed. Use the **E** line-command to have a message explained.

To view the date and time of any production IODF build, specify the production IODF data set on the HCD entry panel, and select option **6.4 View I/O definition file information**.

Using the D IOS,CONFIG system command to display a token of an active production IODF, issue the following system command:

```
D IOS,CONFIG
```

Figure 11-4 shows output from the **D IOS,CONFIG** system command.

```
IOS506I 16.54.29 I/O CONFIG DATA 256
ACTIVE IODF DATA SET = SYS6.IODF26
CONFIGURATION ID = TEST3287       EDT ID = 01
TOKEN:  PROCESSOR DATE     TIME     DESCRIPTION
 SOURCE: SCZP101  09-10-04 20:31:13 SYS6     IODF26
ACTIVE CSS:  0    SUBCHANNEL SETS CONFIGURED: 0
CHANNEL MEASUREMENT BLOCK FACILITY IS ACTIVE
```

Figure 11-4 Build production IODF: D IOS,CONFIG system command (Token)

Again the HSA token includes the processor name, date and time of production IODF build, and the name of the production IODF build.

Because the active production IODF data set is the name specified in the HSA token, dynamic I/O configuration updates are probably allowed. However, because the production IODF that is used for writing the IOCDS could have been performed on another partition on the processor, the active SYS6.IODF26 data set might not be the production IODF that is used for writing the IODF. It might be two separate data sets with the same name, and in that case, the token might not match.

When performing an IPL of a system by using a production IODF that does not match the IOCDS token, the following message is written to the system log:

```
IOS505A DYNAMIC I/O CONFIGURATION CHANGES ARE NOT ALLOWED, THE HARDWARE AND
SOFTWARE CONFIGURATIONS DO NOT MATCH
```

This messages indicates that dynamic hardware and software updates are not allowed using this system. Only dynamic software updates are allowed. This does not prevent you from doing dynamic hardware and software updates on another system on the processor.

The out-of-synchronization condition might be an error but does not have to be, because other systems on the processor might be used for managing hardware and software updates. See 13.4, “Synchronizing an out-of-sync system” on page 406 for information about how to recover from the out-of-synchronization status, in case this is an error condition.

HCD option 2.11 (Build and manage S/390 microprocessor IOCDSs and IPL parameters) provides more detailed information about the token status. Select the processor using option **S, Work with IOCDSs**.

In this example, in Figure 11-5, IOCDS A2 has been used for power-on reset (the Write Protect column is `Yes-POR`). The IOCDS token matches the token in HSA (IOCDS matches current production IODF) and the IOCDS token matches the token of the currently accessed production IODF (IOCDS matches IODF specified on the HCD entry panel).

```
IOCDS List         Row 1 of 4 More:       >
Command ===> ______________________________________________ Scroll ===> CSR

Select one or a group of IOCDSs, then press Enter.

                                          -----Token Match----- Write
/ IOCDS       Name     Type   Status      IOCDS/HSA IOCDS/Proc. Protect
_ A0.SCZP101  IODF23   LPAR   Alternate   No        No          No
_ A1.SCZP101  IODF24   LPAR   Alternate   No        No          No
_ A2.SCZP101  IODF26   LPAR   POR         Yes       Yes         Yes-POR
_ A3.SCZP101  IODF22   LPAR   Alternate   No        No          No
```

Figure 11-5 Build production IODF: Work with IOCDSs (Token Match)

After a dynamic hardware and software configuration update, and before updating the IOCDS, the IOCDS/HSA column is `No` (IOCDS not yet updated) and the IOCDS/Proc column is `Yes` (Current production IODF specified on the HCD entry panel in order to update IOCDS).

The Name column displays a title specified when writing the IOCDS. The column can include comments on changes, such as ADD2000 for a production IODF adding device 2000.

Scroll to the right to display tokens for all IOCDSs on the processor. See Figure 11-6.

```
IOCDS List         Row 1 of 4 More: <
Command ===> ______________________________________________ Scroll ===> CSR

Select one or a group of IOCDSs, then press Enter.

              --Last Update--
/ IOCDS       Date        Time  IOCDS Configuration Token Information
_ A0.SCZP101  2009-09-22  14:09 SCZP101  16:51:01 09-07-30 SYS6     IODF23
_ A1.SCZP101  2009-10-02  17:42 SCZP101  16:45:24 09-10-02 SYS6     IODF24
_ A2.SCZP101  2009-10-05  14:44 SCZP101  20:31:13 09-10-04 SYS6     IODF26
_ A3.SCZP101  2009-09-18  11:13 SCZP101  16:51:01 09-07-30 SYS6     IODF22
```

Figure 11-6 Build production IODF: Work with IOCDSs (Token Information)

In this example, the `SYS6.IODF26` production IODF has been used to write the A2 IOCDS. The HCD 2.11 option can be used to identify the production IODF matching an IOCDS.

Similar information is available in HCD reports.

See *Hardware Configuration Definition User's Guide,* SG33-7988 and *Hardware Configuration Definition Planning,* GA22-7525 for more details about the IOCDS, HSA and processor token.

11.1.2 Determining the current active production IODF

Before building a production IODF you need to determine the currently active production IODF. This is to make sure you do not update or replace the current production IODF.

There are two ways of determining the current active production IODF:

- Using the **D IOS,CONFIG** system command
- Using HCD panels option 2.5

Using the D IOS,CONFIG system command

Issue the following system command on each system on the CPC to be updated:

```
D IOS,CONFIG
```

Figure 11-7 shows output from the D IOS,CONFIG command.

```
IOS506I 16.54.29 I/O CONFIG DATA 256
ACTIVE IODF DATA SET = SYS6.IODF26
CONFIGURATION ID = TEST3287       EDT ID = 01
TOKEN:  PROCESSOR DATE     TIME     DESCRIPTION
 SOURCE: SCZP101  09-10-04 20:31:13 SYS6     IODF26
ACTIVE CSS:  0    SUBCHANNEL SETS CONFIGURED: 0
CHANNEL MEASUREMENT BLOCK FACILITY IS ACTIVE
```

Figure 11-7 Build production IODF: D IOS,CONFIG system command (IODF)

The current active production IODF data set is SYS6.IODF26. The message informs you that the operating system configuration that is used on this system is TEST3287 and the Eligible Device Table (EDT) in the operating system configuration is 01.

When building a new production IODF, chose another suffix, for example 27 (production IODF data set SYS6.IODF27). Currently active production SYS6.IODF26 will then be the backup (fallback) IODF after the activation.

Using HCD panels option 2.5

On the HCD entry panel, specify any IODF data set, select **Activate and process configuration data**, and then select **View active configuration.** See Figure 11-8 on page 345.

```
+------------------------- View Active Configuration -------------------------+
|                                                                             |
| Currently active IODF  . . : SYS6.IODF26                                    |
|    Creation date . . . . . : 09-10-04                                       |
|    Volume serial number  . : IODFPK                                         |
|                                                                             |
| Configuration ID . . . . . : TEST3287     Test 3287 devices                 |
| EDT ID . . . . . . . . . . : 01                                             |
|                                                                             |
| HSA token  . . . . . . . . : SCZP101  09-10-04 20:31:13 SYS6     IODF26     |
|                                                                             |
| Activation scope:                                                           |
| Hardware changes allowed . : Yes                                            |
| Software changes allowed . : Yes                                            |
|                                                                             |
| ENTER to view details on the activation scope.                              |
+-----------------------------------------------------------------------------+
```

Figure 11-8 Build production IODF: View Active Configuration

Using the HCD panels offers slightly different information from the **D IOS,CONFIG** system command. The View Active Configuration panel indicates the activation scope (token status), to let you know whether dynamic I/O configuration updates are possible.

To see a sysplex-wide view of the active production IODFs by using HCD option 2.7 **Activate configuration sysplex-wide**.

11.1.3 Building a production IODF

To build a production IODF, perform the following steps:

1. Select **Activate and process configuration data** on the HCD entry panel. The I/O definition file that is specified must be the updated work IODF.
2. From the resulting panel, select **Build production I/O definition file**. HCD validates the configuration data in the work IODF. If the work IODF is valid, then a production IODF can successfully be built.

   During build of a production IODF HCD performs a validation. The validation might issue messages you have to resolve them, according to their severity. The production IODF is not created if any errors with a severity higher than *warning* are produced. See Figure 11-9 on page 346.

```
+------------------------------- Message List --------------------------------+
|   Save  Query  Help                                                          |
| -------------------------------------------------------------------------- |
|                                                              Row 1 of 340 |
| Command ===> ___________________________________________ Scroll ===> PAGE  |
|                                                                            |
| Messages are sorted by severity. Select one or more, then press Enter.     |
|                                                                            |
| / Sev Msg. ID  Message Text                                                |
| _ W   CBDG483I CFP channel path 1.BF of processor SCZP101 is not           |
| #              connected. It should be connected to a channel path of      |
| #              type CFP.                                                   |
| _ W   CBDG092I Maximum number of 256 logical paths on link 63.43 to        |
| #              control unit 6100 exceeded. Actually defined: 324           |
+----------------------------------------------------------------------------+
```

Figure 11-9 Build production IODF: Message List

3. Review the messages, if any, on the message list. Use the **Save** option to keep messages for further reference; messages are saved in your personal HCD message log file. Press the End key when you are done.

   Although you are able to build a production IODF when only warning messages are displayed, be sure to review messages carefully because warning messages might affect your configuration. An example of a warning message is CBDG092I, which warns you that the number of physical paths has been exceeded. This issue can cause LPARs to be unable to access the control units in question.

4. After reviewing the messages, the Build Production I/O Definition File panel is displayed. See Figure 11-10 on page 347. Specify the new production IODF name and the target volume for the new production IODF.

5. If the data set specified already exits, the Confirm Delete I/O Definition File panel is displayed, indicating the creation date and the volume of the IODF data set to be deleted. Select yes, to confirm deletion of the IODF. Be careful not to delete the active IODF. If you have specified the name of the active IODF, another confirmation panel is displayed to warn you about the effect.

Attention: Never delete or replace the active production IODF, because this can cause an out-of-sync condition that you might need a power-on reset to resolve.

```
+-------------- Build Production I/O Definition File ---------------+
|                                                                    |
| Specify the following values, and choose how to continue.          |
|                                                                    |
| Work IODF name . . . : 'SYS6.IODF26.WORK'                          |
|                                                                    |
| Production IODF name . _____________________________________       |
| Volume serial number . SBOX38  +                                   |
|                                                                    |
| Continue using as current IODF:                                    |
| 2   1.  The work IODF in use at present                            |
|     2.  The new production IODF specified above                    |
|                                                                    |
+--------------------------------------------------------------------+
```

Figure 11-10 Build production IODF: Build Production I/O Definition File

6. Specify the name and volume serial number (if applicable) for the production IODF. The syntax of a production IODF name is described in 6.2, "IODF naming standards" on page 79. The current IODF high level is specified in the LOADxx member. See 11.6, "LOADxx members" on page 369. The volume serial number specified must be the device to be specified as the first four bytes of the LOAD parameter when performing system IPL.
7. Press Enter. The Define Descriptor Fields panel is displayed. See Figure 11-11. The descriptor fields are part of the token.

```
+-------------------- Define Descriptor Fields --------------------+
|                                                                  |
| Specify or revise the following values.                          |
|                                                                  |
| Production IODF name  . : 'SYS6.IODF27'                          |
|                                                                  |
| Descriptor field 1  . . . SYS6                                   |
| Descriptor field 2  . . . IODF27                                 |
|                                                                  |
+------------------------------------------------------------------+
```

Figure 11-11 Build production IODF: Descriptor fields

8. Press Enter to build the production IODF. After the production IODF is built, HCD displays the following message:

```
Production IODF <highlevel.IODFxx> created
```

> **Attention:** If you specify asterisks (**), equals (==), pluses (++), or minuses (••) for the IODF suffix in LOADxx, never change the default descriptor field values because z/OS uses these values to find the current IODF during IPL. Also take this relationship into consideration if you copy the IODF to a separate data set name. For further details, see *Hardware Configuration Definition Planning,* GA22-7525.

9. Verify the following information:
   – The volume serial and allocation of the new production IODF
   – That the production IODF is allocated on the device that is to be specified in the LOAD parameter for the next IPL
   – That the production IODF is allocated in a single extent

> **Attention:** Production IODFs cannot have multiple extents because they result in a wait state during IPL. To verify that your production IODF has a single extent only, issue the LISTCAT TSO/E command using ISPF option 6 or other corresponding interface.

Use the following TSO/E command to verify the number of extents in production IODF:

```
LISTCAT ENT('production IODF dataset name') ALL
```

Look for the EXTENTS field, which must be 1. See Figure 11-12. If the new production IODF file has multiple extents and is not in use, reallocate the data set.

```
DATA ---------- SYS6.IODF26
IN-CAT --- CATALOG.SHRICF1.VIODFPK
HISTORY
  DATASET-OWNER-----(NULL)     CREATION--------2009.277
  RELEASE----------------2     EXPIRATION------0000.000
  ACCOUNT-INFO-----------------------------------(NULL)
PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
ASSOCIATIONS
  CLUSTER--SYS6.IODF26.CLUSTER
ATTRIBUTES
  KEYLEN-----------------0 AVGLRECL---------------0 BUFSPACE------------8192
  RKP--------------------0 MAXLRECL---------------0 EXCPEXIT----------(NULL)
  SHROPTNS(1,3)   RECOVERY UNIQUE          NOERASE LINEAR        NOWRITECHK
  UNORDERED        NOREUSE NONSPANNED
STATISTICS
  REC-TOTAL--------------0 SPLITS-CI--------------0 EXCPS------------------0
  REC-DELETED------------0 SPLITS-CA--------------0 EXTENTS----------------1
  REC-INSERTED-----------0 FREESPACE-%CI----------0 SYSTEM-TIMESTAM
  REC-UPDATED------------0 FREESPACE-%CA----------0      X'0000000000000000'
  REC-RETRIEVED----------0 FREESPC----------------0
```

Figure 11-12 Build production IODF: IDCAMS Listcat Example

Sharing production IODFs

For sharing an IODF between two or more systems, these systems must of course all be able to access the volume on which the production IODF is allocated. If a shared volume is not applicable, systems cannot share IODFs and individual production IODFs must be built or copied. To review other considerations when you are deciding about the number of IODFs that are required, see *Hardware Configuration Definition User's Guide,* SG33-7988.

When using more than one production IODF on the same CPC, consider the following information:

- The token must match in order to be able to dynamically activate hardware updates.
- If the token does not match, only dynamic software updates are allowed.
- At least one production IODF on a CPC must have a matching token.

If the token matches on some of the systems on the CPC, perform software updates on the systems that are not synchronized, and perform hardware updates on one of the synchronized systems.

Copying production IODFs

If the work IODF is located in a central repository (not accessible from the system on which the IODF is to be activated), be sure to copy your production IODF to the target load volume by using shared DASD, JES2 NJE, FTP, or other ways of copying data.

Copying using shared DASD can be performed online by using the HCD panels. Copying to a remote system using JES2 NJE can be done using the HCD export and import facility. For transmitting an IODF using FTP you can export the production IODF, transmit the sequential file using FTP and the import the sequential file.

Both the online copy and the export and import facility preserve the production IODF token.

Copying production IODFs by using HCD panels

To copy production IODFs by using HCD panels, perform the following steps:

1. Select the **Maintain I/O definition files** option on the HCD entry panel.
2. Select option **2, Copy I/O Definition file** on the Maintain I/O definition files panel. See Figure 11-13.

```
+-------------------- Copy I/O Definition File ---------------------+
|                                                                   |
| Specify or revise the following values.                           |
|                                                                   |
| Source IODF name . . . 'SYS6.IODF26'                          +   |
|                                                                   |
| Target IODF name . . . ____________________________________       |
| Activity logging . . . _____  (Yes or No)                         |
|                                                                   |
+-------------------------------------------------------------------+
```

Figure 11-13 Build production IODF: Copy IODF

3. Specify the Source IODF name, the Target IODF name, and whether to include the Activity log file in the copy.
4. If the target IODF exists, you have to confirm reuse of the target IODF.
   If the target IODF does *not* exist, you are prompted for the volume serial number, space allocation, and activity logging in order for HCD to allocate the target IODF.

Copying production IODFs by using the HCD export and import facility

The HCD export and import function uses NJE to transfer IODF data sets to other systems.

To *export* an IODF by using HCD panels, perform the following steps:

1. Select the **Maintain I/O definition files** option on the HCD entry panel.
2. Select option **5, Export I/O definition file option** on the Maintain I/O definition files panel. See Figure 11-14 on page 350.

```
+------------------------ Export IODF ------------------------+
|                                                             |
| Specify or revise the following values.                     |
|                                                             |
| IODF name  . . . 'SYS6.IODF26' +                            |
|                                                             |
| Target:                                                     |
| User ID or nickname . . . ________   Node ID  . . ________  |
|                                                             |
|                                                             |
| Operating system status . 1   1.  Attended                  |
|                               2.  Unattended (MVS only)     |
|                                                             |
|                                                             |
| Send activity log file  . 2   1.  Yes (attended only)       |
|                               2.  No                        |
|                                                             |
+-------------------------------------------------------------+
```

Figure 11-14 Build production IODF: Export IODF

3. Specify the user ID of the receiver and the JES2 NJE node ID of the receiving system. HCD uses the TSO/E TRANSMIT command. Therefore, after exporting the IODF, you must use the TSO/E RECEIVE command to receive and create a sequential file including the IODF data set on the receiving system. The transmitting system and the receiving system can be the same, in case you need a sequential copy of your IODF data set.
4. For the unattended option, HCD submits a batch job for receiving the IODF data set. The Specify Target IODF and User Password panel is displayed. Specify IODF data set name on the receiving system plus user ID and password for the batch job. Verify the completion of the batch job on the receiving system.

   When receiving the IODF data set using the attended option, the cataloged sequential data set inserts the word `EXPORTED` as the second level of the data set name. See Figure 11-15.

```
 Dataset <userid>.EXPORTED.IODF26 from <userid> on WTSCPLX2
 Enter restore parameters or 'DELETE' or 'END' +
```

Figure 11-15 Build production IODF: TSO/E Receive the exported IODF data set

5. Also, when exporting the activity log, this data set does *not* have a second-level added automatically causing it to select the name of the activity log for the exported IODF. Select another activity log name in case you receive the IODF data on a system that shares catalogs with the transmitting system.

Figure 11-16 shows how to specify a cataloged sequential data set name for the activity log.

```
 Dataset<userid>.IODF26.ACTLOG from <userid> on WTSCPLX2
 Enter restore parameters or 'DELETE' or 'END' +
da('<userid>.EXPORTED.IODF26.ACTLOG’)
```

Figure 11-16 Build production IODF: TSO/E Receive the exported activity log

For details about changing the high-level qualifier of the data set name, from the user ID that is specified as the default high-level qualifier, see 6.1, “HCD setup” on page 76.

To *import* an IODF by using HCD panels, perform the following steps:

1. Select the **Maintain I/O definition files** option on the HCD entry panel.
2. Select option **6, Import I/O definition file option** on the Maintain I/O definition files panel. The panel shown i n Figure 11-17 is displayed.

```
+-------------------------------- Import IODF -------------------------------+
|                                                                            |
| Specify the following values.                                              |
|                                                                            |
|                                                                            |
| Import from a data set:                                                    |
|                                                                            |
| Data set name . . <userid>.EXPORTED.IODF26'______________________________  |
|                                                                            |
|                                                                            |
| Target IODF name  'SYS6.IODF27_________________________  +                 |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 11-17 Build production IODF: Import IODF

3. Specify the cataloged sequential data set name and the target IODF, and press Enter. The HCD import panel does not include the copying of the optional activity log file. You have to copy the file manually.

> **Note:** To leave the Export and Import panels use PF3 or PF12. Pressing Enter causes the action to be repeated.

Alternatively exporting and importing IODFs can be done using batch jobs. See *Hardware Configuration Definition User’s Guide,* SG33-7988 for details.

Identifying systems to be updated

You must update all systems to which the I/O configuration updates apply. You might also include other systems on the CPC in order for the IODFs to keep syncronized (token match). Consider updating all systems in affected syslexes.

11.2 Testing the activation of a production IODF

The two ways of verifying the updated production IODF against one or more active systems are as follows:

- Using the ACTIVATE system command
- Using the HCD panels

The IODF production data set must be cataloged otherwise dynamic test and activation fails. Although you may perform an IPL by using an uncataloged production IODF, the dynamic test and activation will not be possible.

Attention: Dynamic I/O configuration activation including test can consume processor resources and does take place in a high-priority address space. On small systems, consider dynamic test and activation when the workload on the system is low.

11.2.1 Using the ACTIVATE system command

To verify the updated IODF by using the ACTIVATE system command, issue the command on each system on the processor to be updated.

To verify hardware and software updates, use the following command:

```
ACTIVATE IODF=xx,TEST
```

In the command, `IODF=xx` specifies the two-character suffix of the target IODF data set name (`highlevel.IODFxx`) that contains the configuration definition that the system is to verify.

To verify software updates only, use the following command:

```
ACTIVATE IODF=xx,SOFT,TEST
```

The result of the ACTIVATE command is an IOS500I message, which lists the IODF resources to be updated, added, and deleted.

Review the IOS500I messages carefully to make sure of the following information:

- The list includes intended updates only.
- The list does *not* include ONLINE CHPIDs or devices to be deleted.

Figure 11-18 shows IOS500I messages.

```
IOS500I ACTIVATE RESULTS 444
TEST DETECTED NO CONDITIONS WHICH WOULD RESULT IN ACTIVATE FAILURE
REASON=A880,DYNAMIC ACTIVATE REQUEST CONTAINS MODIFICATIONS TO CF
            CONNECTIONS. ENSURE THAT S/W CHANGES ARE DONE PRIOR TO
            H/W CHANGES.
 COMPID=SC1XL
NOTE = A883,FOLLOWING CONTROL UNITS ARE TO BE DELETED FROM PROCESSOR
            SCZP101: 1.FFFA,1.FFF8
 COMPID=SC1XL
NOTE = A882,FOLLOWING CHANNEL PATHS ARE TO BE MODIFIED FOR PROCESSOR
            SCZP101: 1.EA,1.EC
 COMPID=SC1XL
NOTE = 0112,REQUEST CONTAINS DELETE(S), SPECIFY FORCE ON H/W ACTIVATE
 COMPID=SC1C3
```

Figure 11-18 Test production IODF: IOS500I message example

When activating updates to coupling facility connections, be sure that z/OS software updates are implemented before activation of the corresponding I/O configuration update.

When deleting resources such as CHPIDs and devices, resources must be offline on all affected systems, otherwise the ACTIVATE command can fail because it cannot delete online resources. Be aware that ACTIVATE test commands do not test whether resources to be deleted are online.

For a list of restrictions on the ACTIVATE command, see *Hardware Configuration Definition Planning,* GA22-7525. For a complete description of the ACTIVATE system command syntax and parameters, see *MVS System Commands,* SA22-7627.

Attention: An ACTIVATE command can still be active as a task in IOSAS after the command task has been abended with a CMDS ABEND system command.

RACF considerations

Users must be granted UPDATE access to the `MVS.ACTIVATE` profile in the OPERCMDS class. This step applies to both ways of verifying the updated production IODF.

To verify and manage resources that will be added, updated, or deleted, also grant the READ access for the CONFIG and VARY system commands in the OPERCMDS class.

11.2.2 Using HCD

This section explains how to test dynamic activation of an I/O configuration update by using HCD panels.

To test the updated IODF using HCD, perform the following steps:

1. In the HCD entry panel, specify the production IODF to be tested.
2. Select option **2, Activate and process configuration data**.
3. In the next panel that is displayed, select either of the following options:
   - Option **6, Activate or verify configuration dynamically** for a single system
   - Option **7, Activate configuration sysplex-wide** for sysplex systems

     Option 7 operates on one system at a time only, and you have to log on to only one of these. HCD routes the appropriate ACTIVATE TEST system command to the systems to be tested.

   Figure 11-19 is the result of selecting option 6.

```
+---------------- Activate or Verify Configuration -----------------+
|                                                                   |
| The currently active IODF matches the hardware I/O                |
| configuration.  Both hardware and software definitions may be     |
| changed. Select one of the following tasks.                       |
|                                                                   |
| __  1.  Activate new hardware and software configuration.         |
|     2.  Activate software configuration only. Validate            |
|         hardware changes. Process changes to Coupling             |
|         Facility elements.                                        |
|     3.  Activate software configuration only.                     |
|     4.  Verify active configuration against system.               |
|     5.  Verify target configuration against system.               |
|     6.  Build CONFIGxx member.                                    |
|                                                                   |
+-------------------------------------------------------------------+
```

Figure 11-19 Test production IODF: Activate or Verify Configuration

4. Select the requested option. Activation of the hardware and software configuration must be performed on one system only on the processor to be tested, however the test can be performed on more than one system. The three activate options are similar but do have separate parameters.

> **Notes:** For the activate function on the Activate or Verify Configuration panel to be available, the highlevel of the new IODF must match the highlevel of the current IODF.
>
> For the verify function on the Activate or Verify Configuration panel to be available, the processor configuration from which the active IOCDS was build must match the configuration in the IODF used for IPL (token match)

Figure 11-20 shows that option 1 is selected.

```
+------------- Activate New Hardware and Software Configuration -------------+
|                                                                            |
| Specify or revise the values for IODF activation.                          |
|                                                                            |
| Currently active IODF . : SYS6.IODF26                                      |
|    Processor ID . . . . : SCZP101                                          |
|    Configuration ID . . : TEST3287     Test 3287 devices                   |
|    EDT ID . . . . . . . : 01                                               |
|                                                                            |
| IODF to be activated  . : SYS6.IODF27                                      |
|    Processor ID . . . . . SCZP101   +                                      |
|    Configuration ID . . . TEST3287  +     EDT ID . . . 01  +               |
|                                                                            |
| Test only  . . . . . . . . . . . . . . . . . . . . . Yes  (Yes or No)      |
| Allow hardware deletes (FORCE, FORCE=DEVICE) . . . . No   (Yes or No)      |
| Delete partition access to CHPIDs unconditionally                          |
| (FORCE=CANDIDATE)  . . . . . . . . . . . . . . . . . No   (Yes or No)      |
| Write IOCDS  . . . . . . . . . . . . . . . . . . . . No   (Yes or No)      |
| Switch IOCDS for next POR  . . . . . . . . . . . . . No   (Yes or No)      |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 11-20 Test production IODF: Activate Test New Hardware and Software Configuration

The Test only option must be Yes and the other four options do not apply to the test.

5. Press Enter. The following message is displayed and the session is locked until the test has completed:

`Activation in progress, please wait” messsage is displayed`

When the test completes the Message List panel is displayed, specifying the result of the test. The Message List corresponds to the IOS500I message when testing using the ACTIVATE system command. See Figure 11-21 on page 355.

```
+------------------------------- Message List --------------------------------+
|   Save  Query  Help                                                         |
| --------------------------------------------------------------------------  |
|                                                                Row 1 of 14 |
| Command ===> ___________________________________________ Scroll ===> CSR    |
|                                                                             |
| Messages are sorted by severity. Select one or more, then press Enter.      |
|                                                                             |
| / Sev Msg. ID  Message Text                                                 |
| _ I   IOS500I  ACTIVATE RESULTS                                             |
| #              TEST DETECTED NO CONDITIONS WHICH WOULD RESULT IN            |
| #              ACTIVATE FAILURE                                             |
| _ I            NOTE = 0112,REQUEST CONTAINS DELETE(S), SPECIFY FORCE ON     |
| #              H/W ACTIVATE                                                 |
| #               COMPID=SC1C3                                                |
| _ W   CBDA880I Dynamic activate request contains modifications to CF        |
| #              connections. Ensure that S/W changes are done prior to       |
| #              H/W changes.                                                 |
| _ I   CBDA883I Following control units are to be deleted from processor     |
| #              SCZP101: 1.FFFA,1.FFF8                                       |
| _ I   CBDA882I Following channel paths are to be modified for processor     |
| #              SCZP101: 1.EA,1.EC                                           |
| _ I   CBDA126I ACTIVATE IODF=25,TEST command was accepted.                  |
+-----------------------------------------------------------------------------+
```

Figure 11-21 Test production IODF: Message List

Use the Save option to save messages in your HCD message log data set. Use the Query option menu bar to view the HCD message log.

11.3 Activating a production IODF

The two ways of activating the updated production IODF on one or more active systems are as follows:

- Using the ACTIVATE system command
- Using the HCD panels

The advantage of using HCD compared to system commands is that more information is provided in a focal point. The disadvantage is that the 3270 session is locked while activation takes place. The lock issue does not apply to sysplex-wide activation using HCD panels, because this is based on routing system commands.

> **Attention:** Always test activation of the new updated IODF before activating the production IODF.

CHPIDs and devices that are added to the I/O configuration are dynamically offline after dynamic activation.

Activating needs exclusive EDT control. To complete a dynamic I/O production IODF activation, the I/O supervisor (IOS) must have exclusive control of the EDT.

If exclusive control cannot be obtained, the following message is issued:

```
IOS513E ACTIVATE STILL WAITING FOR THE OLD EDT TO BE DELETED / ISSUE 'D
IOS,CONFIG(EDT)' TO DETERMINE OUTSTANDING BINDS
```

Outstanding binds on the primary EDT is typically caused by requests for device resources that have not yet been replied to, such as the following IEF238D job name message:

```
REPLY DEVICE NAME OR CANCEL
```

11.3.1 Activating with a system command

This section explains how to dynamically activate I/O configuration updates using system commands.

Using the ACTIVATE system command

To activate the updated IODF by using the ACTIVATE system command, issue the command on each system on the processor to be updated.

Hardware and software updates

Use the command to activate hardware and software updates. The following command must be issued only on one system on the processor to be updated:

```
ACTIVATE IODF=xx
```

In the command, `IODF=xx` specifies the two-character suffix of the target IODF data set name (`highlevel.IODFxx`) that contains the configuration definition the system is to activate.

Updates to the IODF that include the deletion of one or more components might require the use of the FORCE parameter. This condition will be indicated as part of the IOS5OOI message that is issued during the ACTIVATE TEST command. Be aware that changing resources in HCD might result in resources to be deleted and added during activation.

Hardware and software updates including delete

Use the ACTIVATE command to activate hardware and software updates including delete operations. The following command must be issued on only one system on the processor to be updated:

```
ACTIVATE IODF=xx,FORCE
```

In the command, `IODF=xx` specifies the two-character suffix of the target IODF data set name (`highlevel.IODFxx`) that contains the configuration definition the system is to activate.

The FORCE parameter can be specified as in any of the following ways:

- FORCE
- FORCE=CANDIDATE
- FORCE=DEVICE
- FORCE=(CANDIDATE,DEVICE)

You have to specify the FORCE parameter in case NOTE=0112 was part of the IOS500I message result from the ACTIVATE TEST command. See *MVS System Commands,* SA22-7627 for details.

Hardware and software updates only

Use the ACTIVATE system command to activate software updates only. The following command must be issued on any other system to be updated on the processor:

```
ACTIVATE IODF=xx,SOFT
```

The result of the ACTIVATE command is an IOS500I message listing the IODF resources updated, added, and deleted.

Review the IOS500I messages carefully to make sure of the following information:

- The list includes intended updates only.
- The list does not include ONLINE CHPIDs or devices to be deleted.

A list of restrictions for the ACTIVATE command is in *Hardware Configuration Definition Planning,* GA22-7525. For a complete description of the ACTIVATE system command syntax and parameters, see *MVS System Commands,* SA22-7627.

> **Attention:** An ACTIVATE command may still be active as a task in IOSAS after the command task has been abended with a CMDS ABEND system command.
>
> HCD issues a CBDA009I message, if dynamic activation encounters a production IODF with multiple extents. Multiple extents will result in a wait state during IPL.

RACF considerations

Users must be granted UPDATE access to the `MVS.ACTIVATE` profile in the OPERCMDS class. This step applies to both ways of activating the updated production IODF.

To verify and manage resources that will be added, updated, or deleted, also grant the READ access for the CONFIG and VARY system commands in the OPERCMDS class.

For more RACF considerations including the need for access to the production IODF files and `SYS1.NUCLEUS`, see *Hardware Configuration Definition User's Guide,* SG33-7988.

11.3.2 Activating with HCD

This section explains how to dynamically activate I/O configuration updates by using HCD panels.

To activate the updated production IODF using HCD, perform the following steps:

1. In the HCD entry panel, specify the production IODF to be activated.
2. Select option **2, Activate and process configuration data**.
3. In the next panel that is display, select either of the following options:
   - Option **6, Activate or verify configuration dynamically** for single systems
   - Option **7, Activate configuration sysplex-wide** for sysplex systems

     Option 7 operates on one system at a time only, and you have to log on to only one of these. HCD routes the appropriate ACTIVATE system command to the systems to be updated.

   Figure 11-22 on page 358 shows that option 6 is selected.

```
+---------------- Activate or Verify Configuration ----------------+
|                                                                   |
| The currently active IODF matches the hardware I/O                |
| configuration.  Both hardware and software definitions may be     |
| changed. Select one of the following tasks.                       |
|                                                                   |
| __  1.  Activate new hardware and software configuration.         |
|     2.  Activate software configuration only. Validate            |
|         hardware changes. Process changes to Coupling             |
|         Facility elements.                                        |
|     3.  Activate software configuration only.                     |
|     4.  Verify active configuration against system.               |
|     5.  Verify target configuration against system.               |
|     6.  Build CONFIGxx member.                                    |
|                                                                   |
+-------------------------------------------------------------------+
```

Figure 11-22 Activate production IODF: Activate or verify Configuration

4. Select the requested option. Activation of the hardware and software configuration must be performed on only one system on the processor to be updated. The three activate options are similar but do have separate parameters.

   Figure 11-23 shows that option 1 is selected.

```
+------------- Activate New Hardware and Software Configuration -------------+
|                                                                            |
| Specify or revise the values for IODF activation.                          |
|                                                                            |
| Currently active IODF . : SYS6.IODF26                                      |
|    Processor ID . . . . : SCZP101                                          |
|    Configuration ID . . : TEST3287     Test 3287 devices                   |
|    EDT ID . . . . . . . : 01                                               |
|                                                                            |
| IODF to be activated  . : SYS6.IODF27                                      |
|    Processor ID . . . . . SCZP101   +                                      |
|    Configuration ID . . . TEST3287  +     EDT ID . . . 01  +               |
|                                                                            |
| Test only  . . . . . . . . . . . . . . . . . . . . . . No   (Yes or No)    |
| Allow hardware deletes (FORCE, FORCE=DEVICE) . . . . No   (Yes or No)      |
| Delete partition access to CHPIDs unconditionally                          |
| (FORCE=CANDIDATE)  . . . . . . . . . . . . . . . . . . No   (Yes or No)    |
| Write IOCDS  . . . . . . . . . . . . . . . . . . . . . No   (Yes or No)    |
| Switch IOCDS for next POR  . . . . . . . . . . . . . . No   (Yes or No)    |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 11-23 Activate production IODF: Activate New Hardware and Software Configuration

Note the following information about the options:

- The “Allow hardware deletes” and “Delete partition access to CHPIDs unconditionally” correspond to specifying the FORCE parameter on the ACTIVATE system command.
- The Write IOCDS option provides the Build IOCDSs panel *after* successfully activating the IODF.

  Switching the IOCDS for the next POR must be done *after* successfully activating the IODF and after successfully writing the IOCDS. If Yes has been specified for both the Write IOCDS and the Switch IOCDS options, the switch will take place after the write has completed.

See 11.4, “Writing IODF to IOCDS on SE” on page 359 for more information about writing an IOCDS and updating the HMC reset profile.

11.4 Writing IODF to IOCDS on SE

When a production IODF has been built, you may write an IOCDS (it can only be written if built from a production IODF). Writing an updated IOCDS is required in order to keep the active I/O configuration synchronized with the IOCDS, enabling you to do power-on resets and more dynamic I/O configuration updates.

The two ways to build an IOCDS are as follows:

- Use HCD option 2.2 (for processors *without* a network address specified)
- Use HCD option 2.11 (for processors *with* a network address specified).

Either method submits a batch job using the CBDJIOCP JCL procedure installed as part of the HCD product. The batch job can be submitted manually by supplying parameters required.

Before updating the IOCDS, identify the IOCDS already used on the processor. Be sure to update another IOCDS than the current one for fallback and backup purposes. Furthermore, disabling write protection and updating the current active IOCDS can cause a 209x processor to call home.

For a description of how to identify the currently active IOCDS, see 11.4.1, “Using HCD option 2.2” on page 359 and 11.4.2, “Using HCD option 2.11” on page 361.

11.4.1 Using HCD option 2.2

To use HCD option 2.2, perform the following steps:

1. In the HCD entry panel, specify the production IODF and select option **2, Activate and process configuration data**.
2. Select option **2, Build IOCDS**. Use this option only for processors that do not have an SNA address specified.

Identifying the currently active IOCDS

After selecting the processor using the `S` line-command, a list of the processor IOCDSs is displayed. See Figure 11-24 on page 360.

```
+--------------------------- IOCDS List ----------------------------+
|   Goto  Backup  Query  Help                                        |
| ---------------------------------------------------------------- |
|                                                          Row 1 of 4 |
| Command ===> _________________________________ Scroll ===> PAGE   |
|                                                                    |
| Select one or more IOCDSs, then press Enter.                       |
|                                                                    |
| Processor ID . . : SCZP101                                         |
|                                                                    |
|                          --Last IOCDS Update--                     |
| / IOCDS  Name     Format  Date         Time                        |
| _ A0     IODF23   LPAR    2009-09-22   14:09:08                    |
| _ A1     IODF24   LPAR    2009-10-02   17:42:05                    |
| _ A2     IODF26   LPAR    2009-10-05   14:44:36                    |
| _ A3     IODF22   LPAR    2009-09-18   11:13:45                    |
| ************************ Bottom of data ************************* |
|                                                                    |
+--------------------------------------------------------------------+
```

Figure 11-24   Write IODF: IOCDS List using HCD option 2.2

Use the Name column, Date, and Time stamps to identify the currently active IOCDS.

Update the IOCDS using HCD option 2.2

Select the IOCDS to be updated and use **U** line-command to open the Build IOCDS panel, shown in Figure 11-25.

```
+------------------------------- Build IOCDS --------------------------------+
|                                                                            |
| Specify or revise the following values.                                    |
|                                                                            |
| IODF name . . . . . . . . . : 'SYS6.IODF25'                                |
| Processor ID  . . . . . . . : ISGSYN       IOCDS  : A0                     |
|                                                                            |
| Title1  . ________________________________________________________________ |
| Title2  : SYS6.IODF25 - 2009-10-02 18:49                                   |
|                                                                            |
| Dualwrite  . . . . . . . . . . . . . . No         Remote Write   No        |
| Switch IOCDS for next POR  . . . . . . No                                  |
| Write IOCDS in preparation of upgrade  No                                  |
|                                                                            |
| Job statement information                                                  |
| //WIOCDS  JOB (ACCOUNT),'NAME'                                             |
| //*                                                                        |
| //*                                                                        |
|                                                                            |
+----------------------------------------------------------------------------+
```

Figure 11-25   Write IODF: Build IOCDS using HCD option 2.2

The Title1 option is where you specify a title for the updated IOCDS. The title becomes available in HCD and in the HMC console. However, because both the HCD and HMC console fields are short, consider using titles that are a maximum of eight characters. The Title1 field is presented in the Name column shown in Figure 11-24 on page 360.

You may use the “Write IOCDS in preparation for upgrade” option to bypass HCD processor verification, for example enabling you to write an IOCDS for a 2097 processor on a 2094 processor.

If a SNA address Network name and CPC name is specified for the processor in the production IODF, the Remote Write option will, by default, be Yes causing HCD to use the SNA address for the IOCDS write operation. This approach corresponds to using HCD option 2.11.

RACF considerations

Users must be granted UPDATE access to the `CBD.CPC.IOCDS` profile in the FACILITY class. For more RACF considerations, see *Hardware Configuration Definition User's Guide,* SG33-7988.

11.4.2 Using HCD option 2.11

To specify the production IODF, perform the following steps:

1. In the HCD entry panel, select option **2, Activate and process configuration data**.
2. Select option **11, Build and manage S/390 microprocessor IOCDSs and IPL attributes**. Use this option for processors that have an SNA address specified.

These steps are a way of updating the IOCDS because HCD option 2.11 provides you with more information than HCD option 2.2.

Identifying the currently active IOCDS

To identify the currently active IOCDS, perform the following steps:

1. Select the processor by using the **S** line-command. A list of the processor IOCDSs is displayed, as shown in Figure 11-26.

```
IOCDS List          Row 1 of 4 More:       >
Command ===> ______________________________________________ Scroll ===> PAGE

Select one or a group of IOCDSs, then press Enter.

                                         -----Token Match----- Write
/ IOCDS       Name     Type   Status     IOCDS/HSA IOCDS/Proc. Protect
_ A0.SCZP101  IODF23   LPAR   Alternate  No        No          No
_ A1.SCZP101  IODF24   LPAR   Alternate  No        No          No
_ A2.SCZP101  IODF26   LPAR   POR        Yes       Yes         Yes-POR
_ A3.SCZP101  IODF22   LPAR   Alternate  No        No          No
```

Figure 11-26 Write IODF: IOCDS list using HCD option 2.11

2. Use the Token Match columns to identify the currently active IOCDS. Scroll to the right for details about the IODFs that has been used for writing the individual IOCDSs including the date and time of the IOCDS updates.

3. Be sure to write-protect the currently active IOCDS. Enabling and disabling write protection is done using line commands on the IOCDS list panel. See Figure 11-27 on page 362.

```
IOCDS List          Row 1 of 4 More: <
Command ===> _______________________________________________ Scroll ===> PAGE

Select one or a group of IOCDSs, then press Enter.

              --Last Update--
/ IOCDS       Date        Time  IOCDS Configuration Token Information
_ A0.SCZP101  2009-09-22  14:09 SCZP101  16:51:01 09-07-30 SYS6     IODF23
_ A1.SCZP101  2009-10-02  17:42 SCZP101  16:45:24 09-10-02 SYS6     IODF24
_ A2.SCZP101  2009-10-05  14:44 SCZP101  20:31:13 09-10-04 SYS6     IODF26
_ A3.SCZP101  2009-09-18  11:13 SCZP101  16:51:01 09-07-30 SYS6     IODF22
```

Figure 11-27 Write IODF: IOCDS List using HCD option 2.11, scroll to the right

4. Select the IOCDS to be updated and use **U** line-command to open the Build IOCDS panel, as shown in Figure 11-28.

```
+------------------------------- Build IOCDSs --------------------------------+
|                                                                  Row 1 of 1 |
| Command ===> ___________________________________________ Scroll ===> PAGE   |
|                                                                             |
| Specify or revise the following values.                                    |
|                                                                             |
| IODF name . . . . . . . . . : 'SYS6.IODF25'                                 |
|                                                                             |
| Title1 . ________________________________________________________________  |
| Title2 : SYS6.IODF25 - 2009-10-02 18:49                                     |
|                                                                             |
|                           Write IOCDS in                                    |
| IOCDS        Switch IOCDS preparation of upgrade                            |
| A1.SCZP101   No           No                                                |
| ***************************** Bottom of data ****************************** |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Figure 11-28 Write IODF: Build IOCDS using HCD option 2.11

The Title1 option is where you can specify a title for the updated IOCDS. The title will be available in HCD and on the HMC console. However, because both the HCD and HMC console fields are short, consider using titles that have a maximum of eight characters. The Title1 field is presented in the Name column shown in Figure 11-26 on page 361.

5. A batch job is submitted. Leave the production IODF to allow the batch job to update the production IODF, otherwise the job completes with return code 04 and the CBDA695I message.

RACF considerations

Users must be granted UPDATE access to the `CBD.CPC.IOCDS` profile in the FACILITY class. For more RACF considerations, see *Hardware Configuration Definition User's Guide,* SG33-7988.

11.5 Switching IOCDS for next power-on reset

After writing the updated production IODF to the IOCDS on the SE, switch the IOCDS for the next power-on reset.

When doing a power-on reset, the IOCDS that is selected is either the IOCDS that is specified for the next power-on reset using the ACTIVATE system command or the HCD panels, or the IOCDS that is specified in the HMC reset profile is used. Because the IOCDS includes a token, the IOCDS selected might also select the production IODF to be used for IPLs of images on the server.

11.5.1 Use active IOCDS

The two ways of switching the active IOCDS dynamically are as followings:

- Using the ACTIVATE system command
- Using the HCD panels

In order to switch the IOCDS for next power-on reset dynamically, the Use active IOCDS option must be selected in the HMC reset profile. See 11.5.2, "Updating the HMC reset profile" on page 364 for a description on how to view and update the HMC reset profile.

Using the ACTIVATE system command

To switch the IOCDS used for the next power-on reset, issue the ACTIVATE system command on a system on the processor.

The following command to switches IOCDS used for next power-on reset and must be issued on only one system on the processor to be updated:

```
ACTIVATE ACTIOCDS=xx
```

In the command, `ACTIOCDS=xx` specifies the IOCDS to be used for the next power-on reset.

An IOS500I message is written. It indicates the result of the command.

Using the HCD panels

Switching the IOCDS for the next power-on reset with HCD can be performed by using other panels. In this example, HCD option 2.11 is used because provides token information and displays the IOCDS the currently selected for the next power-on reset.

To use the HCD panels, perform the following steps:

1. In the HCD entry panel, select option **2, Activate and process configuration data**.
2. Select option **11, Build and manage S/390 microprocessor IOCDSs and IPL attributes**.
3. Select the processor and the Work with IOCDSs option.

   In this example, the A2 IOCDS is currently selected for the next power-on reset (the Status column). See Figure 11-29 on page 364.

```
IOCDS List          Row 1 of 4 More:       >
Command ===> ________________________________________________ Scroll ===> CSR

Select one or a group of IOCDSs, then press Enter.

                                        -----Token Match----- Write
/ IOCDS       Name     Type   Status     IOCDS/HSA IOCDS/Proc. Protect
_ A0.SCZP201  IODF23   LPAR   Alternate  No        No          No
_ A1.SCZP201  IODF24   LPAR   Alternate  No        No          No
_ A2.SCZP201  IODF26   LPAR   POR        Yes       Yes         Yes-POR
_ A3.SCZP201  09100426 LPAR   Alternate  Yes       Yes         No
```

Figure 11-29 Switch IOCDS: IOCDS List POR status

In order to switch the IOCDS to be used for next power-on reset the IOCDS token must match the token in HSA (the corresponding production IODF must be activated).

To switch the IOCDS to be used for the next power-on reset, select the IOCDS and the **Switch IOCDS** option. The Status column is updated to specify POR for the IOCDS selected.

11.5.2 Updating the HMC reset profile

To select an updated IOCDS by using the HMC reset profile, you must have access to the HMC either physical or through the Web interface. You also must have an HMC user ID with the authority of *operator* or higher.

The HMC reset profile includes a pointer to the currently active IOCDS. When a power-on reset is done on the processor, the IOCDS is read into HSA including the token pointing to the corresponding IODF. In case the HMC reset profile is *not* updated before power-on reset, the processor uses a back-level I/O configuration after power-on reset.

The HMC can operate in either *Tree* mode or *Classic* style (icons). The following steps describe the HMC Web interface operating in Tree mode:

1. Log on to the HMC Web interface, shown in Figure 11-30.

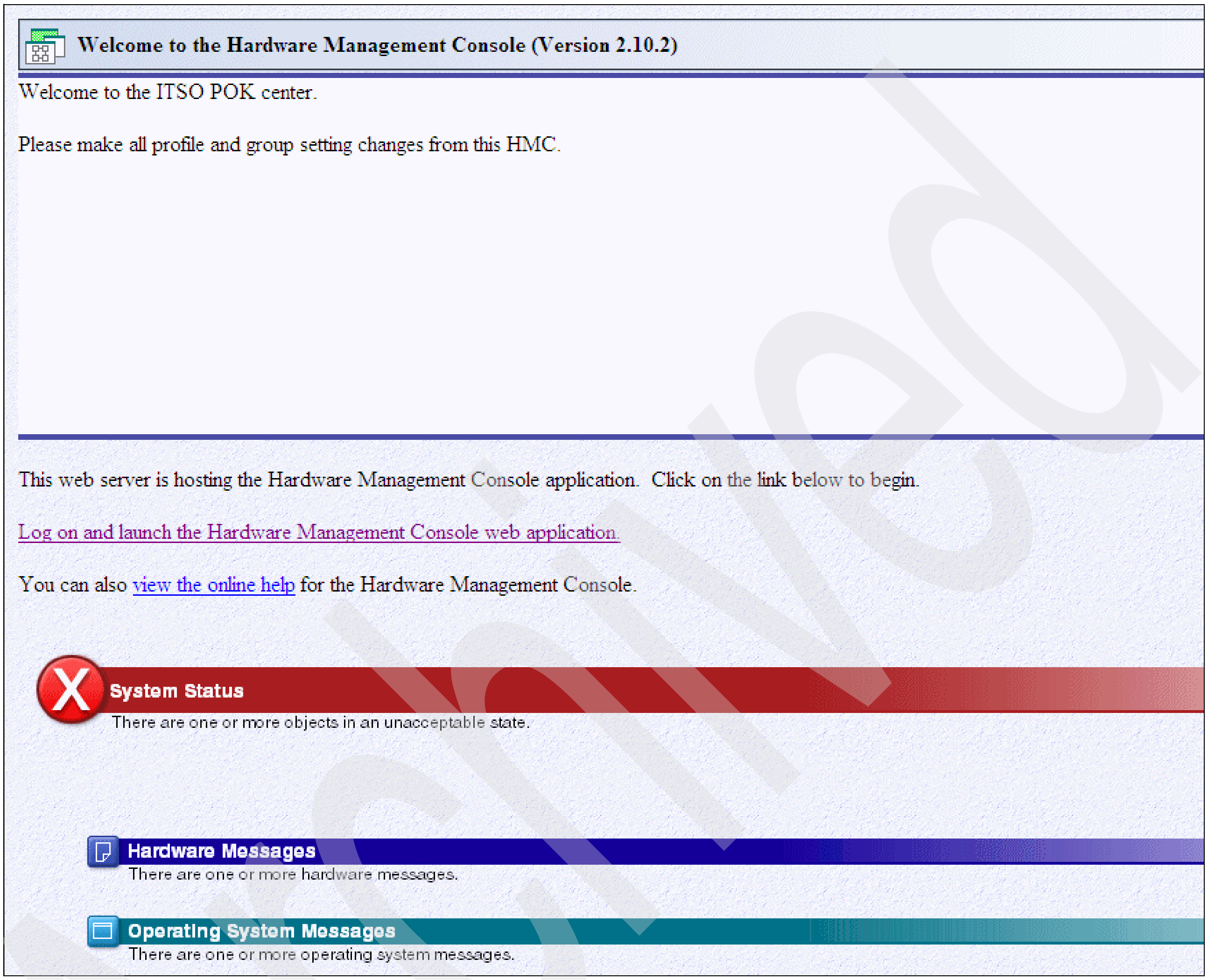


Figure 11-30 HMC Web Interface Logon

2. Select **Log on and launch the Hardware Management Console Web application**. A dialog box opens.
3. Enter user ID and password, and then click **Logon**. See Figure 11-31.

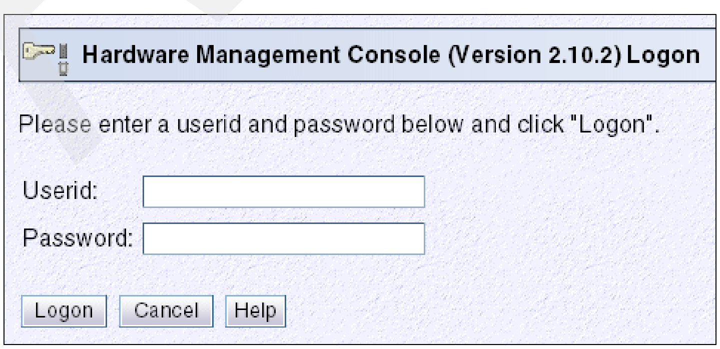


Figure 11-31 HMC Web Interface Userid and Password

You are now logged on to the HMC and the main window opens. See Figure 11-32.

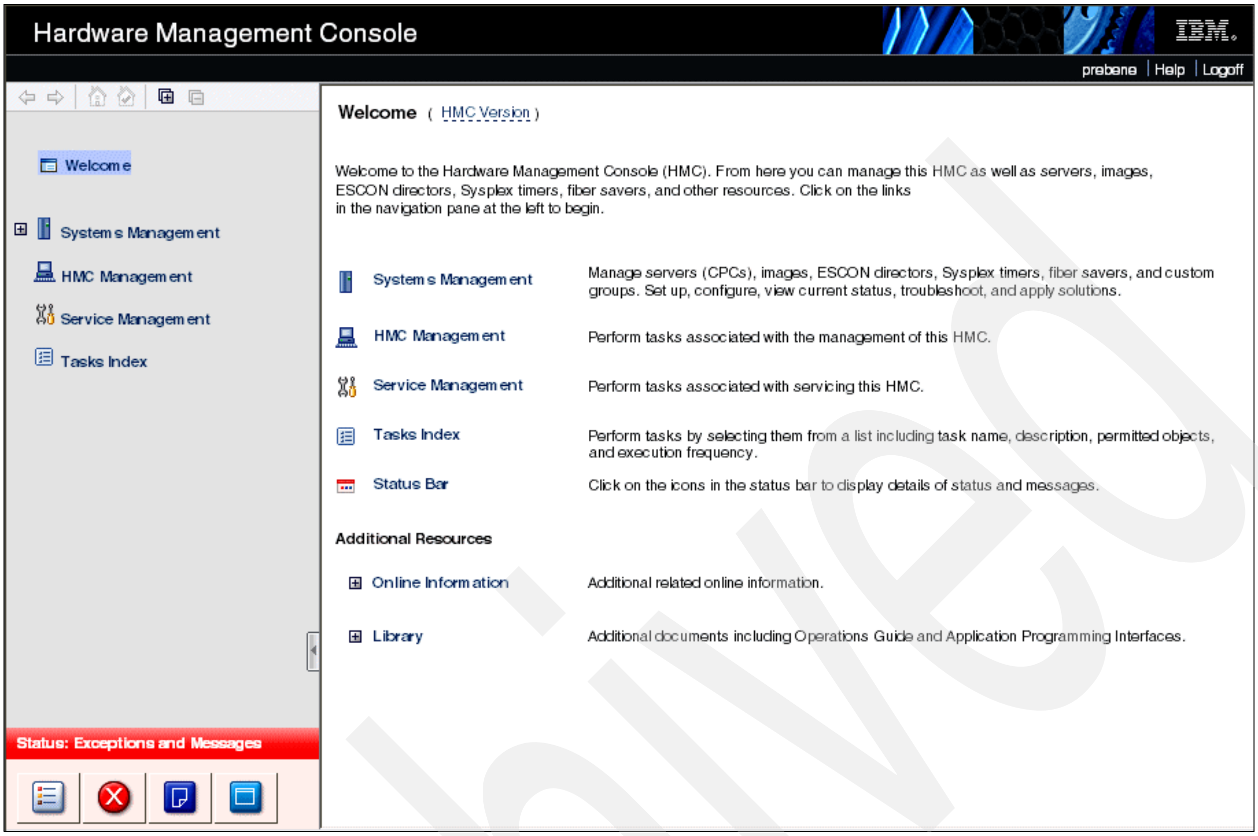


Figure 11-32 HMC Web interface main window

We are ready to find and update the HMC reset profile for the processor. There are several ways to get to the image profiles. This example includes only one.

4. Select **Systems Management**, and then select **Servers**. See Figure 11-33.

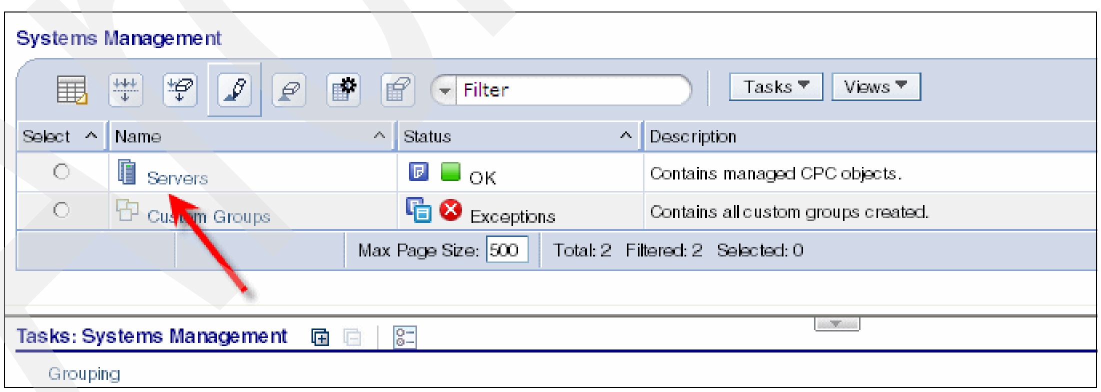


Figure 11-33 HMC Web interface Systems Management

5. Select the processor that needs to have its IOCDS pointer updated. See Figure 11-34 on page 367.

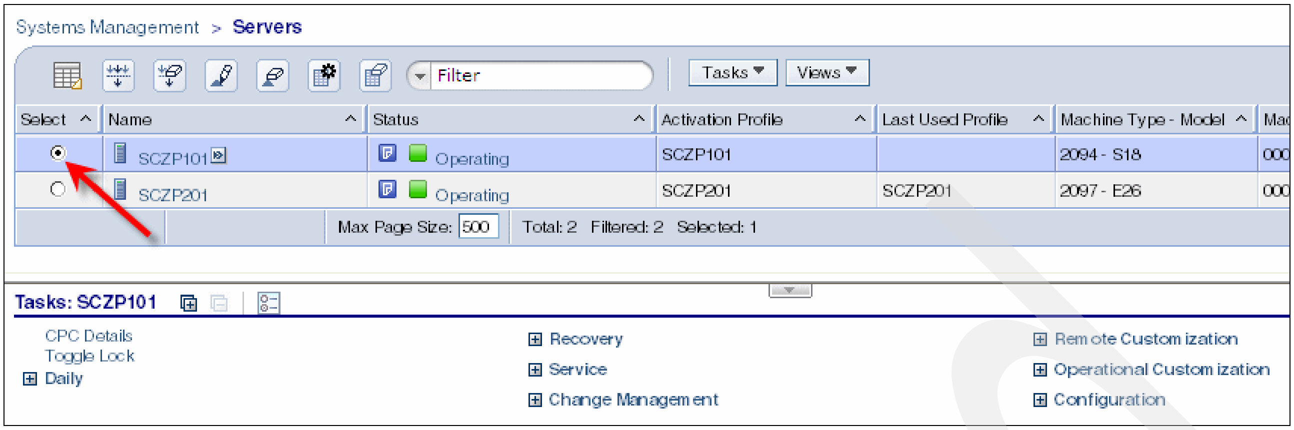


Figure 11-34 HMC Web interface select server

Be sure to note the HMC reset profile that is used for the server. The profile name is specified in the Activation Profile column. In this case, the HMC reset profile is SCZP101, as with the server name.

6. If you want to specify another HMC reset profile to be used for next power-on reset, double-click the server name to view the server details, then select the **Change Options** button. Specifying another HMC reset profile for next power-on reset is not described further in this chapter.
7. Select **Operational Customization** → **Customize/Delete activation profiles** option. The window shown in Figure 11-35 opens.

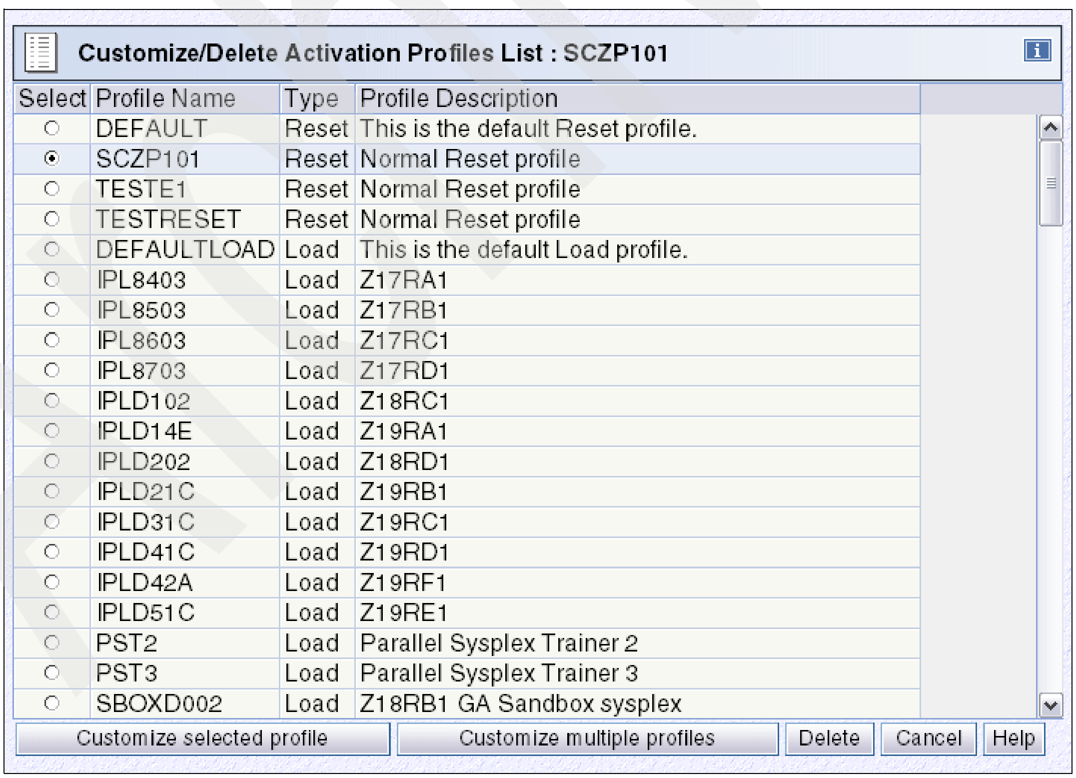


Figure 11-35 HMC Web interface profile list

8. Select the HMC reset profile used for the server and click **Customize selected profile**.

The HMC reset profile contains options for the server plus all the HMC image profiles for the logical partitions on the server. See Figure 11-36.

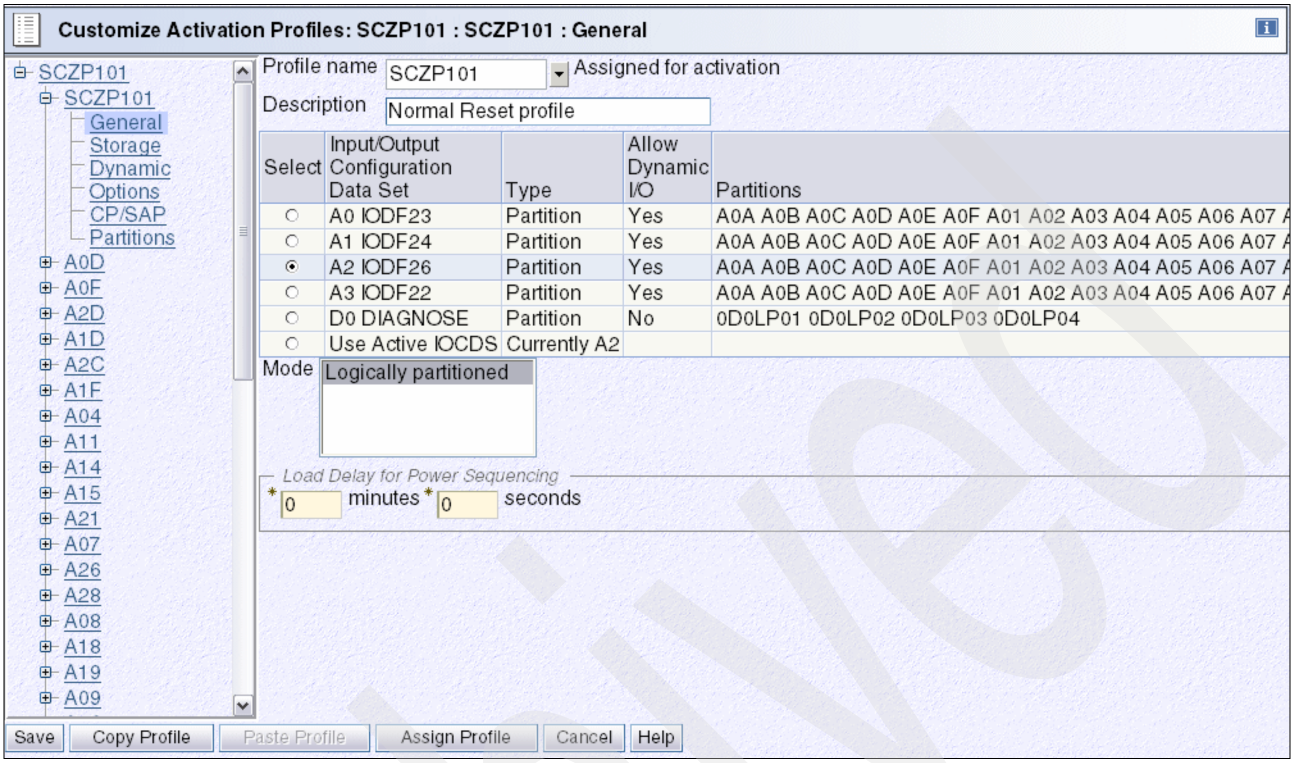


Figure 11-36 HMC Web Interface Server General

9. Select the input/output configuration data set (IOCDS) that you updated and then click **Save**.

   In this example, IOCDS A2 is currently selected. The text in the Input/Output Configuration Data Set column (IODF26 in this example) is the Title1 text that you specified when you used the production IODF to write an IOCDS to the SE.

10. To manage the current IOCDS dynamically, select the **Use Active IOCDS** option. See 11.5, “Switching IOCDS for next power-on reset” on page 363 for a description of how to switch the current IOCDS dynamically.

11. Click Save to save the profile.

12. After saving the updated profile, click **Cancel** to leave the profile.

13. Consider documenting the current IOCDS. Operators, hardware technicians, and others might need this information. Pointers to profiles might be reset and the reset profile might be updated as part of other hardware activities.

The HMC reset profile has now been updated to use the IOCDS that was updated by you for the next power-on reset.

11.6 LOADxx members

LOADxx members are used for a number of various statements. The only statement described in this section is the IODF statement that is used for I/O configuration parameters. For details about other statements in the LOADxx member, see *MVS Initialization and Tuning Reference,* SA22-7592.

You can place LOADxx members in `SYSn.IPLPARM` or `SYS1.PARMLIB`. For details, see either *MVS Initialization and Tuning Reference,* SA22-7592 or *Hardware Configuration Definition User's Guide,* SG33-7988. The LOADxx member is used during IPL only.

The IODF statement identifies the production IODF data set that contains the information about the I/O configuration defined to your system. Figure 11-37 shows the IODF statement in a LOADxx member.

```
----+----1----+----2----+----3----+----4----+----5----+----6----+----7--
IODF     ** SYS6     OSSYS1PR 01 Y 0
```

Figure 11-37 LOADxx: IODF statement example

The columns in the IODF statement are as follows

- Columns 1 - 4 must be IODF.
- Columns 10 - 11 identify the IODF suffix.
- Columns 13 - 20 identify the production IODF data set highlevel.
- Columns 22 - 29 identify the OS Configuration ID.
- Columns 31 - 32 identify the EDT ID defined in the OS Configuration.
- Column 34 identifies whether the system is to load all supported device support modules or only device support modules for devices currently defined:
  - The "Y" indicates loading all supported modules.
  - Any other character indicates loading modules for defined devices only.
- Column 36 identifies subchannel set ID for devices used for IPL:
  - Specify `0` (zero) to use a normal base device in subchannel set 0 for IPL (such as device type 3390B).
  - Specify `1` to use a special secondary device in subchannel 1 for IPL (device type 3390D).

  If duplicate device addresses are present in the Operating System Configuration specified, and the subchannel set ID is not specified in the IODF statement, the operator is prompted to specify the subchannel set ID to be used for IPL.

  The *MVS Initialization and Tuning Reference,* SA22-7592 manual describes that the subchannel set can be specified in the LOADxx members by using the SCHSET statement. However, APAR OA28336 indicates that this is not connect, and column 36 in the IODF statement must be used.

If asterisks (**), pluses (++), minuses (--), or equals (==) is not specified in the LOADxx member IODF suffix (IODF statement columns 10 - 11), update the number to the activated production IODF suffix.

Specify two asterisks (**), two plus signs (++), two minus signs (--), or two equal signs (==) as the IODF suffix, causing the system to use the number found in the hardware token. This approach helps you to keep the I/O configuration synchronized, enabling you to perform dynamic I/O configuration updates. Furthermore, the requirements for updating LOADxx members are reduced.

Consider creating a backup member that points to the old production IODF or a backup IODF. This step enables you to perform a system IPL by using the old production IODF. However, using the old production IODF for the IPL does not back out hardware configuration updates and can cause an out-of-sync condition for the system in question.

Backup considerations

Consider the following backup information:

- Be sure to maintain a backup copy of your production IODF on a separate volume, which is accessible from all systems that will be sharing the backup. When the primary IODF volume is inaccessible or the IODF itself is corrupted, an IPL of the system can be performed by using the backup production IODF on the backup volume.
- Be sure to maintain a backup copy of your `SYSx.IPLPARM` data set on the volume that is used for the production IODF backup. Use the `SYSx.IPLPARM` data set name for your backup so that you are able to perform an IPL by using the backup production IODF and `SYSx.IPLPARM` data set simply by specifying another Load parameter for IPL.

RACF considerations

Users must be granted UPDATE access to the data set used for the LOADxx member.

11.7 IPL parameters

IPL parameters include the IPL address and the Load parameter pointing to the IODF volume and the LOADxx member in the `SYSx.IPLPARM` data set.

IPL parameters can be specified in the HMC image profiles, multiple HMC Load profiles, HMC load option, GDPS panels or using HCD option 2.11.

When specifying IPL parameters in the HMC image profile or in HMC Load profiles, the IPL parameters are syncronized between the HMC consoles in the network. The HMC image profile is a single profile for the partition; the HMC Load profiles can be used by several partitions.

If IPL parameters are static, consider using the HMC image profile. If IPL parameters change, consider using HMC Load profiles. For information about specifying IPL parameters in GDPS panels, see *GDPS/PPRC V3V6 Installation and Customization Guide*, ZG24-6703.

Using HCD for managing IPL parameters

To manage IPL parameter with HCD, perform the following steps:

1. On the HCD entry panel select option **2, Activate or process configuration data**. You can specify any work or production IODF for this, because the IODF data set is used only for listing the processors for which the IPL parameters are to be managed. Therefore the IODF must include the processors (SNA address, Network name and CPC name).
2. Select option **11, Build and manage S/390 microprocessor IOCDSs and IPL attributes**.

3. Select the processor and the Work with IPL attributes option.

   A partition list for the processor selected is displayed, as shown in Figure 11-38.

```
IPL Attribute List     Row 1 of 45 More:       >
Command ===> _______________________________________________ Scroll ===> CSR

Update the values to be used for the next IPL and press Enter. To view the
values used for the last IPL, scroll to the right.

                                    -----------Next IPLPARM------------
Processor  Partition  Next IPLADDR  IODF    LOADxx  Prompt/Msg  Nucleus
ID         Name       IPL Device    Device  Suffix  Option      Suffix
SCZP101    A0A        0000          ____    __      _           _
SCZP101    A0B        0000          ____    __      _           _
SCZP101    A0C        0000          ____    __      _           _
SCZP101    A0D        0000          ____    __      _           _
SCZP101    A0E        0000          ____    __      _           _
SCZP101    A0F        0000          ____    __      _           _
```

Figure 11-38 IPL Attribute List: Next IPL

4. Scroll to the right to view parameters used for the last IPL. See Figure 11-39. The parameters are obtained from the SE.

```
IPL Attribute List     Row 1 of 45 More: <
Command ===> _______________________________________________ Scroll ===> CSR

View the values used for the last IPL.


                                    -----------Last IPLPARM------------
Processor  Partition  Last IPLADDR  IODF    LOADxx  Prompt/Msg  Nucleus
ID         Name       IPL Device    Device  Suffix  Option      Suffix
SCZP101    A0A        D41C          C730    R2      M           1
SCZP101    A0B        6700          6707    01      M           1
SCZP101    A0C        0000
SCZP101    A0D        0000
SCZP101    A0E        0000
SCZP101    A0F        0000
```

Figure 11-39 IPL Attribute List: Last IPL

To specify IPL parameters for the next IPL, simply type in the updated values in the Next IPLADDR column, the Next IPLPARM column, or both columns. You can specify the IPL address, the IPL parameters or both. When specifying the IPL parameters you must specify all required parameters. The updated parameters are stored on the SE.

To use the values updated using HCD and stored on the SE, you must update the HMC image or the HMC load profile used. See Figure 11-40 on page 372.

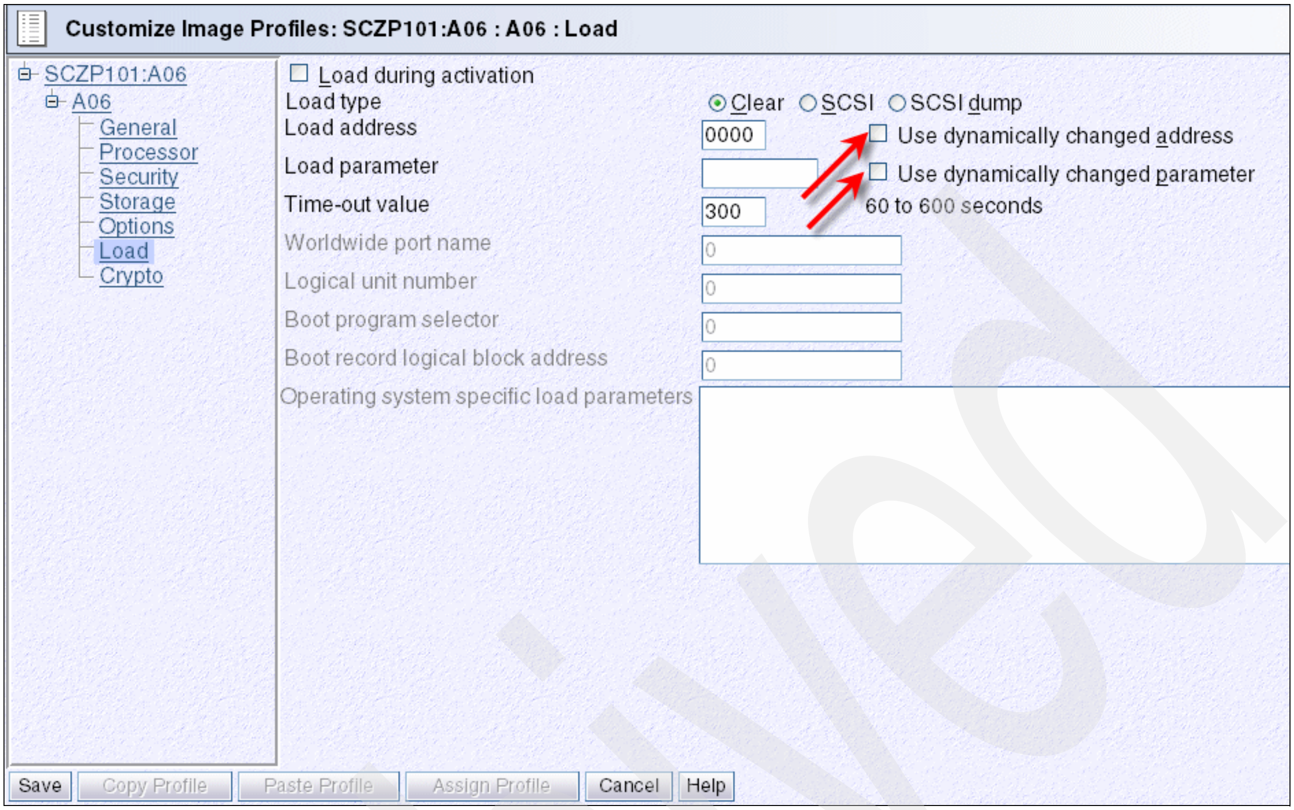


Figure 11-40 HMC Image profile: Dynamically changed

5. Select one of the following check boxes:
   - **Use dynamically changed address**: Select this option if the IPL address is to be maintained using HCD.
   - **Use dynamically changed parameter**: Select this option if the IPL parameters are to be maintained using HCD.

   Similar options are available on the HMC Load profiles.

   When selecting the options, the corresponding Load address and Load parameter fields in the HMC profiles become locked, and you can no longer view or update them by using HMC.

Consider how operators are to view current or specify alternative IPL addresses or IPL parameters in case of fallback. Other Load profiles can be used or operators can deselect the options and type in IPL Address and IPL parameters as specified in documentation.

11.8 Sysplex considerations

Before updating the I/O configuration of a sysplex, verify that all systems in the sysplex are using the same production IODF:

1. In the HCD entry panel, select **Activate or process configuration data**.
2. Select option **7, Activate configuration sysplex wide**. See Figure 11-41 on page 373.

```
Active Sysplex Member List                Row 1 of 4
Command ===> _______________________________________________ Scroll ===> PAGE

Select one or more systems, then press Enter. To refresh the Activate/Verify
Status, press Enter without selections made.

IODF to be activated: SYS6.IODF25
Active sysplex  . . : SANDBOX

  System   Processor Partition Active         Config.  EDT Act./Verify
/ Name     ID        Name      IODF           ID       ID  Status
_ SC63     SCZP101   A04       SYS6.IODF26    TEST3287 01
_ SC64     SCZP101   A06       SYS6.IODF26    TEST3287 01
_ SC65     SCZP101   A11       SYS6.IODF26    TEST3287 01
_ SC70     SCZP101   A16       SYS6.IODF26    TEST3287 01
```

Figure 11-41 Activate production IODF: Activate configuration sysplex wide

In this example all systems in the sysplex are placed on the SCZP101 processor, using production IODF SYS6.IODF26, and the TEST3287 OS configuration. If systems are not using the same production IODF, be aware that updates to the configuration might not be identical for all systems in the sysplex. Identify the reason for not using the same IODF for all systems.

Be sure to use a single production IODF for all systems in a sysplex, regardless of the number of processors used.

12

Exploiting additional features

Many additional features are available in HCD that we have not discussed yet. In this chapter, we discuss several of those features and how to implement them.

- Migrating I/O configuration statements
- HCD LDAP support
- HCD reporting and connectivity report
- HCD interface to the CHPID Mapping Tool (CMT)
- HCD filtering
- HCD generation of WWPN input file
- HCD configuration packages
- Repair action for an IODF
- Exploitation of subchannel set 1
- HyperPAV
- CMT CU Report shows hardware view

12.1 Migrating I/O configuration statements

HCD allows you to migrate existing configuration data that was defined in IOCP, MVSCP, and HCPRIO input data sets to an IODF.

Use one of the following data sets as input:

- IOCP input data set
- MVSCP input data set
- HCPRIO input data set

You can also use the migration to create I/O definitions by editing control statements. Data sets containing the statements that correspond to a specific IODF can be generated by using a batch utility.

When migrating from input data sets, HCD checks the syntax of the input statements and runs a validation process, which checks that the definitions being migrated do not conflict with the I/O configuration rules and existing definitions in the IODF, or with other definitions being migrated. If HCD detects an error in the input data sets, it issues messages after the migration process has ended.

Before starting the migration, you need a work IODF. You can create a new work IODF or use an existing one.

To migrate I/O config statements, perform the following steps:

1. On the Primary Task Selection panel enter the name of the IODF to which you want to migrate your input data sets.
2. Select option **5 Migrate configuration data**. See Figure 12-1.

```
 z/OS V1.11 HCD
Command ===> ______________________________________________________

                          Hardware Configuration

Select one of the following.

5   0.  Edit profile options
    1.  Define, modify, or view configuration data
    2.  Activate or process configuration data
    3.  Print or compare configuration data
    4.  Create or view graphical configuration report
    5.  Migrate configuration data
    6.  Maintain I/O definition files
    7.  Query supported hardware and installed UIMs
    8.  Getting started with this dialog
    9.  What's new in this release

For options 1 to 5, specify the name of the IODF to be used.

I/O definition file . . . 'SYS6.IODF26.WORK'                     +
```

Figure 12-1 Migrate configuration data

If you create a new work IODF, a panel opens, shown in Figure 12-2, on which you have to enter IODF specifications.

```
z/OS V1.11 HCD
+----------- Migrate Configuration Data ------------+
|                                                   |
|                                                   |
| Select one of the following tasks.                |
|                                                   |
| 1_  1.  Migrate IOCP/OS data                      |
|     2.  Migrate switch configuration data         |
|                                                   |
|  F1=Help     F2=Split    F3=Exit     F9=Swap      |
| F12=Cancel                                        |
+---------------------------------------------------+
```

Figure 12-2 Migrate Configuration Data Options

3. Select **1, Migrate IOCP/OS data**. The Migrate IOCP / MVSCP / HCPRIO Data panel opens. See Figure 12-3.

```
+-------------------- Migrate IOCP / MVSCP / HCPRIO Data ---------------------+
|                                                                             |
|                                                                             |
| Specify or revise the following values.                                     |
|                                                                             |
| Processor ID . . . . . . . . . . . . ________  +   CSS ID . . . . . . . _  + |
| OS configuration ID  . . . . . . . . ________  +                            |
|                                                                             |
| Combined IOCP/MVSCP input data set . ____________________________________   |
| IOCP only input data set . . . . . . ____________________________________   |
| MVSCP only or HCPRIO input data set  ____________________________________   |
|            Associated with processor ________  +                            |
|                            partition ________  +                            |
| Processing mode  . . . . . . . . . . 2   1.  Validate                       |
|                                          2.  Save                           |
|                                                                             |
| Migrate options  . . . . . . . . . . 1   1.  Complete                       |
|                                          2.  Incremental                    |
|                                          3.  PCHIDs                         |
| MACLIB used  . . . . . . . . 'SYS1.MACLIB'                                  |
| Volume serial number . . . ______  + (if not cataloged)                     |
|                                                                             |
|  F1=Help     F2=Split    F3=Exit     F4=Prompt   F9=Swap    F12=Cancel      |
+-----------------------------------------------------------------------------+
```

Figure 12-3 Migrate IOCP / MVSCP / HCPRIO Data

4. In the Migrate Configuration Data panel (shown in Figure 12-2), select option **2, Migrate switch configuration data** to open the Migrate Switch Configuration Data panel. See Figure 12-4 on page 378.

```
+--------- Migrate Switch Configuration Data ---------+
|                                                    |
|                                                    |
| Migrate switch configuration definitions to:       |
|                                                    |
| Switch ID . . . . . . . . . . . . . . __  +        |
| Switch configuration ID . . . . . . ________  +    |
|                                                    |
| From one of the following:                         |
|                                                    |
| __  1.  ISPF table                                 |
|     2.  Active Director                            |
|     3.  Saved Director file                        |
|                                                    |
|                                                    |
|  F1=Help      F2=Split     F3=Exit      F4=Prompt  |
|  F5=Reset     F9=Swap     F12=Cancel               |
+----------------------------------------------------+
```

Figure 12-4 Migrate Switch Configuration Data

For more information about the migration process, see *Hardware Configuration Definition User's Guide Version1 release 11*, SC33-7988.

12.2 HCD LDAP support

HCD LDAP back-end plug-in, along with IBM Tivoli Directory Server for z/OS and the RACF back-end SDBM, can be used to access and update existing IODFs through the standardized Lightweight Directory Access Protocol (LDAP) which is based on TCP/IP.

The HCD LDAP backend is optional and there are no limits in HCD functionality if the backend is not used.

LDAP is a protocol that makes directory information available (like the yellow pages). New entries can be added, and existing entries can be altered or deleted. Another possibility is to search for matching entries by using wildcards.

The HCD LDAP backend is plugged into the Tivoli Directory Server and configured using the IBM Tivoli Directory Server for z/OS configuration file (usually called `ds.conf`). See Figure 12-5 on page 379.

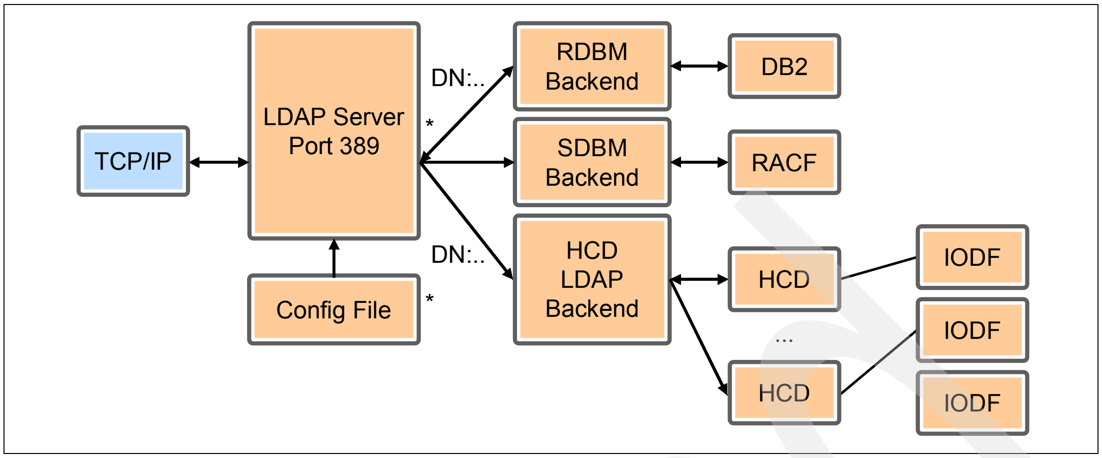


Figure 12-5 HCD LDAP back end structure

Similar to the RACF back-end SDBM, the main function of the HCD LDAP back end is to mediate between the TDS and an external component: HCD in this case.

HCD maintains control of the IODFs while update requests are validated, processed, and the results are stored in the appropriate IODF. Although the TDS updates the IODF, HCD processes the updates ensuring the integrity of the IODFs. As a result, the HCD portion of the LDAP directory information tree (DIT) must reflect the data structure of HCD exactly. Strict rules can be invoked when an update of IODF data through the TDS is requested.

The HCD LDAP back end uses RACF access rights only of the user IDs that services are performed for, in order to determine whether this is a valid request, assuming that the plug-in runs under a user ID that is entitled to switch to the user ID of the respective bind request. The plug-in takes its user ID as that of the TDS and therefore the HCD LDAP back end can be plugged in only to the TDS; the TDS must run as a started task under a user ID that is permitted to switch to another user ID. To perform the switching, the HCD LDAP back end uses the pthread_security_np() service (thread-level security model).

You must choose one of the following options for the security level of TDS:

- UNIX level security

  The TDS must run under superuser who is automatically entitled to assume the identity of any other user.

- z/OS UNIX-level security

  The right to switch user IDs must be explicitly granted to all, even to the superuser. The z/OS UNIX-level security is more secure than the UNIX-level security; we recommend using the higher level of security. Be aware that this is a global decision and can affect all the servers on your system. The required steps are listed here for both options, and warnings are issued when a step affects your system configuration.

The setup can be divided into three phases:

1. Setting up the IBM Tivoli Directory Server for z/OS (TDS) so that it can run with the HCD LDAP back end.
2. Setting up the HCD LDAP back end as plug-in to the TDS (including security definitions, APF authority, and so on).
3. Adding the HCD schema (`schema.hcd.ldif`, which is located in the `/usr/lpp/hcd/etc` directory) to TDS.

These phases are all performed outside HCD. For setup information, see *z/OS V1R11.0 HCD User's Guide*, SC33-7988.

There is a one-to-one mapping between the IODF data structure and the LDAP DIT that makes the HCD IODF information able to be accessed through the LDAP protocol and makes IODF updates possible.

You must perform the following two steps to request a service from the HCD LDAP back end:

1. Authenticate (bind) yourself to the RACF back-end SDBM.
2. Access an IODF.

The HCD LDAP back-end functions as follows:

- HCD LDAP back end does *not* participate in extended group membership searching a client request.
- Running several back-end systems on one TDS is possible.
- The root of a subtree or back end is denoted with a suffix in the configuration file. There is only one suffix specified per HCD LDAP back end and it must be unique if you are running multiple HCD LDAP back-end systems.
- It does *not* support access control lists (ACLs) that are used to protect information stored in an LDAP directory from unauthorized access because the access control is performed by RACF.
- It does *not* support LDAP request types such as: Bind, ModifyDN or ModifyRDN, Compare, Abandon, or Extended Request. Requests are answered with the following return code: Unwilling to Perform.
- It does support the following LDAP request types but does impose restrictions because the HCD portion of the DIT is rigidly controlled:
  - Add
  - Delete
  - Modify
  - Search
- HCD LDAP back end does *not* support multi-server or replication.

To initiate, extend, and close a transaction using the HCD LDAP back end you must have set up and run the TDS and the back end, and you must provide an LDAP V3 client program with the appropriate controls of the HCD LDAP back end. You must choose the version of the LDAP client API function that allows the specification of server controls. See the *V1R11.0 IBM Tivoli Directory Server Client Programming for z/OS*, SA23-2214 for more information about the functions and the parameters to be passed for various requests.

12.3 HCD reporting and connectivity report

With HCD, you may print and view a graphical representation of the I/O configuration, based on the definitions in the IODF. The reports can either be stored in a data set for printing on an AFP printer (such IBM 3820 or IBM 3800) or through GDDM later on, or be displayed on an IBM 3270 terminal with graphical capability. See Figure 12-6 on page 381.

The graphical report function allows you to print or view five types of reports:

- LCU report: Shows all logical control units defined for one processor.
- CU report: Takes a control unit as a focal point and shows the connections to the processors and the devices of the IODF. On request, it shows the switches also.

- CHPID report: Shows the defined channel paths for a processor and the switches, control units, and devices attached to the CHPID.
- Switch report: Takes a switch (ESCON director) as a focal point and shows the processors, chained switches, and control units with devices attached to the switch.
- CF connection report: Takes a coupling facility as a focal point and shows all connections that exist between the coupling facility and the other processors defined in the IODF.

```
+------------- Create or View Graphical Configuration Report -------------+
|                                                                          |
|                                                                          |
| Select the type of report you want, and specify the values below.       |
|                                                                          |
| IODF name . . . . . . : 'SYS6.IODF26.WORK'                              |
|                                                                          |
| Type of report  . . . . __  1.  LCU report                              |
|                             2.  CU report                               |
|                             3.  CHPID report                            |
|                             4.  Switch report                           |
|                             5.  CF connection report                    |
|                                                                          |
| Processor ID  . . . . . ________  + (for an LCU or a CHPID report)      |
| Partition name  . . . . ________  + (to limit an LCU or a CHPID report) |
|                                                                          |
| Output data set . . . . ____________________________________________    |
|                                                                          |
| Output  . . . . . . . . 1   1.  Write to output data set                |
|                             2.  View                                    |
|                                                                          |
|  F1=Help     F2=Split    F3=Exit     F4=Prompt   F5=Reset    F9=Swap    |
| F12=Cancel                                                               |
+--------------------------------------------------------------------------+
```

Figure 12-6 Create or View Graphical Configuration Report

To obtain a report, perform the following steps:

1. Specify information in the following fields:
   - Type of report: Select the type of report you want to create.
   - Processor ID and Partition name: Enter the required data for an LCU or a CHPID report.
   - Output: Select whether you want to write the output to an output data set for printing or to display the output on your terminal.
   - Output data set: For IBM BookMaster® program, GML, or DCF processing, the output data set must be a sequential data set or a member of a partitioned data set. If the PDS or the sequential data set does not exist, it automatically is allocated (record length 200, record format fixed blocked). For creating output for GDF, specify a member of a partitioned data set. If the data set does not exist, it will automatically be allocated (record length 400,record format fixed blocked). If the data set already exists, it is overwritten with the new data, you are not asked to confirm replacement. The

output is written into separate members, one for each segment. The member names are up to eight characters long. They are derived from taking up to seven characters from the member name specified in the output data set field and adding a number.

For instance, if the name is specified as `SYS6.IODF26.PRINT(SWITCHES)`, the member names are SWITCH11, SWITCH12, SWITCH13, and so on.

2. Press Enter. The Define Report Layout panel opens. Figure 12-7 shows the panel for a CU report.

```
+-------------------------- Define Report Layout ---------------------------+
|                                                                           |
|                                                                           |
| Specify the values below for report type: CU                              |
|                                                                           |
| Include index . . . . 1   1.  Yes     Include partitions . 1   1.  Yes    |
|                           2.  No                               2.  No     |
|                                                                           |
|                                       Only for a CU or CHPID report:      |
| Include CTC, CF CUs  . 1   1.  Yes     Include switches . . 1   1.  Yes   |
|                           2.  No                               2.  No     |
|                                                                           |
| Show CU  . . . . . . . 1   1.  Serial number                              |
|                           2.  Description                                 |
|                                                                           |
| To limit a CU report, specify only one of the following:                  |
| Range  . . . . . . . . ____  -  ____                                      |
| Type . . . . . . . . . ____________  +                                    |
| Group  . . . . . . . . ________  +                                        |
|                                                                           |
|  F1=Help     F2=Split    F3=Exit     F4=Prompt   F5=Reset    F9=Swap      |
| F12=Cancel                                                                |
+---------------------------------------------------------------------------+
```

Figure 12-7 Define Report Layout

3. Select what you want to include in the graphical report. To limit the control units to be shown in a CU report, you can specify either the range, type, or group (for example, DASD) of the control units.
4. Press Enter. The report is written to an output data set or shown on the terminal.

   Figure 12-8 on page 383 shows a partial report.

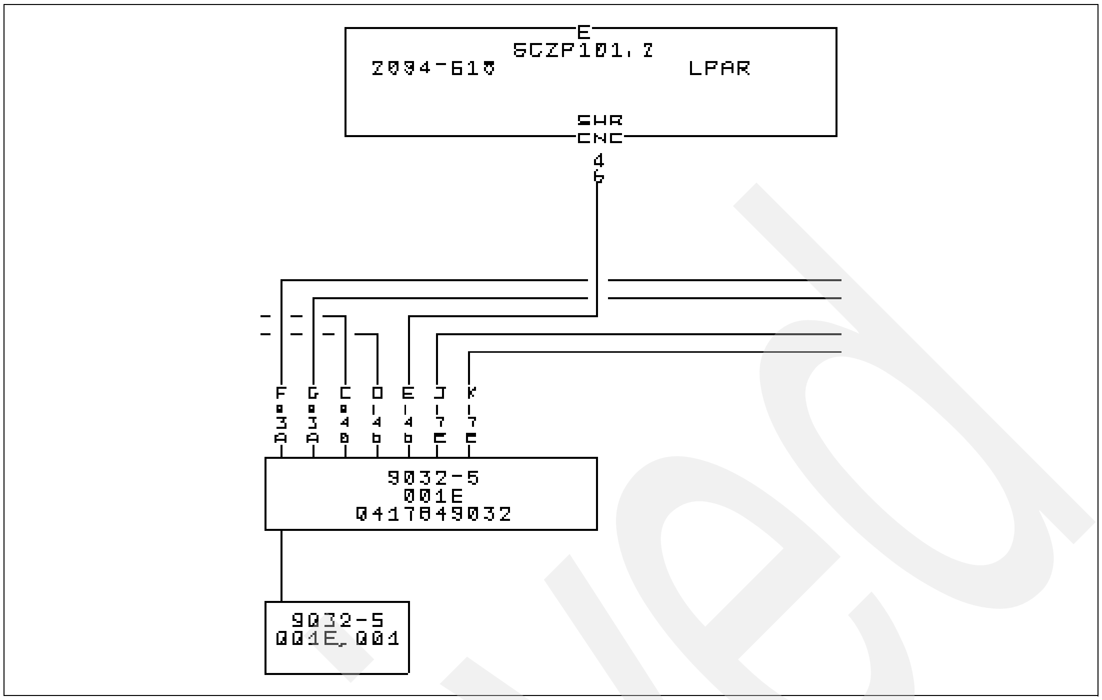


Figure 12-8 Graphical report example

12.4 HCD interface to the CHPID Mapping Tool (CMT)

For the CHPID Mapping Tool to map your PCHIDs to the CHPIDs that are defined in the IODF, you must create an IOCP ASCII text workstation file and then import the file into the CHPID Mapping Tool. After mapping the PCHIDs to the CHPIDs, import the updated workstation file back into HCD.

After generating the IOCP ASCII text workstation file and before importing the updated workstation file back into HCD, do not manually edit the file; editing this file might prevent it from being re-imported.

12.4.1 Exporting the IOCP file to the CMT for a selected processor

To export the IOCP file to the CMT for a selected processor, perform the following steps:

1. Validate the work IODF; this step is a prerequisite for building an IOCP input data set. The *validated work* IODF is the stage of IODF in which all logical definitions (channel subsystems, logical partitions, CHPIDs, control units, and devices) are in place except for PCHID definitions. To validate the work IODF by using HCD, perform the following steps:

   a. On the HCD entry panel, enter the work IODF to be validated.
   b. Select option **2, Activate and process configuration data**. Another panel opens.
   c. Select option **12, Build validated work I/O definition file**.

   This task validates a work IODF for correctness and completion. In case of errors or warnings, a Message List panel is displayed. It includes messages describing incomplete or erroneous logical definitions you might have to handle, according to their severity. If errors occur, correct them and restart the task. Select **Exit** to leave the Message List panel.

   The work IODF is now validated.

2. Build an IOCP input data set (with PCHIDs still missing or obsolete).
   a. From the Activate or Process configuration data panel, select option **3, Build IOCP input dataset**.
   b. Select the processor to which PCHIDs will be added to the Available Processor panel. The panel shown in Figure 12-9 opens.

```
+------------------------- Build IOCP Input Data Set --------------------------+
|                                                                              |
| Specify or revise the following values.                                      |
|                                                                              |
| IODF name . . . . . . . . . : 'SYS6.IODF26.WORK'                             |
| Processor ID  . . . . . . . : CPCPKR1                                        |
| Title1 . NOPCHIDS________________________________________________________    |
| Title2 : SYS6.IODF26.WORK - 2009-10-12 15:44                                 |
|                                                                              |
| IOCP input data set                                                          |
| 'SYS6.IODF26.CPCPKR1'___________________________________                     |
| Input to Stand-alone IOCP?  Yes  (Yes or No)                                 |
|                                                                              |
| Job statement information                                                    |
| //WIOCDS JOB (ACCOUNT),'NAME'                                                |
| //*                                                                          |
| //*                                                                          |
| //*                                                                          |
| //*                                                                          |
| //*                                                                          |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 12-9 HCD: Build IOCP Input Data Set

3. Enter information in the following fields:
   – In the Title1 field, specify a title for the IOCP input data set. The title is displayed on the first header line of the IOCP input data set.
   – In the IOCP input data set field, specify the data set to which the IOCP is written. It must be a sequential disk data set or a member of a partitioned data set (PDS). If the PDS or the sequential disk data set does not exist, it is automatically allocated. The record length must be 80. The record format must be fixed blocked (RECFM=FB).

   The hardware configuration token is passed with the IOCP statements. This token is used to assure that during the process of assigning PCHID values the contents of the IODF is not changed.
4. After the batch job is submitted, verify completion of the batch job. Now the IOCP input data set has been created. It is similar to the example in A.1, "IOCP data set for CPCPKR1" on page 412, however no PCHIDs are assigned yet.
5. Download the IOCP input data set to the workstation where the CMT is running. The following description applies to Personal Communications for Windows:
   a. From the ISPF main panel select option **6, Enter TSO or Workstation commands**.
   b. From the menu, select **Actions** and then **Receive File From Host.**
   c. Specify the IOCP Input data set for **Host File** and a workstation file name for **PC File**. Select **Text** as transfer type. Click **Add to List** and then **Receive**.

The IOCP ASCII text workstation file is now created and can be imported (migrated) into the CMT.

12.4.2 Migrating the IOCP with PCHIDs back into the IODF

After PCHIDs have been mapped to the CHPIDs by using the CMT, the updated IOCP source must be migrated back into HCD:

1. Upload the workstation file (that is updated with PCHIDs) to an IOCP data set on the system where the work IODF is located. The following description applies to Personal Communications for Windows.
   a. From the ISPF main panel select option **6, Enter TSO or Workstation commands**.
   b. From the menu, select **Actions** and then **Send File To Host.**
   c. Specify the workstation file name updated with PCHIDs for **PC File**.
   d. Specify a pre-allocated IOCP Input data set for **Host File** and a Select **Text** as transfer type.
   e. Click **Add to List** and then click **Send**.

   The IOCP input data set must be a sequential disk data set or a member of a partitioned data set. The record length must be 80. The record format must be fixed blocked (RECFM=FB).
2. Migrate the updated IOCP data set back into the perviously validated IODF work file:
   a. On the HCD entry panel, specify the validated word IODF and select option **5, Migrate configuration data.**
   b. On the Migrate Configuration Data Panel, select option **1, Migrate IOCP/OS data** . The Migrate IOCP / MVSCP / HCPRIO Data panel opens. See Figure 12-10.

```
+------------------- Migrate IOCP / MVSCP / HCPRIO Data --------------------+
|                                                                           |
| Specify or revise the following values.                                   |
|                                                                           |
| Processor ID . . . . . . . . . . . . CPCPKR1_  +   CSS ID . . . . . . . _  + |
| OS configuration ID  . . . . . . . . ________  +                          |
|                                                                           |
| Combined IOCP/MVSCP input data set . ____________________________________ |
| IOCP only input data set . . . . . . 'SYS6.IODF26.CPCPKR1.PCHIDS'_________ |
| MVSCP only or HCPRIO input data set  ____________________________________ |
|            Associated with processor ________  +                          |
|                            partition ________  +                          |
| Processing mode  . . . . . . . . . . 2   1.  Validate                     |
|                                          2.  Save                         |
|                                                                           |
| Migrate options  . . . . . . . . . . 3   1.  Complete                     |
|                                          2.  Incremental                  |
|                                          3.  PCHIDs                       |
| MACLIB used  . . . . . . . 'SYS1.MACLIB'                                  |
| Volume serial number . . . ______  + (if not cataloged)                   |
|                                                                           |
|  F1=Help     F2=Split    F3=Exit     F4=Prompt   F9=Swap    F12=Cancel    |
+---------------------------------------------------------------------------+
```

Figure 12-10 HCD - Migrate IOCP Input data set

3. Enter information in the following fields:
   – In the Processor ID field, specify the ID for which you have mapped the PCHIDs to the CHPIDs.
   – In the IOCP only input data set field, indicate the data set that is uploaded from the workstation.
   – For the Migration options field, specify **3** for migrating PCHIDs only.
   – For the Processing mode field, the settings can be as follows:
     • The Validate processing mode setting, enables you to validate the migration without actually updating the IODF, even if the migration is free of errors. The Migration Message List panel is displayed, providing you with detailed messages about the migration.
     • The Save processing mode validates the migration also. If no errors occur, this mode updates the PCHIDs in the IODF.

   Because the migration is an online process the following message is displayed while the migration takes place:

   ```
   HCD deck migration in process - please wait ...:
   ```

When importing the IOCP input data set into the validated work IODF through the migration process for PCHID migration, HCD verifies that the token passed with the IOCP statements match the token stored in the IODF. If this is the case, and if the logical I/O definition described by the imported IOCP statements does not differ from the IODF data, HCD writes the PCHID values into the IODF. If the token does not match, for example, because the IODF has been updated in the meantime, a PCHID migration is not performed. In this case you must start the process from the beginning.

PCHIDs are now assigned in the work IODF. You can continue updating the work IODF or build a production IODF.

12.5 HCD filtering

The Filtering feature in HCD is available when the action bar includes a Filter option enabling you to limit lists. The Filter option is available on most HCD list panels:

- Channel Path List
- Switch Port List
- Control Unit List
- I/O Device List

You can use the Filter feature to limit lists or to locate resources. To use the Filter feature, perform the following steps:

1. Place the cursor on the filter option in the action bar and press Enter to display a list of filter options. See Figure 12-11.

```
+-------------------------------------+
|    1. Set Filter                    |
|    2. Clear Filter                  |
|    3. Count rows on (filtered) list |
+-------------------------------------+
```

Figure 12-11 HCD Filtering: Selecting an option

2. Select option **1, Set Filter**. The panel in Figure 12-12 opens.

```
+-------------------- Filter Channel Path List --------------------+
|                                                                  |
| Specify or revise the following filter criteria.                 |
|                                                                  |
| Channel path type  . O*_                                         |
| Operation mode . . . SPAN  +                                     |
| Managed  . . . . . . ___  (Yes or No)   I/O Cluster ________  +   |
| Dynamic entry switch __    +                                     |
| Entry switch . . . . __    +                                     |
| CF connected . . . . _    (Y = Connected; N = Not connected)     |
| PCHID or AID/P . . . ____                                        |
|                                                                  |
| Description  . . . . *3000*__________________________            |
|                                                                  |
| Partition  . . . . . ________  +                                 |
| Connected to CUs . . Y    (Y = Connected; N = Not connected)     |
|                                                                  |
+------------------------------------------------------------------+
```

Figure 12-12 HCD Filtering: Channel Path List example

3. Filtering can be done on one or several fields at a time. And asterisk (*) can be used in front or at the end (or both the front and the end) of a term in most fields. Press Enter after specifying filtering criteria.

   In this example we select all OSA Channel Paths (Channel path type O*), with the operation mode of SPAN. We include only Channel Paths with the number of 3000 specified in the description field (for example a device number) and the Channel Paths must be Connected to CUs (In use. Free Channel Paths not included).

4. To reset the filter, use the Filter option in the action bar, and select option **2, Clear Filter** or leave the List panel. Filtering is always off when entering a HCD list panel.

An alternative to the Filter option in the action bar is the FILTER SET, FILTER CLEAR, and FILTER NUM primary commands corresponding to the filter options.

> **Note:** The count option counts the number of rows and not the number of resources. When using the count option on the I/O Device List a device group of for example 15 devices will be counted as one row.

12.6 HCD generation of WWPN input file

The worldwide port name (WWPN) Prediction Tool can be used for setup of your SAN prior to the delivery and installation of your new System z10 server so that systems can be up and running faster.

The tool assigns WWPNs to each virtual Fibre Channel Protocol (FCP) channel/port using the same WWPN assignment algorithms a system uses when assigning WWPNs for channels utilizing N_Port Identifier Virtualization (NPIV).

The tool requires information about the FCP-specific I/O device definitions in the form of a CSV file. This file can be either created manually or exported from HCD or HCM. The tool then creates the WWPN assignments, which are required to set up your SAN. The tool also creates a binary configuration file that can be imported later by your system.

The WWPN prediction tool can be downloaded from Resource Link. To sign in to the Resource Link, go to the following Web address:

http://www.ibm.com/servers/resourcelink/

The tool is applicable to all FICON channels that are defined as CHPID type FCP (for communication with SCSI devices) on System z10. The WWPN Prediction Tool is supported for all current releases of z/OS and z/VM. PTFs might be required.

HCD exports the FCP device configurations for a specific processor from the currently accessed IODF as comma-separated values into a CSV output format. You can use this output as input to the WWPN Prediction Tool to assign worldwide port names to virtualized FCP ports. This HCD output file is also referred to as *FCP SAN configuration template file.*

To generate an input file for WWPN by using HCD, perform the following steps:

1. On the HCD entry panel, specify a production or a work IODF and select option **2, Activate or Process Configuration Data**.
2. Select option **10, Build I/O Configuration Data**. Figure 12-13 shows the panel that opens.

```
+-------------------- Build I/O Configuration Data ---------------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| IODF name  . . . . . : 'SYS6.IODF26.WORK'                             |
|                                                                       |
| Configuration type . . 1   1.  Processor                              |
|                            2.  Operating System                       |
|                            3.  Switch                                 |
|                            4.  FCP Device Data                        |
|                                                                       |
| Configuration ID . . . CPCPKR1   +                                    |
| Output data set   . . . 'SYS6.IODF26.WWPNFILE'______________________  |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 12-13 HCD generation of WWPN input file

3. Select option **4, FCP Device Data**. In the Configuration ID field, specify the processor ID of the processor that owns the FCP channel path for the FCP device. Specify the name of an output data set to which HCD will write the file. The IODF name cannot be updated on this panel.

   The output data set must be fixed block with a record length of 132. If the output data set specified does not exist, HCD will allocate it, and if it does exist, you will be requested to confirm replace of the data set.
4. Press Enter. The output data set is updated including a header and a record for each FCP device defined to the processor.

12.7 HCD configuration packages

Configuration packages enable you to build and transmit subset production IODFs to specific systems (JES2 NJE nodes) to be used for dynamic activation, power-on reset, and more while maintaining the token from the master IODF. Therefore, using this facility does require JES2 NJE connections. The subset IODFs are extracted from the centrally administered master IODF.

Updates to the IODF can be performed in the master work IODF or in the subset IODFs. In the latter case, transfer the subset IODF back into the master work IODF.

The configuration package feature exploits the export and import facility for transmitting and receiving subset IODFs. However, the configuration package feature does not include the activity log file.

Configuration packages are normally used for extremely large IODFs. If you do not want the complete IODFs distributed to all systems, consider the configuration packages. Configuration packages can be added, edited, and deleted in the work IODF. After building a production IODF, configuration packages can be transmitted.

> **Note:** Until recently, working with configuration packages was possible only with HCD. Starting with HCM for z/OS V1R10, you use HCM dialog boxes to define, edit, transmit, and delete configuration packages, corresponding to the HCD functionality.

12.7.1 Defining packages

When defining a configuration package, you select one or more processors and one or more Operating System Configurations. HCD generates a subset of IODFs based on your selections. The configuration packages are stored in the work IODF.

To define configuration packages, perform the following steps:

1. Specify the work IODF on the HCD entry panel, and select option **6, Maintain I/O Definition files**.
2. Select option **7, Work with configuration packages**. The Configuration Package List panel is displayed, and the list is empty because we have not yet defined any packages. See Figure 12-14.

```
 Configuration Package List  Row 1 of
Command ===> ___________________________________________ S

Select one or more packages, then press Enter. To add, use F11

IODF name  . . . . : SYS6.IODF26.WORK

  Package  ------Target----- ----Last sent---
/ Name     User     Node     Date       Time  Description
****************************** Bottom of data ********************************
```

Figure 12-14 HCD Configuration Package List

3. Press F11 to add a configuration package. See Figure 12-15 on page 390.

```
+----------------------- Add Configuration Package -----------------------+
|                                                                         |
| Specify the following values.                                           |
|                                                                         |
| Package name . . . . . . ________                                       |
| Package description  . . ________________________________               |
|                                                                         |
| User ID  . . . . . . . . ________                                       |
| Node ID  . . . . . . . . ________                                       |
|                                                                         |
| Operating system status  1  1. Attended                                 |
|                             2. Unattended (MVS only)                    |
|                                                                         |
| Target IODF name . . . . _____________________________________          |
| Target volume  . . . . . ______  (for unattended, if not SMS)           |
|                                                                         |
+-------------------------------------------------------------------------+
```

Figure 12-15   HCD Configuration Package (Define Package)

4. Specify information in the following fields: Package name, Package description, and User ID and Node ID of the system that are to receive the package. The information is used for transmitting the package to the system. Select an option in the Operating system status field, and specify the Target IODF name (production IODF) on the receiving system and optionally a volume.
5. Press Enter to add the package.

> **Note:** If you select the **Unattended** option, a batch job is submitted on the receiving system. You do not need to receive the subset IODF using the TSO/E Receive command, but log on to the receiving system so that you can verify batch job completion.

Consider using a permanent Target production IODF on the receiving system, because you might not know the current production IODF on the receiving system when transmitting the package.

The User ID, Node ID and Target IODF can be overwritten when transmitting the package later on.

6. After defining the package, you must specify objects to be included in the package. The objects are processors, operating system configurations, or both. Select the configuration package using the S line-command and press F11 to add objects to the package. The Configuration Package Objects List panel opens. See Figure 12-16 on page 391.

```
+---------------- Configuration Package Object List -----------------+
|   Goto  Backup  Query  Help                                        |
| ----------------------------------------------------------------   |
|                                                                    |
| Command ===> _________________________________ Scroll ===> CSR     |
|                                                                    |
| Select one or more Objects, then press Enter. To add, use F11.     |
|                                                                    |
| Package name . . : CPCPKR1      test                               |
|                                                                    |
|   -----------------Configuration-----------------                  |
| / ID       Type Description                                        |
| *********************** Bottom of data ************************    |
|                                                                    |
+--------------------------------------------------------------------+
```

Figure 12-16 HCD Configuration Package (Object List)

7. Press F11 to add Objects. The panel in Figure 12-17 opens.

```
+---------------- Add Configuration Package Object -----------------+
|                                                                    |
| Specify the following values.                                      |
|                                                                    |
| Package name . . : CPCPKR3      Poughkeepsie Customer 1            |
|                                                                    |
| Configuration type . . . . . . 1  1. PR                            |
|                                   2. OS                            |
|                                                                    |
| Configuration ID . . . . . . . ________  +                         |
|                                                                    |
+--------------------------------------------------------------------+
```

Figure 12-17 HCD Configuration Package (Object Add)

8. Specify the Configuration type (processor or operating system configuration); the Configuration ID is the processor name or operating system configuration. You can use the F4 Prompt Option to get a list of objects.

Consider sysplex scope. If systems in the sysplex are located on separate processors, add all of them, if the IODF is shared for all systems in the sysplex. Furthermore, consider issues such as disaster recovery. Apart from systems being moved to disaster processors more than on Operating System Configuration might be defined for example one for primary disks and one for secondaries.

12.7.2 Transmitting packages

To transmit configuration packages, perform the following steps:

1. Specify the master production IODF on the HCD entry panel.
2. Select option **6, Maintain I/O Definition files**.
3. Select option **7, Work with configuration packages**. The Configuration package List panel is displayed. See Figure 12-18 on page 392.

```
 Goto  Backup  Query  Help
 ------------------------------------------------------------------------------
                          Configuration Package List  Row 1 of 3 More:       >
 Command ===> _______________________________________________ Scroll ===> CSR

 Select one or more packages, then press Enter. To add, use F11.

 IODF name  . . . . : SYS6.IODF26

   Package  ------Target----- ----Last sent---
 / Name     User     Node     Date       Time  Description
 _ CUSTPKR1 <userid> USC1JER1                  CPCPKR1 Processor Customer 1
 _ CUSTPKR2 <userid> USC2JER2                  CPCPKR2 processor Customer 2
 _ CUSTPKR3 <userid> USC3JER3                  CPCPKR3 Processor Customer 3
******************************* Bottom of data ********************************
```

Figure 12-18 HCD Configuration Package (Package List Left)

4. Scroll to the right to view the attended option (Att), IODF name, and Volume of the packages. See Figure 12-19.

```
 Configuration Package List   Row 1 of 3 More: <
 Command ===> ______________________________________________ Scroll ===> CSR

 Select one or more packages, then press Enter. To add, use F11.

 IODF name  . . . . : SHCDDM.IODF80.WORK

   Package       -------------------Target-------------------
 / Name     Att. IODF name                               Volume
 _ CUSTPKR1 Y    'SYS6.IODF10'                           IODF10
 _ CUSTPKR2 N    'SYS6.IODF20'                           IODF20
 _ CUSTPKR3 N    'SYS6.IODF30'                           IODF30
******************************* Bottom of data ********************************
```

Figure 12-19 HCD Configuration Package (Package List Right)

5. To transmit a package to a receiving system use the **X** line-command. The Transmit Configuration Package panel is displayed. See Figure 12-20 on page 393.

```
Transmit Configuration Package

Package name . . . . . : CPCPKR1      CPCPKR1 Processor
High level qualifier . . <userid>     Volume . . . . ______  +
JCL member used  . . . . CBDJXMIT     Space  . . . . 7840    (4K blocks)

Descriptor field 1 . . . SYS6         Descriptor field 2   IODF10
Target user ID . . . . . <userid>     Target node ID . . . DKDMJE01
Operating system status  1  1. Attended
                            2. Unattended (MVS only)

Specify or revise the job control statements for the transmit job.

//<userid> JOB 1,'CPCPKR1',CLASS=E,MSGCLASS=H,REGION=100M
//*
```

Figure 12-20   HCD Configuration Package (Transmit Package)

On this panel, you are able to update the Configuration Package information.

The high-level qualifier is used for temporary IODFs to be created during transmit, HCDMLOG and HCDTRACE data sets. The default is the user ID. Descriptor field 1 and 2 includes the name of the target IODF on the receiving system.

For the Attended option the receive is manual. You can specify the receiving target IODF name during receive operations.

6. Press Enter to submit the transmitting batch job. For the unattended option the Specify Target IODF and User Password panel is displayed, as shown in Figure 12-21.

```
+---------------- Specify Target IODF and User Password ----------------+
|                                                                       |
| Specify or revise the following values.                               |
|                                                                       |
| Target IODF name  . . . . 'SYS6.IODF10'                               |
| Volume serial number  . . IODF10  (If IODF does not exist             |
|                                    at the target node)                |
|                                                                       |
| Replace target IODF . . . 2  1. Yes    (If IODF already exists)       |
|                              2. No                                    |
|                                                                       |
| User ID . . . . . . . . : <userid>     Node  . : DKDMJED1             |
| Password  . . . . . . . .                                             |
| Reentered password  . . .                                             |
|                                                                       |
+-----------------------------------------------------------------------+
```

Figure 12-21   HCD Configuration Package (Unattended option)

7. On this panel, you may overwrite the Target IODF name and Volume serial number specified in the configuration package. Update the information if required and press Enter to submit the transmitting and the receiving batch jobs.

8. After transmitting the package, return to the Configuration Package List panel. The Last Sent Date and Time information has been updated.

12.7.3 Receiving packages

The method for receiving a package depends on whether the attended or unattended option is specified in the configuration package or is overwritten during transmit.

Packages transmitted using attended option

To receive a package transmitted using the attended option, perform the following steps:

1. Log on to the receiving system and issue the TSO/E RECEIVE command.

   When receiving the IODF data set using the attended option, the cataloged sequential data set contains the word EXPORTED, which is inserted as the second level of the data set name.

```
Dataset <userid>.EXPORTED.IODF26 from <userid> on WTSCPLX2
Enter restore parameters or 'DELETE' or 'END' +
```

Figure 12-22 HCD Configuration Package (TSO/E Receive)

   After receiving the data set, the cataloged sequential data set must be imported into a production IODF.

2. To import an IODF using HCD panels, select the **Maintain I/O definition files** option on the HCD entry panel.
3. Select option **6, Import I/O definition file option** on the Maintain I/O definition files panel. The panel in Figure 12-23 opens.

```
+--------------------------------- Import IODF --------------------------------+
|                                                                              |
| Specify the following values.                                                |
|                                                                              |
|                                                                              |
| Import from a data set:                                                      |
|                                                                              |
| Data set name . . <userid>.EXPORTED.IODF26'_______________________________   |
|                                                                              |
|                                                                              |
| Target IODF name  'SYS6.IODF27_________________________  +                   |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 12-23 HCD Configuration Package (Import IODF)

4. Specify the cataloged sequential data set name and the target IODF, and press Enter. The subset production IODF is now complete.

Packages transmitted using unattended option

To receive a package transmitted using the unattended option, log on to the receiving system, and verify the completion of the batch job. The transmitted subset IODF is located in the IODF production file name specified in the configuration package or overwritten during transmit. The subset production IODF is now complete.

For more information about HCD Configuration Packages, see *z/OS V1R11.0 HCD User's Guide*, SC33-7988.

12.8 Repair action for an IODF

To repair an IODF, perform the following steps:

1. Determine whether the IODF contains defects by issuing the following command from an HCD command line:

   ```
   TRACE ON,ID=IODF
   ```

   If the result is TRACE COMMAND ACCEPTED, this is an indication that cursory checks did not detect a problem.

   If HCD detects any defects within the IODF, it issues the following message:

   ```
   CBDA999I DEFECT(S) DETECTED IN IODFxx
   ```

2. Access the IODF, identified in the message in the previous step, in update mode by changing anything in the work IODF (for example changing a character in a description field, then changing it back immediately).
3. Run the following HCD command:

   ```
   TRACE ON,ID=IODF,REPAIR
   ```

   The following message is displayed:

   ```
   CBDA998I DEFECT(S) DETECTED IN IODFxx. REPAIR ACTION PERFORMED
   ```

4. Verify that the IODF is now successful by re-running the **TRACE ON,ID=IODF** command.

   If HCD does not detect any defect in the IODF, the following message is displayed:

   ```
   CBDA126I TRACE COMMAND WAS ACCEPTED
   ```

The TRACE command activates and deactivates the HCD trace facility. The command allows you also to limit the detail of data written into the trace data set by requesting that only certain functions and details be traced. The TRACE command can be entered on any HCD panel showing a command line.

You can also activate tracing by adding the TRACE command in the HCD profile. This step allows you to specify the trace parameters in more detail. In this case, you must allocate DD name HCDPROF to the HCD profile when invoking the batch utility.

The TRACE command is not shown in the HCD Profile Options dialog box.

For HCD to write the output to the trace data set, ON must be specified with at least one trace category. To view the trace output, you have to close the trace data set first. You can do this by either leaving HCD or by entering the command **TRACE OFF,CLOSE**. See Figure 12-24 on page 396.

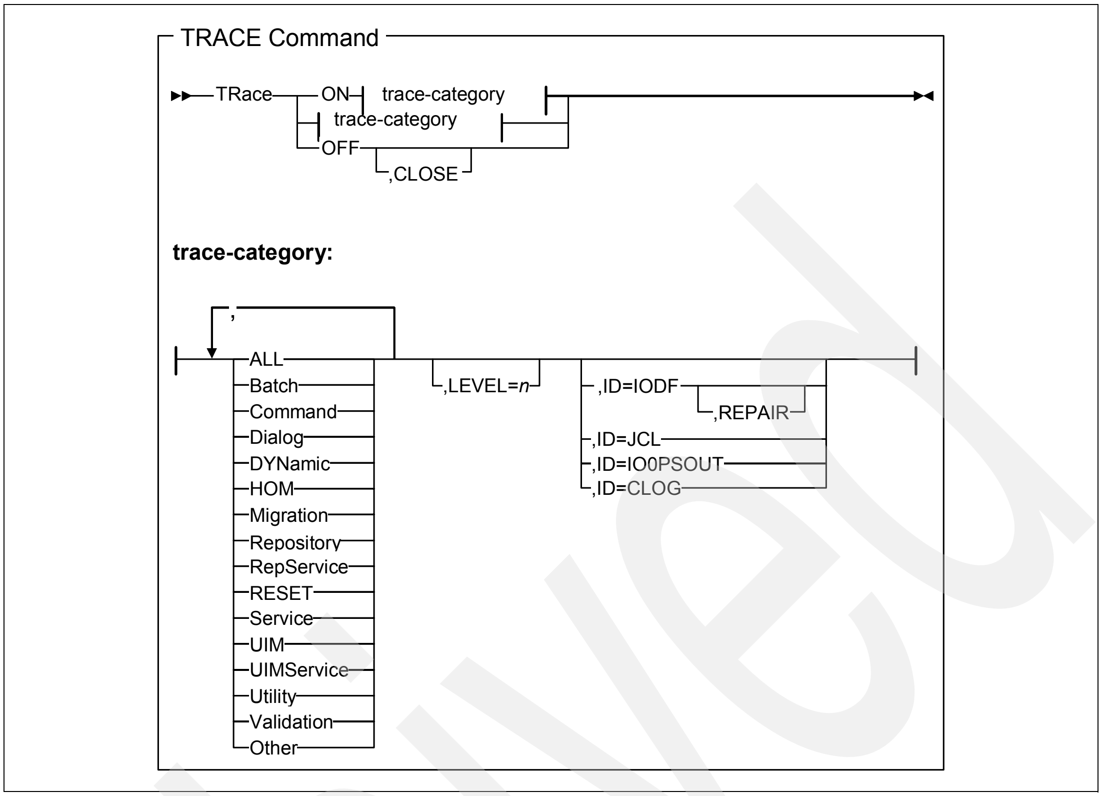


Figure 12-24 HCD Trace command options

Note: You may abbreviate several keywords. Characters you must use are shown as uppercase (you may omit lowercase). For example *RepService* may be abbreviated as RS.

The TR command options are described in the following list:

ON Starts the trace facility.
OFF Stops the trace facility.
CLOSE Closes the trace data set.

The trace category specifies the functional scope to be traced:

ALL Trace everything.
Batch Trace all batch routine.
Command Trace all command routines.
Dialog Trace all dialog routines.
DYNamic Trace all dynamic routines.
HOM Trace all object management routines.
Migration Trace all migration routines.
Repository Trace all repository main routines.
RepService Trace all repository service routines.
RESET Reset all currently active categories, LEVEL and ID.
Service Trace all service routines.
UIM Trace all UIM routines.
UIMService Trace all UIM service routines.
Utility Trace all utility routines.
Validation Trace all validation routines.
Other Trace all other not yet mentioned routines.

Additional options are as follows:

LEVEL=*n* Assigns a level of detail to the functions to be traced, where *n* is a decimal number ranging from 0 to 255. If the option is omitted, the default level of 5 is assumed.

ID=IODF Writes an IODF dump into the trace data set. This parameter cannot be specified in the HCD profile. If you have a consistent IODF, an output in the trace data set is shown only when you set LEVEL=128 or higher. Otherwise, an output is shown only if the IODF contains defects.

REPAIR: Removes detected errors in the work IODF and reports corrections in the trace data set. Before you use the REPAIR option, you must set the work IODF in update mode.

ID=JCL Writes into the trace data set, all statements generated when action *Transmit configuration package* is invoked from the HCD dialog.

ID=IOOPSOUT Writes all responses of I/O operations IHVAPI2 calls into the trace data set. These are the results of I/O operations query requests.

ID=CLOG Writes the contents of the change log file into the HCD trace data set. Use this option together with LEVEL=8 parameter. This parameter cannot be specified in the HCD profile.

The most commonly used trace commands:

```
TRACE ON,ALL,LEVEL=255
TRACE OFF,CLOSE
```

12.9 Exploitation of subchannel set 1

Subchannel set 1 (SS1) had been used exclusively for PAV alias devices (device type 3390A). To relieve the device number limitation in subchannel set 0 (SS0), you may also use SS1 to perform the following actions, listed with the two new device types:

- Define non-PAV alias devices to back up open systems data (fixed-block architecture, FBA) from the storage area network (SAN): new device type 3390S
- Define Peer-to-Peer Remove Copy (PPRC) secondary devices: new device type 3390D

The two new device types are called *special devices* (3390S) and *special secondary devices* (3390D).

Figure 12-25 on page 398 shows the list.

```
------------------------------ I/O Device List       Row 1 of 256 More:
 Command ===> ___________________________________________ Scroll ===> CSR

 Select one or more devices, then press Enter. To add, use F11.

 Control unit number  : D400     Control unit type  . : 2107

   ----------Device------ --Æ--- --------Control Unit Numbers + --------
 / Number   Type +        CSS OS 1--- 2--- 3--- 4--- 5--- 6--- 7--- 8---
 _ D400     3390S         4   2  D400 ____ ____ ____ ____ ____ ____ ____
 _ D401     3390S         4   2  D400 ____ ____ ____ ____ ____ ____ ____
 _ D402     3390S         4   2  D400 ____ ____ ____ ____ ____ ____ ____
 _ D403     3390S         4   2  D400 ____ ____ ____ ____ ____ ____ ____
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Control unit number  : D500     Control unit type  . : 2107

   ----------Device------ --Æ--- --------Control Unit Numbers + --------
 / Number   Type +        CSS OS 1--- 2--- 3--- 4--- 5--- 6--- 7--- 8---
 _ D200     3390D         2   2  D500 ____ ____ ____ ____ ____ ____ ____
 _ D201     3390D         2   2  D500 ____ ____ ____ ____ ____ ____ ____
 _ D202     3390D         2   2  D500 ____ ____ ____ ____ ____ ____ ____
 _ D203     3390D         2   2  D500 ____ ____ ____ ____ ____ ____ ____
```

Figure 12-25 I/O Device List showing Device Type 3390S and 3390D

They must be defined to a z10 and later processor, and they must be defined in subchannel set 1 (SS1). See Figure 12-26.

```
----------------- View Device / Processor Definition ------------------
                                                          Row 1 of 4
 Command ===> _____________________________________ Scroll ===> CSR

 Select one or more processors to view the device candidate list, or
 ENTER to continue without selection.

 Device number  . : D400          Device type  . : 3390S

                                     Preferred Device Candidate List
 / Proc.CSSID SS UA Time-Out STADET  CHPID     Explicit         Null
 Æ CPCPKR1.0  1  00 No       Yes               No               ___
 Æ CPCPKR1.1  1  00 No       Yes               No               ___
 Æ CPCPKR2.0  1  00 No       Yes               No               ___
 Æ CPCPKR2.1  1  00 No       Yes               No               ___
 ************************** Bottom of data ***************************
```

Figure 12-26 Displaying device number, type and subchannel set (SS1 is always indicated)

These device types are not eligible to be varied online or offline, allocated by device allocation (SVC99 or DD card in JCL), reconfigured by taking paths logically online or offline, and are not measured by the RMF Device Activity Report. The 3390S and 3390D devices are not included in the EDT either. These *special* devices use the default MIH setting for their device classes and the MIH interval for them cannot be changed. See Figure 12-27 on page 399.

```
---------------- View Device Parameter / Feature Definition -----------------
                                                              Row 1 of 4
 Command ===> ________________________________________ Scroll ===> CSR

 Configuration ID . : OSSYS1PR      OSconfig SYS1 monoplex Primary
 Device number  . . : D400          Device type  . . . : 3390S
 Generic / VM device type  . . . . : 3390

 ENTER to continue.

 Parameter/
 Feature    Value           R Description
 DYNAMIC    Yes               Device supports dynamic configuration
 LOCANY     Yes               UCB can reside in 31 bit storage
 WLMPAV     Yes               Device supports work load manager
 SHARED     Yes               Device shared with other systems
 ***************************** Bottom of data ******************************
```

Figure 12-27 Notice that no OFFLINE option exists

Special (3390S) devices are considered to be offline and in-use by the system. The IBM DASD Error Recovery Procedure (ERP) is bypassed for an application that uses these 3390S devices. No event codes are issued by the event notification facility (ENF) to indicate whether 3390S devices are online or offline. To *unbox* a 3390S device, you can use the IOSODS OFF, and then the IOSODS ON service.

The 3390D special secondary devices (PPRC secondary devices) placed in SS1 can be swapped to dynamically switch the devices, concurrent to the applications using them. Note the following information for special secondary devices:

- MIH values are not exchanged during a swap.
- IPL and IODF devices cannot have secondaries in subchannel set 1.
- These device come up offline.
- The VARY PATH,ONLINE command is used to unbox these 3390D devices.

For PPRC device pairs, the four-digit primary and secondary device numbers must match, the associated primary device must have the same attributes as the secondary device and must be defined as a 3390B, and, in a non-swapped configuration, adding or deleting PPRC pairs at the same time is a good practice.

Both of these *special* device types can be defined in HCD and HCM.

12.10 HyperPAV

HyperPAV is an on-demand automated allocation of alias devices for z/OS environments.

Parallel access volumes (PAVs) that are managed by WLM represent a significant performance improvement by the storage unit over traditional I/O processing. For more information, see 2.5.2, “Workload Manager (WLM)” on page 19.

PAV is an optional feature on the DS8000 series, and has the following benefits:

- Reduction in I/O addresses
- Reduction in IOSQ
- Potential increase in throughput

Figure 12-28 illustrates the basic characteristics of how traditional PAV operates.

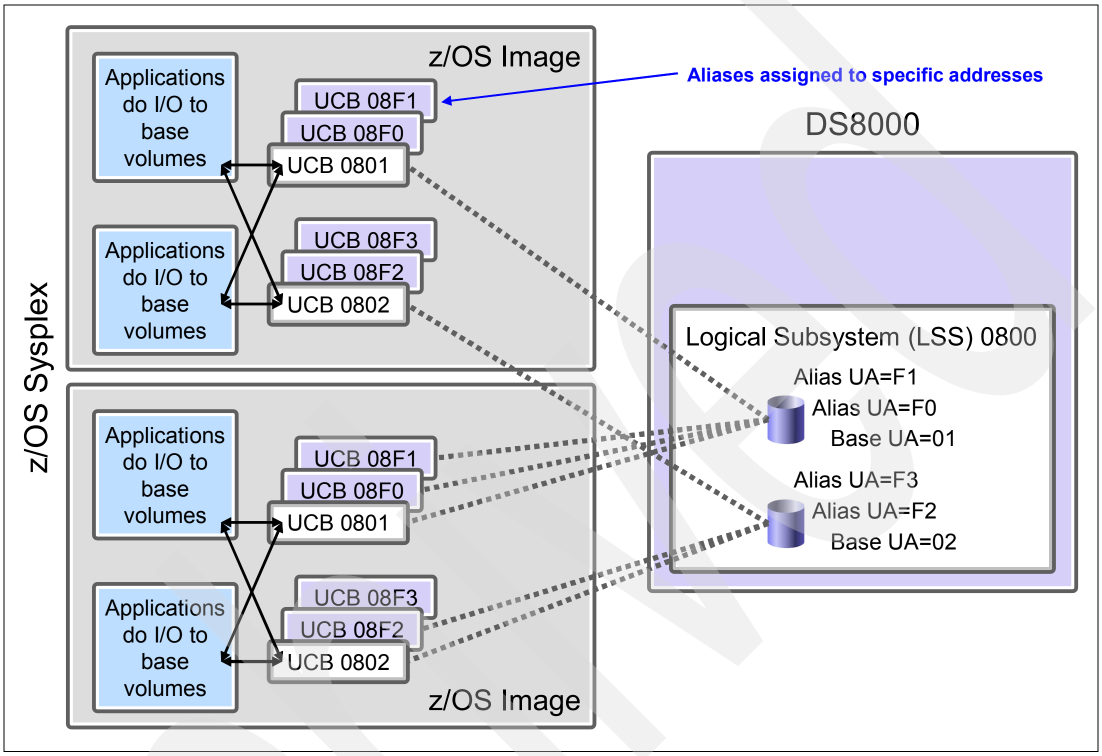


Figure 12-28 Basic operational characteristics of traditional PAV

HyperPAV is an enhancement of the algorithms where alias devices are not assigned to a specific device number. With HyperPAV, WLM is no longer involved in managing alias addresses. For each I/O, an alias address can be drawn from a pool available for all base addresses in the logical control unit (LCU) and returned to the pool when the I/O is complete.

This capability also allows separate HyperPAV hosts to use one alias to access separate bases, thereby reducing the number of alias addresses required to support a set of bases in a System z environment with no latency in targeting an alias to a base. This functionality also enables applications to achieve better performance than is possible with the original PAV feature alone, using the same or fewer operating system resources.

Guideline: The number of aliases required can be approximated by the peak I/O rates, multiplied by the average response time. For example, if the average response time is 4 ms and the peak I/O rate is 2000 per second, the average number of I/O operations executing at one time for that LCU during the peak is eight. Therefore, eight PAV aliases might be all that is needed to handle the peak I/O rate for the LCU, along with all the other PAV-base addresses in the LCU.

The correct number of aliases for your workload can be determined from analysis of RMF data.

The PAV Analysis Tool, which can also be used to analyze PAV usage, is available from the following Web site:

http://www.ibm.com/servers/eserver/zseries/zos/unix/bpxa1ty2.html#pavanalysis

Figure 12-29 illustrates the basic characteristics of how HyperPAV operates.

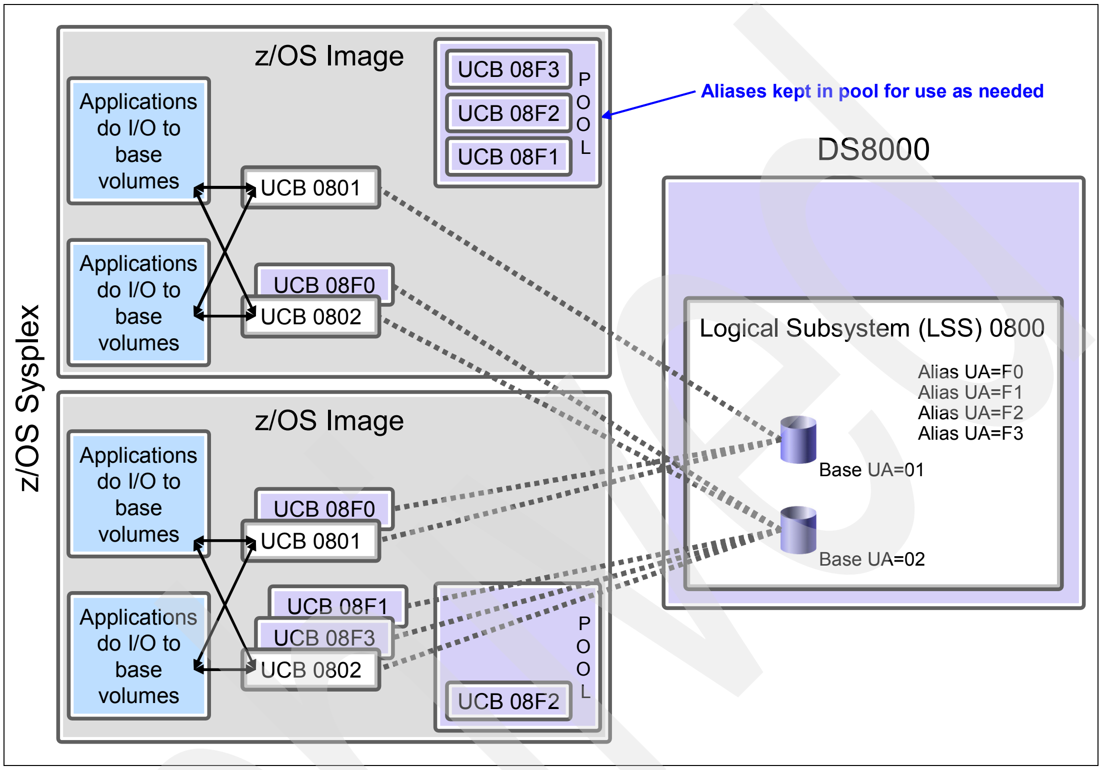


Figure 12-29 Basic operational characteristics of HyperPAV

Benefits of HyperPAV include the following items:

- Provides more efficient Parallel Access Volume (PAV) function.
- Helps clients, who implement larger volumes, to scale I/O rates without the need for additional PAV alias definitions.
- Exploits FICON architecture to reduce overhead, improve addressing efficiencies, and provide storage capacity and performance improvements:
  - More dynamic assignment of PAV aliases improves efficiency.
  - Number of PAV aliases needed can be reduced, taking less than the 64K device limitation and leaving more storage for capacity use.
- Enables a more dynamic response to changing workloads.
- Simplifies management of aliases.
- Enables users to avoid migration to larger volume sizes.

HyperPAV is an optional licensed function of the DS8000 series of processors. The license is a flat-fee add-on license that requires the PAV license to be installed.

12.10.1 HyperPAV commands for setup, control, and status display

You can use the following commands for HyperPAV management and status information:

- SETIOS HYPERPAV=YES|NO|BASEONLY
- SET IOS=xx
- D M=DEV
- D IOS,HYPERPAV
- DEVSERV QPAV,dddd

You may also use the following parmlib member:

```
SYS1.PARMLIB(IECIOSxx)
HYPERPAV=YES|NO|BASEONLY
```

Note the following information:

- YES: This setting is an attempt to initialize LCUs in HyperPAV mode.
- NO: This setting indicates not to attempt to initialize LCUs in HyperPAV mode.
- BASEONLY: This setting indicates an attempt to initialize LCUs in HyperPAV mode, but start I/Os only in base volumes.

See the information about HyperPAV z/OS support and implementation in *IBM System Storage DS8000: Architecture and Implementation*, SG24-6786.

12.11 CMT CU Report shows hardware view

The CHPID Mapping Tool also provides a report option so you can perform these actions:

- Create reports.
- Save reports in HTML format.
- View reports in your Web browser.
- Print reports.

The following report types are available:

- CHPID Report: This report is similar to the report that e-config produces but includes the CHPID values.
- FTS Report: This is a specialized report to assist with documenting the cabling from the trunking brackets to the patch panel.
- Fiber Cable Chart: Assists with documenting cabling from an I/O port to a device.
- Port Report: This report is similar to the Manual remapping screen presentation. It presents each I/O port, type, and, if assigned, the CHPID and its CHPID origin.
- Control Unit Report: This report is available only after IOCP has been loaded. It shows the hardware connections associated to each control unit. It is a good record of how you prioritized the control units and any availability intersects you may have encountered.
- CHPID to Control Unit Report: This report is available only after IOCP has been loaded. It shows information about each CHPID, hardware connection, and the control units on which it is defined.

For more information about Report Generation, see *CHPID Mapping Tool User's Guide*, GC28-6825.

13

Systems management

This chapter contains the following topics:

- Director (switch) guidelines
- Where to obtain cable and connectivity information
- The importance of naming conventions
- How to get your IODF back *in sync*
- The importance of documentation

13.1 Managing director (switch) configurations

The switching functions for ESCON and FICON architectures are supported by a class of devices called ESCON or FICON *Directors (switches)*. These switches can be connected to the following items:

- Processor (through a channel path)
- Control unit
- Another switch

Switches connect channel paths and control units only for the duration of an I/O operation. The switch configuration is its *internal* configuration.

The I/O Operations portion of IBM Tivoli System Automation for z/OS (previously called ESCON Manager) maintains and manages switch configurations.

IBM Tivoli System Automation I/O Operations functions, such as activation of switch configurations and retrieval of the active configuration data, can be invoked from HCD with option 2.8 “Activate switch configuration” and option 2.5 “View active configuration.”

Through HCD, you have a single point of control for all switch configuration activities and the ability to check whether a certain data path (from processor to device) is fully configured.

You can also use HCD to migrate switch configurations into HCD from three sources:

- Directly from the switches
- From a saved switch file
- From ISPF tables saved by IBM Tivoli System Automation I/O Operations

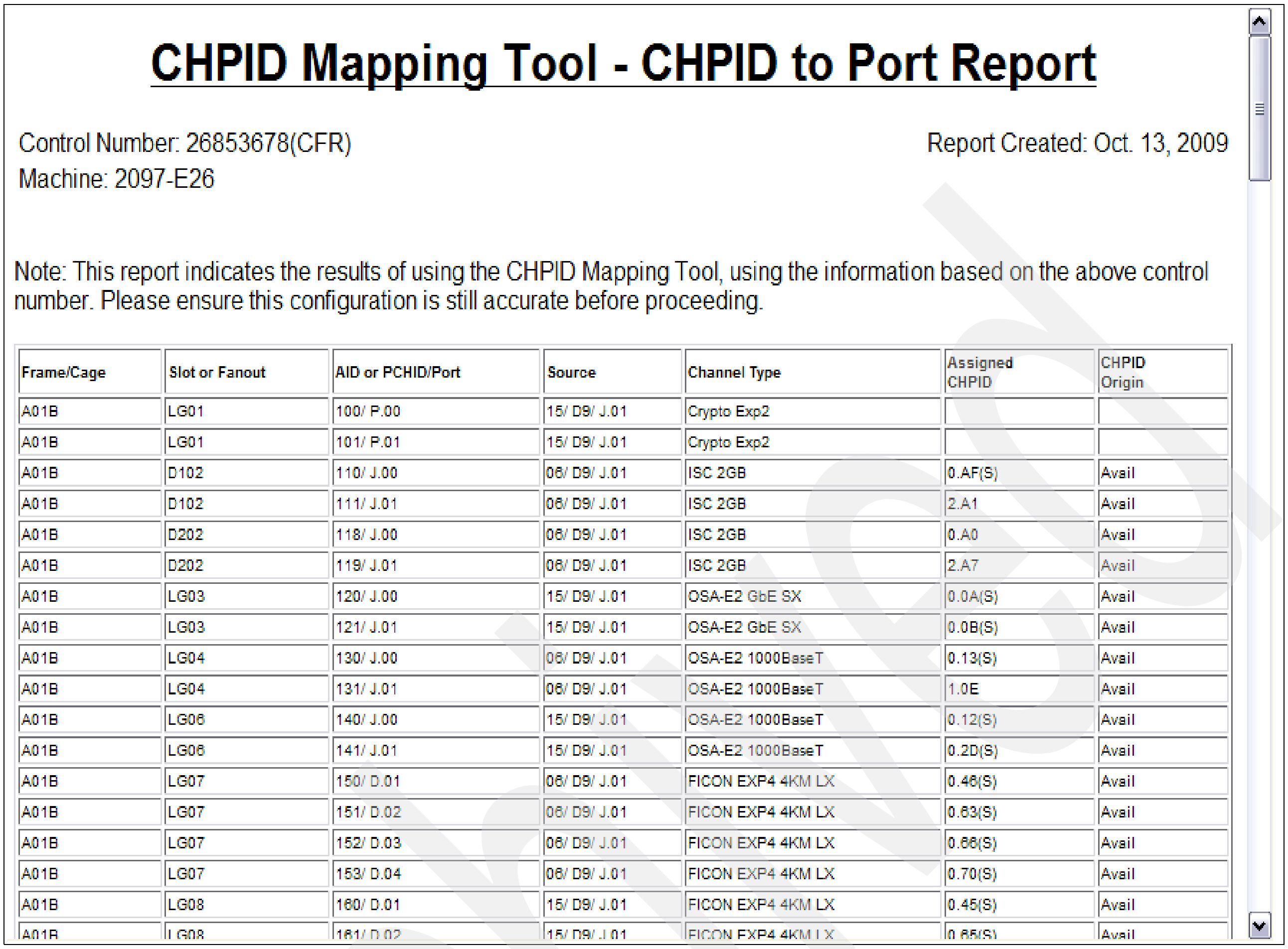
You may use HCD to save switch configuration data in a switch file and activate the switch configuration. That way, the switch is activated using the switch configuration stored in the IODF.

13.2 Providing cable management and connectivity information to CSR

The CHPID Mapping Tool (CMT) provides a report named *Port Report* that presents each I/O port and type, and the CHPID and its CHPID origin, if they are assigned. This report has three options:

- Sorted by location
- Sorted by CHPID
- Database order

The person who will be installing the I/O cables during system installation can benefit from the Port Report to help label the cables. The PCHID or cage/slot/port information must be included on the labels prior to system delivery. Figure 13-1 on page 405 shows a sample Port Report, sorted by location:



CHPID Mapping Tool - CHPID to Port Report

Control Number: 26853678(CFR)
Machine: 2097-E26

Report Created: Oct. 13, 2009

Note: This report indicates the results of using the CHPID Mapping Tool, using the information based on the above control number. Please ensure this configuration is still accurate before proceeding.

Frame/Cage	Slot or Fanout	AID or PCHID/Port	Source	Channel Type	Assigned CHPID	CHPID Origin
A01B	LG01	100/ P.00	15/ D9/ J.01	Crypto Exp2		
A01B	LG01	101/ P.01	15/ D9/ J.01	Crypto Exp2		
A01B	D102	110/ J.00	06/ D9/ J.01	ISC 2GB	0.AF(S)	Avail
A01B	D102	111/ J.01	06/ D9/ J.01	ISC 2GB	2.A1	Avail
A01B	D202	118/ J.00	06/ D9/ J.01	ISC 2GB	0.A0	Avail
A01B	D202	119/ J.01	06/ D9/ J.01	ISC 2GB	2.A7	Avail
A01B	LG03	120/ J.00	15/ D9/ J.01	OSA-E2 GbE SX	0.0A(S)	Avail
A01B	LG03	121/ J.01	15/ D9/ J.01	OSA-E2 GbE SX	0.0B(S)	Avail
A01B	LG04	130/ J.00	06/ D9/ J.01	OSA-E2 1000BaseT	0.13(S)	Avail
A01B	LG04	131/ J.01	06/ D9/ J.01	OSA-E2 1000BaseT	1.0E	Avail
A01B	LG06	140/ J.00	15/ D9/ J.01	OSA-E2 1000BaseT	0.12(S)	Avail
A01B	LG06	141/ J.01	15/ D9/ J.01	OSA-E2 1000BaseT	0.2D(S)	Avail
A01B	LG07	150/ D.01	06/ D9/ J.01	FICON EXP4 4KM LX	0.46(S)	Avail
A01B	LG07	151/ D.02	06/ D9/ J.01	FICON EXP4 4KM LX	0.63(S)	Avail
A01B	LG07	152/ D.03	06/ D9/ J.01	FICON EXP4 4KM LX	0.66(S)	Avail
A01B	LG07	153/ D.04	06/ D9/ J.01	FICON EXP4 4KM LX	0.70(S)	Avail
A01B	LG08	160/ D.01	15/ D9/ J.01	FICON EXP4 4KM LX	0.45(S)	Avail
A01B	LG08	161/ D.02	15/ D9/ J.01	FICON EXP4 4KM LX	0.65(S)	Avail

Figure 13-1 CMT Port Report sorted by location

13.3 Naming conventions

Part of the planning for your system definition in HCD includes devising a naming convention or naming standard for your definitions. Having meaningful CPC naming standards can become important when there are many System z servers in your complex. Also, having a name that can cross the boundaries of hardware definition, documentation, and asset management can successfully link a device across these separate areas, thus helping to remove confusion.

Consider including system/sysplex, customer, disks, or any other information relevant to your system.

Although you do not need a numbering scheme for control units and device numbers, consider having one. Several numbering schemes are possible, each of which is suitable for specific circumstances. See *Hardware Configuration Definition Planning*, GA22-7525 for more information about device numbering schemes.

In our configuration example, we used OS for OSconfiguration, SYSX for the sysplex, and PR for primary disks (see 7.3, “Defining the operating system configuration” on page 88). For a processor (CPCPKR1), the CPC signifies it is a processor, the PK is for site location, and the R1 is a unique identifier that is found outside the normal 00 - FF range. An LPAR with a name of LPPKR101 consists of LP for logical partition, PK for Poughkeepsie, R1 (the unique identifier outside the 00 - FF range) for the processor ID, and 02 for LCSS 0 LPAR number 2 (see 7.6, “Defining partitions” on page 96). The partition name can identify the LPAR on the HMC.

You might consider naming standards for production IODF data sets matching IODF volumes and LOADxx members. Typically, the data set name format consists of the following qualifiers:

- A high-level qualifier (HLQ) of up to 8 bytes
- A second-level qualifier of 6 bytes starting with IODF, and the last two bytes are hexadecimal characters 0 - 9 and A - F

For work IODF files, use these two qualifiers and a third level (such as SYS6.IODF26.WORK) to ensure that you never replace a production IODF.

When using HCM, the entire IODF data set name must not exceed 29 characters. When not using HCM, the entire data set name must not exceed 35 characters.

The naming convention you use must suit your particular needs and requirements.

13.4 Synchronizing an out-of-sync system

The following out-of-sync I messages can occur:

- `CBDA821I - Token of processor` *`proc_id`* `in currently active IODF` *`dsname`* `does not match HSA token, H/W and S/W are out of sync.`

  This message indicates that the activation request is restricted to *software only* changes because the processor token in the currently active IODF does not match the hardware token that is kept in HSA storage on the processor and is updated by either a power-on reset (POR) or dynamic hardware activate. The processor definition has been changed so that it cannot be used as base for hardware changes. Only software changes are possible. The software token is maintained in storage on the running system and is updated by a dynamic hardware activation, dynamic software activation, or IPL (a hardware activation does both hardware and software at the same time, software does only software). A hardware activation can be performed only when the hardware token in HSA matches the token in the active IODF. Software activations can be done without the tokens matching.

  You may respond to this message as follows:

  – Use the **`D IOS,CONFIG`** command to determine what the token (from HSA) information reveals.

  – Find the IODF that has the same processor token for that machine. For production IODFs, you can use HCD dialog option View Processor Definition, and the CSS report, to determine the processor token.

  – Enter an ACTIVATE request with the SOFT keyword to change the software configuration definition to match the hardware configuration definition. Note that this might mean activating an old IODF in order to get the tokens back in sync.

  – After definitions are back in sync, you may perform a hardware activation to the appropriate IODF.

  If the IODF containing the matching token no longer exists, a POR must be done, using an IOCDS that has a matching IODF available, to get the tokens in sync allowing for later dynamic hardware activations.

- `IOS505A - Dynamic I/O Configuration changes are not allowed, the hardware and software configurations do not match.`

  This message indicates that the configuration token in the I/O definition file (IODF) does not match the configuration token in the hardware system area (HSA).

  You may respond as follows:

  – Ensure that the correct LOADxx parmlib member was selected.

  – Ensure that the correct parmlib device number was specified on the IPL load parameter.

  – Use the D IOS,CONFIG command to determine what the token information reveals. This is the processor token from HSA.

  – Find the IODF that has the same processor token for that machine.

  – Enter an ACTIVATE request with the SOFT keyword to change the software configuration definition to match the hardware configuration definition. Note that this might mean activating an old IODF in order to get the tokens back in sync.

  – After definitions are back in sync, perform a hardware activation to the appropriate IODF.

- “`OK`” `out of sync condition`

  If you perform a hardware activation on LPAR 1, but LPAR 2 and LPAR 3 are not activated/soft, this message is displayed until they are software-activated or loaded (IPL) with: `LOAD**` or `LOADxx`.

13.5 Documentation

Be sure to document your current work and production IODFs including all your OS configurations, EDTs, consoles, LOADxx members, IOCDSs; document all of it even if you have never done so in the past.

Documenting the current work IODF being used can prevent losing work IODF updates, because new IODFs can be created directly from a production IODF.

Documenting your setup for operators and others who manage your systems is important. This step also helps limit time spent during backup procedures and minimizes the risk of errors.

Part 3

Appendix

This part provides the IOCP data sets for the sample configuration that is described in 7.1, “Configuration example” on page 84.

A

Configuration example IOCP data sets

This appendix includes examples of the following IOCP data sets:

- FICON FCTC using a single FC Channel Path (FICON FCTC loop)
- CIB coupling facility links used for STP only
- Special devices type 3390D in subchannel set 1 (duplicate device numbers).

Because coupling facility links that are used for both CF and STP only is impossible between the CPCPKR1 and CPCPKR2 processors in the sample configuration, a third CPCPKR3 processor has been added for this example.

Examples in this appendix show the following information:

- The IOCP data set for the CPCPKR1 processor, which is complete
- The IOCP data set for the CPCPKR1 processor, which does not include control units shared with the CPCPKR1 processor
- The IOCP data set for the CPCPKR3 processor, which includes coupling facility STP only links to the CPCPKR2 processor only

A.1 IOCP data set for CPCPKR1

This section shows, in the following figures, the complete IOCP data set for the CPCPKR1 processor:

- Figure A-1 on page 413: Resource and CHPIDs
- Figure A-2 on page 414: Switches and Network
- Figure A-3 on page 415: FICON FCTC
- Figure A-4 on page 416: TS7700 Cluster 0
- Figure A-5 on page 417: TS7700 Cluster 1
- Figure A-6 on page 417: ATL
- Figure A-7 on page 418: DS8000 Primary
- Figure A-8 on page 419: DS8000 Secondary
- Figure A-9 on page 419: Consoles and coupling facility links

```
ID    MSG1='IOCDSDS',MSG2='PREBENE.IODF10 - 2009-10-28 08:43',*
      SYSTEM=(2097,1),LSYSTEM=CPCPKR1,                         *
      TOK=('CPCPKR1',00800006991E2094084303270109301F00000000,*
      00000000,'09-10-28','08:43:03','PREBENE','IODF10')
RESOURCE PARTITION=((CSS(0),(CFPKR101,1),(LPPKR102,2),(*,3),(**
      ,4),(*,5),(*,6),(*,7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D*
      ),(*,E),(*,F)),(CSS(1),(LPPKR111,1),(*,2),(*,3),(*,4),(**
      ,5),(*,6),(*,7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D),(*,E*
      ),(*,F)),(CSS(2),(*,1),(*,2),(*,3),(*,4),(*,5),(*,6),(*,*
      7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D),(*,E),(*,F)),(CSS*
      (3),(*,1),(*,2),(*,3),(*,4),(*,5),(*,6),(*,7),(*,8),(*,9*
      ),(*,A),(*,B),(*,C),(*,D),(*,E),(*,F)))
CHPID PATH=(CSS(0),16),SHARED,PARTITION=((LPPKR102),(=)),      *
      PCHID=500,TYPE=OSN
CHPID PATH=(CSS(0),17),SHARED,PARTITION=((LPPKR102),(=)),      *
      PCHID=501,TYPE=OSN
CHPID PATH=(CSS(0,1),1A),SHARED,                               *
      PARTITION=((CSS(0),(LPPKR102),(=))),PCHID=530,TYPE=OSC
CHPID PATH=(CSS(0,1),1E),SHARED,                               *
      PARTITION=((CSS(0),(LPPKR102),(=))),PCHID=3E0,TYPE=OSD
CHPID PATH=(CSS(0,1),40),SHARED,                               *
      PARTITION=((CSS(0),(LPPKR102),(=))),SWITCH=11,PCHID=180,*
      TYPE=FC
CHPID PATH=(CSS(0,1),44),SHARED,                               *
      PARTITION=((CSS(0),(LPPKR102),(=))),SWITCH=12,PCHID=1A0,*
      TYPE=FC
CHPID PATH=(CSS(0,1),57),SHARED,                               *
      PARTITION=((CSS(0),(LPPKR102),(=))),SWITCH=12,PCHID=1C0,*
      TYPE=FC
CHPID PATH=(CSS(0,1),5A),SHARED,                               *
      PARTITION=((CSS(0),(LPPKR102),(=))),SWITCH=11,PCHID=160,*
      TYPE=FC
CHPID PATH=(CSS(0,1),5C),SHARED,                               *
      PARTITION=((CSS(0),(LPPKR102),(=))),SWITCH=11,PCHID=150,*
      TYPE=FC
CHPID PATH=(CSS(0),98),SHARED,                                 *
      PARTITION=((CFPKR101,LPPKR102),(=)),CPATH=(CSS(0),B8),  *
      CSYSTEM=CPCPKR2,AID=0A,PORT=1,TYPE=CIB
CHPID PATH=(CSS(0),99),SHARED,                                 *
      PARTITION=((CFPKR101,LPPKR102),(=)),CPATH=(CSS(0),B9),  *
      CSYSTEM=CPCPKR2,AID=0A,PORT=2,TYPE=CIB
CHPID PATH=(CSS(0),F8),SHARED,                                 *
      PARTITION=((CFPKR101,LPPKR102),(=)),CPATH=(CSS(0),F9),  *
      TYPE=ICP
CHPID PATH=(CSS(0),F9),SHARED,                                 *
      PARTITION=((CFPKR101,LPPKR102),(=)),CPATH=(CSS(0),F8),  *
      TYPE=ICP
```

Figure A-1 IOCP data set for CPCPKR1 (resource and CHPIDs)

```
CNTLUNIT CUNUMBR=0011,PATH=((CSS(1),5C)),UNITADD=((00,001)),  *
      LINK=((CSS(1),11FE)),UNIT=2032
IODEVICE ADDRESS=011,UNITADD=00,CUNUMBR=(0011),STADET=Y,      *
      UNIT=2032
CNTLUNIT CUNUMBR=0012,PATH=((CSS(0),44)),UNITADD=((00,001)),  *
      LINK=((CSS(0),12FE)),UNIT=2032
IODEVICE ADDRESS=012,UNITADD=00,CUNUMBR=(0012),STADET=Y,      *
      UNIT=2032
CNTLUNIT CUNUMBR=0013,PATH=((CSS(0),5C)),UNITADD=((00,001)),  *
      LINK=((CSS(0),13FE)),UNIT=2032
IODEVICE ADDRESS=013,UNITADD=00,CUNUMBR=(0013),STADET=Y,      *
      UNIT=2032
CNTLUNIT CUNUMBR=0014,PATH=((CSS(0),44)),UNITADD=((00,001)),  *
      LINK=((CSS(0),14FE)),UNIT=2032
IODEVICE ADDRESS=014,UNITADD=00,CUNUMBR=(0014),STADET=Y,      *
      UNIT=2032
CNTLUNIT CUNUMBR=3000,PATH=((CSS(0),1E),(CSS(1),1E)),UNIT=OSA
IODEVICE ADDRESS=(3000,015),CUNUMBR=(3000),UNIT=OSA
IODEVICE ADDRESS=300F,UNITADD=FE,CUNUMBR=(3000),UNIT=OSAD
CNTLUNIT CUNUMBR=3800,PATH=((CSS(0),16)),UNIT=OSN
IODEVICE ADDRESS=(3800,015),CUNUMBR=(3800),UNIT=OSN
IODEVICE ADDRESS=380F,UNITADD=FE,CUNUMBR=(3800),UNIT=OSAD
CNTLUNIT CUNUMBR=3900,PATH=((CSS(0),17)),UNIT=OSN
IODEVICE ADDRESS=(3900,015),CUNUMBR=(3900),UNIT=OSN
IODEVICE ADDRESS=390F,UNITADD=FE,CUNUMBR=(3900),UNIT=OSAD
```

Figure A-2 IOCP data set for CPCPKR1 (switches and network)

```
CNTLUNIT CUNUMBR=4000,PATH=((CSS(0),5C)),UNITADD=((00,008)),  *
      LINK=((CSS(0),1112)),CUADD=11,UNIT=FCTC
IODEVICE ADDRESS=(4000,008),CUNUMBR=(4000),STADET=Y,          *
      PARTITION=((CSS(0),LPPKR102)),UNIT=FCTC
CNTLUNIT CUNUMBR=4008,PATH=((CSS(0),44)),UNITADD=((00,008)),  *
      LINK=((CSS(0),1212)),CUADD=11,UNIT=FCTC
IODEVICE ADDRESS=(4008,008),UNITADD=00,CUNUMBR=(4008),        *
      STADET=Y,PARTITION=((CSS(0),LPPKR102)),UNIT=FCTC
CNTLUNIT CUNUMBR=4010,PATH=((CSS(1),5A)),UNITADD=((00,008)),  *
      LINK=((CSS(1),1102)),CUADD=2,UNIT=FCTC
IODEVICE ADDRESS=(4010,008),UNITADD=00,CUNUMBR=(4010),        *
      STADET=Y,PARTITION=((CSS(1),LPPKR111)),UNIT=FCTC
CNTLUNIT CUNUMBR=4018,PATH=((CSS(1),57)),UNITADD=((00,008)),  *
      LINK=((CSS(1),1202)),CUADD=2,UNIT=FCTC
IODEVICE ADDRESS=(4018,008),UNITADD=00,CUNUMBR=(4018),        *
      STADET=Y,PARTITION=((CSS(1),LPPKR111)),UNIT=FCTC
CNTLUNIT CUNUMBR=4020,PATH=((CSS(0),5C)),UNITADD=((00,008)),  *
      LINK=((CSS(0),1312)),CUADD=4,UNIT=FCTC
IODEVICE ADDRESS=(4020,008),UNITADD=00,CUNUMBR=(4020),        *
      STADET=Y,PARTITION=((CSS(0),LPPKR102)),UNIT=FCTC
CNTLUNIT CUNUMBR=4028,PATH=((CSS(0),44)),UNITADD=((00,008)),  *
      LINK=((CSS(0),1412)),CUADD=4,UNIT=FCTC
IODEVICE ADDRESS=(4028,008),UNITADD=00,CUNUMBR=(4028),        *
      STADET=Y,PARTITION=((CSS(0),LPPKR102)),UNIT=FCTC
CNTLUNIT CUNUMBR=4100,PATH=((CSS(0),40)),UNITADD=((00,008)),  *
      LINK=((CSS(0),1100)),CUADD=11,UNIT=FCTC
IODEVICE ADDRESS=(4100,008),CUNUMBR=(4100),STADET=Y,          *
      PARTITION=((CSS(0),LPPKR102)),UNIT=FCTC
CNTLUNIT CUNUMBR=4110,PATH=((CSS(1),40)),UNITADD=((00,008)),  *
      LINK=((CSS(1),1100)),CUADD=2,UNIT=FCTC
IODEVICE ADDRESS=(4110,008),UNITADD=00,CUNUMBR=(4110),        *
      STADET=Y,PARTITION=((CSS(1),LPPKR111)),UNIT=FCTC
```

Figure A-3 IOCP data set for CPCPKR1 (FICON FCTC)

Control unit 4100 and 4100 is a FICON FCTC loop that connects two partitions on the same processor but, in this case, on separate LCSSs by using a single FICON Channel Path.

```
CNTLUNIT CUNUMBR=B000,                                                 *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),               *
      UNITADD=((00,016)),                                              *
      LINK=((CSS(0),1119,1129,1219,1229),(CSS(1),1119,1129,121*
      9,1229)),CUADD=0,UNIT=3490
IODEVICE ADDRESS=(B000,016),CUNUMBR=(B000),STADET=Y,UNIT=3490
CNTLUNIT CUNUMBR=B010,                                                 *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),               *
      UNITADD=((00,016)),                                              *
      LINK=((CSS(0),1119,1129,1219,1229),(CSS(1),1119,1129,121*
      9,1229)),CUADD=1,UNIT=3490
IODEVICE ADDRESS=(B010,016),UNITADD=00,CUNUMBR=(B010),                 *
      STADET=Y,UNIT=3490
CNTLUNIT CUNUMBR=B020,                                                 *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),               *
      UNITADD=((00,016)),                                              *
      LINK=((CSS(0),1119,1129,1219,1229),(CSS(1),1119,1129,121*
      9,1229)),CUADD=2,UNIT=3490
IODEVICE ADDRESS=(B020,016),UNITADD=00,CUNUMBR=(B020),                 *
      STADET=Y,UNIT=3490
CNTLUNIT CUNUMBR=B030,                                                 *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),               *
      UNITADD=((00,016)),                                              *
      LINK=((CSS(0),1119,1129,1219,1229),(CSS(1),1119,1129,121*
      9,1229)),CUADD=3,UNIT=3490
IODEVICE ADDRESS=(B030,016),UNITADD=00,CUNUMBR=(B030),                 *
      STADET=Y,UNIT=3490
```

Figure A-4 IOCP data set for CPCPKR1 (TS7700 Cluster 0)

```
CNTLUNIT CUNUMBR=B100,                                              *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),             *
      UNITADD=((00,016)),                                           *
      LINK=((CSS(0),1319,1329,1419,1429),(CSS(1),1319,1329,141*
      9,1429)),CUADD=0,UNIT=3490
IODEVICE ADDRESS=(B100,016),CUNUMBR=(B100),STADET=Y,UNIT=3490
CNTLUNIT CUNUMBR=B110,                                              *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),             *
      UNITADD=((00,016)),                                           *
      LINK=((CSS(0),1319,1329,1419,1429),(CSS(1),1319,1329,141*
      9,1429)),CUADD=1,UNIT=3490
IODEVICE ADDRESS=(B110,016),UNITADD=00,CUNUMBR=(B110),              *
      STADET=Y,UNIT=3490
CNTLUNIT CUNUMBR=B120,                                              *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),             *
      UNITADD=((00,016)),                                           *
      LINK=((CSS(0),1319,1329,1419,1429),(CSS(1),1319,1329,141*
      9,1429)),CUADD=2,UNIT=3490
IODEVICE ADDRESS=(B120,016),UNITADD=00,CUNUMBR=(B120),              *
      STADET=Y,UNIT=3490
CNTLUNIT CUNUMBR=B130,                                              *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),             *
      UNITADD=((00,016)),                                           *
      LINK=((CSS(0),1319,1329,1419,1429),(CSS(1),1319,1329,141*
      9,1429)),CUADD=3,UNIT=3490
IODEVICE ADDRESS=(B130,016),UNITADD=00,CUNUMBR=(B130),              *
      STADET=Y,UNIT=3490
```

Figure A-5 IOCP data set for CPCPKR1 (TS7700 Cluster 1)

```
CNTLUNIT CUNUMBR=B800,PATH=((CSS(0),5C,44),(CSS(1),5C,44)),   *
      UNITADD=((00,016)),                                      *
      LINK=((CSS(0),1117,1217),(CSS(1),1117,1217)),CUADD=0,   *
      UNIT=3590
IODEVICE ADDRESS=(B800,016),CUNUMBR=(B800),STADET=Y,UNIT=3590
```

Figure A-6 IOCP data set for CPCPKR1 (ATL)

```
CNTLUNIT CUNUMBR=D000,PATH=((CSS(0),5C,5A,44,57)),           *
      UNITADD=((00,256)),LINK=((CSS(0),1118,1128,1218,1228)), *
      CUADD=0,UNIT=2107
IODEVICE ADDRESS=(D000,100),CUNUMBR=(D000),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(D064,156),CUNUMBR=(D000),STADET=Y,SCHSET=1, *
      UNIT=3390A
CNTLUNIT CUNUMBR=D100,PATH=((CSS(0),5C,5A,44,57)),           *
      UNITADD=((00,256)),LINK=((CSS(0),1118,1128,1218,1228)), *
      CUADD=1,UNIT=2107
IODEVICE ADDRESS=(D100,100),CUNUMBR=(D100),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(D164,156),CUNUMBR=(D100),STADET=Y,SCHSET=1, *
      UNIT=3390A
CNTLUNIT CUNUMBR=D200,PATH=((CSS(0),5C,5A,44,57)),           *
      UNITADD=((00,256)),LINK=((CSS(0),1118,1128,1218,1228)), *
      CUADD=2,UNIT=2107
IODEVICE ADDRESS=(D200,100),CUNUMBR=(D200),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(D264,156),CUNUMBR=(D200),STADET=Y,SCHSET=1, *
      UNIT=3390A
CNTLUNIT CUNUMBR=D300,                                        *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),       *
      UNITADD=((00,256)),                                     *
      LINK=((CSS(0),1118,1128,1218,1228),(CSS(1),1118,1128,121*
      8,1228)),CUADD=3,UNIT=2107
IODEVICE ADDRESS=(D300,100),CUNUMBR=(D300),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(D364,156),CUNUMBR=(D300),STADET=Y,UNIT=3390A
CNTLUNIT CUNUMBR=D500,PATH=((CSS(0),5C,5A,44,57)),           *
      UNITADD=((00,256)),LINK=((CSS(0),1118,1128,1218,1228)), *
      CUADD=5,UNIT=2107
IODEVICE ADDRESS=(D200,100),CUNUMBR=(D500),STADET=Y,SCHSET=1, *
      UNIT=3390D
```

Figure A-7 IOCP data set for CPCPKR1 (DS8000 Primary)

Control unit D500 includes special devices type 3390D in subchannel set 1. Starting device number is D200, just as for control unit D200. Both sets of devices can be part of a single operating system configuration.

```
CNTLUNIT CUNUMBR=E000,PATH=((CSS(0),5C,5A,44,57)),            *
      UNITADD=((00,256)),LINK=((CSS(0),1318,1328,1418,1428)), *
      CUADD=0,UNIT=2107
IODEVICE ADDRESS=(E000,100),CUNUMBR=(E000),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(E064,156),CUNUMBR=(E000),STADET=Y,SCHSET=1, *
      UNIT=3390A
CNTLUNIT CUNUMBR=E100,PATH=((CSS(0),5C,5A,44,57)),            *
      UNITADD=((00,256)),LINK=((CSS(0),1318,1328,1418,1428)), *
      CUADD=1,UNIT=2107
IODEVICE ADDRESS=(E100,100),CUNUMBR=(E100),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(E164,156),CUNUMBR=(E100),STADET=Y,SCHSET=1, *
      UNIT=3390A
CNTLUNIT CUNUMBR=E200,                                        *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),       *
      UNITADD=((00,256)),                                     *
      LINK=((CSS(0),1318,1328,1418,1428),(CSS(1),1318,1328,141*
      8,1428)),CUADD=2,UNIT=2107
IODEVICE ADDRESS=(E200,100),CUNUMBR=(E200),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(E264,156),CUNUMBR=(E200),STADET=Y,SCHSET=1, *
      UNIT=3390A
CNTLUNIT CUNUMBR=E300,                                        *
      PATH=((CSS(0),5C,5A,44,57),(CSS(1),5C,5A,44,57)),       *
      UNITADD=((00,256)),                                     *
      LINK=((CSS(0),1318,1328,1418,1428),(CSS(1),1318,1328,141*
      8,1428)),CUADD=3,UNIT=2107
IODEVICE ADDRESS=(E300,100),CUNUMBR=(E300),STADET=Y,UNIT=3390B
IODEVICE ADDRESS=(E364,156),CUNUMBR=(E300),STADET=Y,UNIT=3390A
```

Figure A-8 IOCP data set for CPCPKR1 (DS8000 Secondary)

```
CNTLUNIT CUNUMBR=F000,PATH=((CSS(0),1A),(CSS(1),1A)),UNIT=OSC
IODEVICE ADDRESS=(F000,032),MODEL=X,CUNUMBR=(F000),UNIT=3270
CNTLUNIT CUNUMBR=FFFD,PATH=((CSS(0),98,99)),UNIT=CFP
IODEVICE ADDRESS=(FFDD,007),CUNUMBR=(FFFD),UNIT=CFP
IODEVICE ADDRESS=(FFEB,007),CUNUMBR=(FFFD),UNIT=CFP
CNTLUNIT CUNUMBR=FFFE,PATH=((CSS(0),F8,F9)),UNIT=CFP
IODEVICE ADDRESS=(FFF2,007),CUNUMBR=(FFFE),UNIT=CFP
IODEVICE ADDRESS=(FFF9,007),CUNUMBR=(FFFE),UNIT=CFP
```

Figure A-9 IOCP data set for CPCPKR1 (consoles and coupling facility links)

A.2 IOCP data set for CPCPKR2

This section shows, in the following figues, the partial IOCP data set for the CPCPKR2 processor:

- Figure A-10 on page 420: Resource and CHPIDs
- Figure A-11 on page 421: Network
- Figure A-12 on page 421: FICON FCTC
- Figure A-13 on page 421: DS8000 FCP
- Figure A-14 on page 421: Consoles and coupling facility links

```
ID     MSG1='IOCDSDS',MSG2='PREBENE.IODF10 - 2009-10-28 08:43',*
       SYSTEM=(2097,1),LSYSTEM=CPCPKR2,                         *
       TOK=('CPCPKR2',00800006991E2094084303270109301F00000000,*
       00000000,'09-10-28','08:43:03','PREBENE','IODF10')
RESOURCE PARTITION=((CSS(0),(CFPKR203,3),(LPPKR204,4),(*,1),(**
       ,2),(*,5),(*,6),(*,7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D*
       ),(*,E),(*,F)),(CSS(1),(LPPKR212,2),(*,1),(*,3),(*,4),(**
       ,5),(*,6),(*,7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D),(*,E*
       ),(*,F)),(CSS(2),(*,1),(*,2),(*,3),(*,4),(*,5),(*,6),(*,*
       7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D),(*,E),(*,F)),(CSS*
       (3),(*,1),(*,2),(*,3),(*,4),(*,5),(*,6),(*,7),(*,8),(*,9*
       ),(*,A),(*,B),(*,C),(*,D),(*,E),(*,F)))
CHPID PATH=(CSS(0,1),14),SHARED,                                *
       PARTITION=((CSS(0),(LPPKR204),(=))),PCHID=3A0,TYPE=OSC
CHPID PATH=(CSS(0,1),1C),SHARED,                                *
       PARTITION=((CSS(0),(LPPKR204),(=))),PCHID=170,TYPE=OSD
CHPID PATH=(CSS(0,1),30),SHARED,                                *
       PARTITION=((CSS(0),(LPPKR204),(=))),SWITCH=13,PCHID=1E0,*
       TYPE=FC
CHPID PATH=(CSS(0,1),4D),SHARED,                                *
       PARTITION=((CSS(0),(LPPKR204),(=))),SWITCH=13,PCHID=1D0,*
       TYPE=FC
CHPID PATH=(CSS(0,1),56),SHARED,                                *
       PARTITION=((CSS(0),(LPPKR204),(=))),SWITCH=14,PCHID=370,*
       TYPE=FC
CHPID PATH=(CSS(0,1),58),SHARED,                                *
       PARTITION=((CSS(0),(LPPKR204),(=))),SWITCH=14,PCHID=360,*
       TYPE=FC
CHPID PATH=(CSS(0),B8),SHARED,                                  *
       PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),98),   *
       CSYSTEM=CPCPKR1,AID=1B,PORT=1,TYPE=CIB
CHPID PATH=(CSS(0),B9),SHARED,                                  *
       PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),99),   *
       CSYSTEM=CPCPKR1,AID=1B,PORT=2,TYPE=CIB
CHPID PATH=(CSS(0,1),F0),SHARED,                                *
       PARTITION=((CSS(0),(LPPKR204),(=))),CHPARM=C0,TYPE=IQD
CHPID PATH=(CSS(0),F8),SHARED,                                  *
       PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),F9),   *
       TYPE=ICP
CHPID PATH=(CSS(0),F9),SHARED,                                  *
       PARTITION=((CFPKR203,LPPKR204),(=)),CPATH=(CSS(0),F8),   *
       TYPE=ICP
CHPID PATH=(CSS(1),79),PARTITION=((LPPKR212),(=)),PCHID=1F3,   *
       TYPE=FCP
CHPID PATH=(CSS(1),F4),SHARED,PARTITION=((0),(LPPKR212)),      *
       CPATH=(CSS(0),F8),CSYSTEM=CPCPKR3,AID=0C,PORT=1,TYPE=CIB
CHPID PATH=(CSS(1),F5),SHARED,PARTITION=((0),(LPPKR212)),      *
       CPATH=(CSS(0),F9),CSYSTEM=CPCPKR3,AID=0C,PORT=1,TYPE=CIB
```

Figure A-10 IOCP data set for CPCPKR2 (resource and CHPIDs)

```
CNTLUNIT CUNUMBR=3100,PATH=((CSS(0),1C),(CSS(1),1C)),UNIT=OSA
IODEVICE ADDRESS=(3100,015),CUNUMBR=(3100),UNIT=OSA
IODEVICE ADDRESS=310F,UNITADD=FE,CUNUMBR=(3100),UNIT=OSAD
CNTLUNIT CUNUMBR=3C00,PATH=((CSS(0),F0),(CSS(1),F0)),UNIT=IQD
IODEVICE ADDRESS=(3C00,128),CUNUMBR=(3C00),UNIT=IQD
```

Figure A-11 IOCP data set for CPCPKR2 (network)

```
CNTLUNIT CUNUMBR=4030,PATH=((CSS(0),30)),UNITADD=((00,008)),  *
      LINK=((CSS(0),1102)),CUADD=2,UNIT=FCTC
IODEVICE ADDRESS=(4030,008),UNITADD=00,CUNUMBR=(4030),        *
      STADET=Y,PARTITION=((CSS(0),LPPKR204)),UNIT=FCTC
CNTLUNIT CUNUMBR=4038,PATH=((CSS(0),56)),UNITADD=((00,008)),  *
      LINK=((CSS(0),1202)),CUADD=2,UNIT=FCTC
IODEVICE ADDRESS=(4038,008),UNITADD=00,CUNUMBR=(4038),        *
      STADET=Y,PARTITION=((CSS(0),LPPKR204)),UNIT=FCTC
```

Figure A-12 IOCP data set for CPCPKR2 (FICON FCTC)

```
CNTLUNIT CUNUMBR=EF00,PATH=((CSS(1),79)),UNIT=FCP
IODEVICE ADDRESS=(EF00,254),CUNUMBR=(EF00),UNIT=FCP
```

Figure A-13 IOCP data set for CPCPKR2 (DS8000 FCP)

```
CNTLUNIT CUNUMBR=F100,PATH=((CSS(0),14),(CSS(1),14)),UNIT=OSC
IODEVICE ADDRESS=(F100,048),MODEL=X,CUNUMBR=(F100),UNIT=3270
CNTLUNIT CUNUMBR=FFF9,PATH=((CSS(1),F4,F5)),UNIT=STP
CNTLUNIT CUNUMBR=FFFB,PATH=((CSS(0),F8,F9)),UNIT=CFP
IODEVICE ADDRESS=(FFC8,007),CUNUMBR=(FFFB),UNIT=CFP
IODEVICE ADDRESS=(FFCF,007),CUNUMBR=(FFFB),UNIT=CFP
CNTLUNIT CUNUMBR=FFFC,PATH=((CSS(0),B8,B9)),UNIT=CFP
IODEVICE ADDRESS=(FFD6,007),CUNUMBR=(FFFC),UNIT=CFP
IODEVICE ADDRESS=(FFE4,007),CUNUMBR=(FFFC),UNIT=CFP
```

Figure A-14 IOCP data set for CPCPKR2 (consoles and coupling facility links)

Control unit FFF9 is an example of a coupling facility link used for STP only. Notice that no IODEVICE statements exists. All the other control units are used for both coupling facility links and STP.

A.3 IOCP data set for CPCPKR3

Figure A-15 shows the partial IOCP data set for the CPCPKR3 processor.

```
ID    MSG1='IOCPDS',MSG2='PREBENE.IODF10 - 2009-10-28 11:08', *
      SYSTEM=(2097,1),LSYSTEM=CPCPKR3,                        *
      TOK=('CPCPKR3',00800006991E20941108360701093O1F00000000,*
      00000000,'09-10-28','11:08:36','PREBENE','IODF10')
RESOURCE PARTITION=((CSS(0),(LPPKR301,1),(*,2),(*,3),(*,4),(*,*
      5),(*,6),(*,7),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D),(*,E)*
      ,(*,F)),(CSS(1),(*,1),(*,2),(*,3),(*,4),(*,5),(*,6),(*,7*
      ),(*,8),(*,9),(*,A),(*,B),(*,C),(*,D),(*,E),(*,F)),(CSS(*
      2),(*,1),(*,2),(*,3),(*,4),(*,5),(*,6),(*,7),(*,8),(*,9)*
      ,(*,A),(*,B),(*,C),(*,D),(*,E),(*,F)),(CSS(3),(*,1),(*,2*
      ),(*,3),(*,4),(*,5),(*,6),(*,7),(*,8),(*,9),(*,A),(*,B),*
      (*,C),(*,D),(*,E),(*,F)))
CHPID PATH=(CSS(0),F8),SHARED,PARTITION=((0),(LPPKR301)),     *
      CPATH=(CSS(1),F4),CSYSTEM=CPCPKR2,AID=0A,PORT=1,TYPE=CIB
CHPID PATH=(CSS(0),F9),SHARED,PARTITION=((0),(LPPKR301)),     *
      CPATH=(CSS(1),F5),CSYSTEM=CPCPKR2,AID=0A,PORT=1,TYPE=CIB
CNTLUNIT CUNUMBR=FFFA,PATH=((CSS(0),F8,F9)),UNIT=STP
```

Figure A-15 IOCP data set for CPCPKR3

Control unit FFFA is an example of a coupling facility link used for STP only. Notice that no IODEVICE statements exists.

Glossary

This glossary defines technical terms and abbreviations used in the Hardware Configuration Definition (HCD) and Hardware Configuration Manager (HCM) documentation. If you do not find the term you are looking for, see the index of the appropriate HCD or HCM document or view the IBM Terminology Web site:
`http://www.ibm.com/ibm/terminology`

A

access list. A CHPID has two partition lists: Access and Candidate. If a CHPID is either shared or reconfigurable, you can specify which partitions have access to that CHPID. Use the CHPID access list with or without the CHPID candidate list.
That is, CHPIDs are assigned to partitions by adding each partition to the CHPID's access or candidate list. A partition has initial access to a CHPID if the logical partition is on that CHPID's access list.

activity log. The activity log is a sequential data set with the name of the associated IODF and the suffix ACTLOG. Use the activity log to document all definitions you made to the current IODF using HCD.

B

Base. Base is the base device number of a *multiple exposure* device, which is accessible by more than one device number. You assign the first device number and the system generates the additional device numbers.

BCPii. Base Control Program internal interface. This is a secure z/OS interface to your HMC/SE that allows authorized applications to query, change, and perform basic operational procedures against the installed System z hardware base.

C

cabinet. Cabinets, also known as fiber management cabinets contain *panels* organized into *port groups* of *patchports*, which are pairs of fiber adapters or couplers. Cabinets are used to organize long, complex cables between processors and controllers, which may be as far away as other buildings. In the configuration diagram, cabinets are shown on the far right.

cable in inventory. You can put unused cables *into inventory*; HCM will not "remember" the past usage of these cables. Cables in inventory are cables that are generally available for use to any object.

candidate list. A partition can gain access to a CHPID if the partition is on that CHPID's Candidate list. A partition is allowed to configure a CHPID online if the logical partition is on that CHPID's Candidate list.
See also access list.

Central processor complex (CPC). A physical collection of hardware that consists of central storage, one or more central processors, timers, and channels.

CFReport. When a machine is ordered, the output of the order process is a binary file that represents the physical description of the final machine. One of the components of that file is the type and physical location, including the physical channel identifier (PCHID) value assigned to that location, of all the I/O features in the final machine. This file is called a CFReport.

Change log. The change log is a VSAM data set with the name of the associated IODF and the suffix CHLOG. It is automatically created if change logging and automatic activity logging is active. A subset of its generated entries will then be used to create the activity log entries.

channel adapter. A channel adapter groups two or more controller channel interfaces electronically.

channel interface. See [controller] channel interface or [crossbar] channel interface.

channel subsystem (CSS). A collection of subchannels that directs the flow of information between I/O devices and main storage. It uses one ore more channel paths as the communication link in managing the flow of information to or from I/O devices. Within the CSS is one subchannel set and logical partitions. One subchannel from the set is provided for and dedicated to each I/O device accessible to the CSS. Logical partitions use subchannels to communicate with I/O devices. The maximum number of CSSs supported by a processor depends on the processor type. If more than one CSS is supported by a processor, each CSS has a processor unique single hexadecimal digit CSS identifier (CSS ID).

CHPID. A logical processor contains a number of CHPIDs, or Channel Path IDs, which are the logical equivalent of channels in the physical processor. See also:
- dedicated CHPID
- reconfigurable CHPID
- shared CHPID
- spanned CHPID

CHPID mapping. Usually, a processor can have up to 256 channels and 256 CHPIDs, therefore a 1:1 mapping can exist. However, in processors of the “one processor per partition” style, there can be up to 512 channels or the relationship between CHPIDs and channels may not be one to one. The default is to map the CHPIDs to the first 256 channels, but you may specify a non-standard CHPID mapping.

CHPID Mapping Tool. The CHPID Mapping Tool helps you in developing a CHPID-to-PCHID relationship for XMP processors. It accepts an IOCP input file without PCHID values, allows the user to assign the logical CHPID values in the input to the PCHIDs available with his ordered machine, and returns an updated IOCP input file that contains the PCHID values.

CHPID type. The logical CHPID type typically corresponds to a physical path interface type.

cluster. See segment.

CMT. See CHPID Mapping Tool.

configuration diagram. From the IODF on the host, HCM constructs an interactive configuration diagram to help you visualize and more easily maintain your system. You can add or modify objects in the diagram to more accurately represent your hardware configuration. You can also print out wall charts or reports to plan and implement future modifications to your system.

configuration file (config file). The configuration file (*.HCM file) contains HCM’s interactive configuration diagram. You can modify and save separate versions of your hardware configuration in a number of configuration files for historical and planning purposes. The configuration file is also called *work configuration file*.

The term configuration files refers to work configuration files (*.hcm/*.hcmz file) and to production configuration files (*.hcr/*.hcrz file). They are equivalent to the work and production IODFs, but are located on the PC. File extensions *.hcmz and *.hcrz indicate that the files are compressed.

See also work configuration file and production configuration file.

context diagram. A context diagram is a configuration diagram showing the object of interest and all equipment connected to it. Think of a context diagram as the configuration as seen by this object.

CPM. HMC and SE are integral part for the z/OS Capacity Provisioning environment. The Capacity Provisioning Manager (CPM) communicates with the HMC through System z APIs and enters CoD requests

cropped. A cropped diagram includes a subset of the entire configuration comprising the selected object (or objects) and any objects that they connect to.

controller. A controller translates high level requests from processors to low level requests to I/O devices, and vice versa. Each physical controller contains one or more logical *control units*, channel and device interfaces, and a power source.

Controller *channel interfaces* can connect to the CHPIDs on one or more processors; controller *device interfaces* can connect to the string interfaces on one or more strings of I/O devices.

Controllers can be divided into *segments*, or grouped into *subsystems*.

[controller] channel interface. A controller has a number of channel interfaces on the top which can be physically connected and logically defined to CHPIDs on processors, possibly through control unit interfaces on crossbar switches (if parallel / bus and tag), ports on switches (if serial / ESCON or FICON), or converters (if connecting parallel <=> serial interfaces or vice versa). Note that the serial physical cables connecting the controller and processor (or processors) may travel through cabinets through patchports.

control unit. Each physical controller contains one or more control units, which translate high level requests to low level requests between processors and devices.

control unit interface. A crossbar switch has a number of control unit interfaces on its side which can connect to channel interfaces on controllers.

converter. The two types of converter are: those that are used to connect serial ESCON cables to parallel bus-and-tag cables (9034 or S->P), and those that connect parallel to serial cables (9035, or P->S).

HCM automatically creates and connects converters when necessary. HCM maintains an inventory of converters currently in use or that were used for connections which have been subsequently disconnected.

coupling facility. The coupling facility is the hardware element that provides high speed caching, list processing, and locking functions in a sysplex. To enable data sharing between a CF partition and the central machines, special types of high speed CF channels are required. A CFR channel path attached to a CF partition can be connected to a CFS channel path attached to a partition in which an operating system is running. Besides CF connections between a CFR and CFS channel path, CF connections can also be established between two CFP channel paths.

coupling facility channel. A high bandwidth fiber optic channel that provides the high-speed connectivity required for data sharing between a coupling facility and the central processor complexes directly attached to it.

CSS. See channel subsystem.

CTC connection. Channel to channel connection. You can create a CTC connection between two CHPIDs on the same or separate processors, either directly or through a switch. When connecting through a switch, both CHPIDs must be connected through the same or a chained switch. One CHPID must be CNC or FCV, the other CTC in case of an SCTC connection. For FCTC connections, two FC CHPIDs have to be connected.

HCM considers a CTC connection as a single entity comprising selected control units and I/O devices in the connected processors.

D

DDS. Distributed Data Server. A single data server on one system in the sysplex, which gathers the data from the RMF Monitor III distributed on all systems in the sysplex.

dedicated CHPID. A CHPID can be dedicated to one partition; only that partition can access I/O devices on this CHPID. All CHPID types can operate in DED (dedicated) mode.

device. See I/O Device.

device adapter. A device adapter groups two or more controller device interfaces electronically.

device interface. A controller has a number of device interfaces on the bottom which can connect to string interfaces on strings of I/O devices.

dialog. A dialog is an interactive pop-up window containing *options* which allow you to browse or modify information, take specific action relating to selected objects, or access other dialogs. HCM provides a series of dialogs to help you create, edit, delete, and connect objects, and manipulate the configuration diagram.

disconnect. A controller channel interface may be disconnected from a CHPID with either a *standard* disconnection or a *physical-only* disconnection. The standard disconnection involves logically disconnecting any control units from any CHPIDs that were reachable only through the controller channel interface, and physically disconnecting the controller from the processor.

drop-down list box. In a dialog box, click the arrow icon, select an item from the list that drops down, and your selection is listed in the text box adjacent.

drop down box. Dialog option: click the arrow icon, select an item from the list that drops down; your selection appears in the text box adjacent. Alternatively, type in the text box.

DCM. See Dynamic Channel Path Management.

Dynamic Channel Path Management. This provides the ability to have the system dynamically manage ESCON, FICON, FICON bridge paths connected to DASD subsystems based on the current workload and its service goals

Dynamic reconfiguration. The ability to make changes to the channel subsystem and to the operating system while the system is running.

E

edit dialog. Type of dialog allowing you to edit data for a selected object.

EDT. Eligible device table. The EDT is an installation-defined and named representation of the devices that are eligible for allocation. The EDT defines the esoteric and generic relationship of these devices. During IPL, the installation identifies the EDT that the operating system uses. After IPL, jobs can request device allocation from any of the esoteric device groups assigned to the selected EDT. An EDT is identified by a unique ID (two digits), and contains one or more esoterics and generics. Define at least one EDT for each operating system configuration.

Enterprise Systems Connection (ESCON). A set of products and services that provides a dynamically connected environment using optical cables as a transmission medium.

ESCON Manager (ESCM). A licensed program that provided host control to help manage connections that use ESCON Directors. The functionality has been incorporated into the I/O operations component of System Automation for z/OS.

ESCON multiple image facility (EMIF). EMIF is now referred to as *MIF*.

ESCON switch. See switch.

esoteric. Esoteric (or esoteric device group) is an installation-defined and named grouping of I/O devices of usually the same device group. EDTs define the esoteric and generic relationship of these devices. The name you assign to an esoteric is used in the JCL DD statement. The job then allocates a device from that group instead of a specific device number or *generic* device group.

extend-select. Certain list boxes allow you to select more than one item. Hold down the SHIFT key while dragging the cursor over several sequential list box items (*extend selection*). See multi-select.

F

fiber link. Fiber links are the physical fiber optic connections and transmission media between optical fiber transmitters and receivers. A fiber link can consist of one or more fiber cables and patchports in fiber management cabinets. Each connection in the *fiber link* is either permanent or mutable.

FICON. Fibre channel connection. FICON is an improved optical fiber communication method offering channels with high data rate, high bandwidth, increased distance and a greater number of devices per control unit for S/390 systems. It can work together with, or replace ESCON links.

FICON director. See switch

fit to window. Fit to window scales the diagram to completely fit in the display window (HCM).

full size. Full size, or 100% scale, is the largest scale for printing diagrams. At this size, each controller will be about one inch tall. (HCM)

G

general box. General box objects represent devices or connections that are not covered by other HCM objects so that you can have a complete view of the physical objects in your configuration. Examples for general boxes may be network devices and their connections or non-System z boxes. These general box objects appear as rectangle boxes on the right side in the configuration diagram. General boxes are not part of the logical definitions of an I/O configuration and thus are stored only in the HCM configuration file, but not in the associated IODF. Connections to and from a general box are defined through panels that contain general box ports.
See also panel and general box port.

general box port. A general box port designates a physical interface of a general box. With general box ports, you can connect general boxes into your configuration where required. The number and vertical and horizontal order of general box ports are defined within general box panels. See also general box and panel.

generic. Generic (or generic device type) is a z/OS grouping that is defined for devices with similar characteristics. For example: the device types 3270-X, 3277-2, 3278-2, -2A, -3, -4, and 3279-2a, -2b, -2c, -3a, -3b belong to the same generic. Every generic has a generic name that is used for device allocation in the JCL DD statement. z/OS interprets this name as “take any device in that group”. In an operating system configuration, each EDT has the same list of generics. This list can vary only by the *preference* values and *VIO* indicators that are assigned to the generics.

H

Hardware Configuration Definition (HCD). HCD supplies an interactive dialog to generate the I/O definition file (IODF) and subsequently the input/output configuration data set (IOCDS). Be sure to use HCD to generate the IOCDS as opposed to writing IOCP statements. The validation checking that HCD performs as data is entered helps eliminate errors before the I/O configuration is implemented.

Hardware Configuration Manager (HCM). The z/OS and z/VM Hardware Configuration Manager (HCM) is a PC-based client/server interface to HCD. It combines the logical and physical aspects of hardware configuration management. In addition to the logical connections, you can also manage the physical aspects of a configuration. For example, you can effectively manage the flexibility offered by the FICON infrastructure (cabinet, cabling).

Hardware Management Console (HMC). The HMC is a console that is used to monitor and control hardware such as the System z.

HSA. hardware system area. HSA is a non-addressable storage area that contains server Licensed Internal Code and configuration dependant control blocks.

HCPRIO data set. The data set containing a real I/O configuration of a VM system.

head of string. This is the first unit of devices in a string. It contains the string interfaces which connect to controller device interfaces.

I

ICB-4. See Integrated Cluster Bus-4 (ICB-4).

independent controller. An independent controller is a subsystem which contains only that controller.

Initial program load (IPL). The process that loads the system programs from the auxiliary storage, checks the system hardware, and prepares the system for user operations.

Integrated Cluster Bus-4 (ICB-4). This feature (FC 3393) is available on System z servers. The ICB-4 feature operates at 2 GBps in peer mode only and is defined as CHPID type CBP via HCD/IOCP. The ICB-4 feature connection of z10 and z9 servers consists of one link that attaches directly to a 2 GBps STI port in the z10, or z9 STI connector in the CEC cage or CPC drawer on z10 BC. It does not require connectivity with a card in the server I/O cage.

Intelligent Resource Director (IRD). The IRD extends the concept of goal-oriented resource management by allowing you to group logical partitions that are resident on the same physical server, and in the same sysplex, into an *LPAR cluster*. This gives workload management the ability to manage resources, both processor and DASD I/O, not just in one single image but across the entire cluster of logical partitions.

interface type. This is the physical path interface type usually corresponding to a particular CHPID type. Interface types include serial, parallel, IOC and OSA.

internal control units. See switch's control unit.

internal devices. See switch's devices.

internal structures. The controller and string structures used by HCM as containers for a switch's control units and devices are called the *internal structures*.

InterSystem Channel-3 (ISC-3). ISC-3 provides connectivity required for data sharing between the coupling facility and the systems. These links also provide connectivity for STP messaging between any z10 or z9 server and coupling facility.

IOCDS. An input/output configuration data set (IOCDS) contains separate configuration definitions for the selected processor. Only one IOCDS is used at a time. The IOCDS contains I/O configuration data on the files associated with the processor controller on the host processor, as it is used by the channel subsystem. The CSS uses the configuration data to control I/O requests. The IOCDS is built from the production IODF.

I/O Cluster. This is a sysplex that owns a managed channel path for an LPAR processor configuration.

IOCP. I/O configuration program. An IOCP is the hardware utility that defines the hardware I/O configuration to the channel subsystem. For this definition, IOCP retrieves information from the IOCP input data set about the following items: the channel paths in the processor complex, control units attached to the channel paths, and I/O devices assigned to the control unit. HCD users can build the IOCP input data set from a production IODF.

IODF. An IODF (input/output definition file) is a VSAM linear data set that contains I/O definition information. This information includes processor I/O definitions (formerly specified by IOCP input streams) and operating system I/O definitions (formerly specified by MVSCP input streams). A single IODF can contain several processor and several operating system I/O definitions.

I/O device. An *I/O device* can be a printer, tape drive, hard disk drive, and so on. Devices are logically grouped inside *units*, which are in turn grouped into *strings*. The first unit, known as the *head of string*, contains *string interfaces* which connect to controller device interfaces and eventually to processor CHPIDs. Devices are represented as lines of text within the appropriate unit object in the configuration diagram.

I/O operations. A component of System Automation for z/OS providing functionality formerly available with ESCON Manager.

IRD. See Intelligent Resource Director.

ISC3. InterSystem Channel-3 link.

J

jumper cable. Fiber *jumper cables* are usually used to make mutable connections between patchports.

L

LCSS. Logical channel subsystems. See also channel subsystem.

LDAP. LDAP (lightweight directory access protocol) is an Internet protocol standard, based on the TCP/IP protocol and serves to access and manipulate data organized in a Directory Information Tree (DIT). LDAP V3 is specified in RFC 2251 and is specifically targeted at management and browser applications that provide read/write interactive access to directories. HCD makes IODF data accessible through LDAP using the z/OS Security Server LDAP Server.

load (IODF load). You can load IODF data from the host to the PC, for HCM to use when creating the interactive configuration diagram for that hardware configuration. The selected IODF file is loaded into a new HCM configuration on the workstation. If the selected IODF file has an associated MCF data set, then HCM creates the new configuration as a copy of the downloaded MCF. In this case, the new configuration can already contain physical definitions.

local system name. When defining an XMP processor, you can specify an optional local CPC designator. If you do not specify a local system name, and a CPC name is given, the local system name defaults to the CPC name.

logical control unit (LCU). An LCU can be a single CU with or without attached devices or a group of one or more CUs that share devices. In a channel subsystem, a logical CU represents a set of CUs that physically or logically attach I/O devices in common. A logical CU is built from the information specified in the CU definitions. The physical CUs the device is attached to form part of a logical CU.

logical definition. You can create *logical definitions* for objects which are physically connected and therefore, reachable. *Logical definitions* represent the connectivity between logical objects in the processor's logical view of the hardware configuration.

logically partitioned (LPAR) mode. A central processor complex (CPC) power-on reset mode that enables use of the PR/SM feature and allows an operator to allocate CPC hardware resources (including central processors, central storage, expanded storage, and channel paths) among logical partitions.

logical object. Logical objects belong to the processor's logical view of the hardware configuration. Generally, logical objects correspond to physical objects. For example, the logical processor has an associated physical processor (machine), and logical CHPIDs have corresponding physical channels. However, there are exceptions: logical partitions have no physical equivalent. Physical cabinets, patchports, or crossbar switches have no logical equivalents.

LPAR. See partition.

M

master configuration file (MCF). This is an HCM configuration stored on the host. It provides a central shared repository, allowing several HCD/HCM users to work on a single configuration cooperatively and safely.

master IODF. A master IODF is a centrally kept IODF containing I/O definitions for several systems or even for a complete enterprise structure. Master IODFs help to maintain consistent I/O data within a system and can provide comprehensive reports. From the master IODF subset IODF may be generated to serve as production IODFs for particular systems within the structure.

MCF. See master configuration file.

MCSS. See multiple channel subsystem.

menu. A menu is a drop down list box containing menu commands. Click a menu title in the menu bar at the top of the HCM screen to display the menu. Alternatively, hold down the ALT key and press the character key corresponding to the underlined letter in the menu title. For example, ALT+F for File menu.

Select a command by clicking it; pressing the character key corresponding to the underlined letter in the command, or; pressing up or down arrow keys until the desired command is highlighted, then pressing ENTER.

migration. Refers to activities that relate to the installation of a new version or release of a program to replace an earlier level. Completion of these activities ensures that the applications and resources on your system will function correctly at the new level.

mode name. The name of the communication mode. This parameter is the same as the mode name on the host (logname). This name must match a value defined at the host.

multiple channel subsystem (MCSS). The multiple channel subsystem (CSS) concept is implemented in the System z servers. The z10 EC and z9 EC support up to four CSSs; the z10 BC and z9 BC support up to two CSSs. The design of the System z servers offers considerable processing power, memory sizes, and I/O connectivity. In support of the larger I/O capability, the CSS concept has been scaled up correspondingly. This approach provides relief for the number of supported logical partitions, channels, and devices available to the server.

multiple exposure device. A multiple exposure device is allocated by a single device number, but accessed by several device numbers, where each device number represents one exposure. The device number by which the device is allocated is the *base exposure*; all other device numbers are called *non-base exposures*.

Multiple Image Facility (MIF). A facility that allows channels to be shared among PR/SM logical partitions in an ESCON or FICON environment.

multi-select. Certain list boxes allow you to select more than one item. Press Ctrl key and click list box items, in any order (multi-select). See extend-select.

multi-user access. Users can define the *multi-user access* attribute for IODFs so that multiple users can simultaneously update this IODF. An IODF is kept in exclusive update mode only for the duration of a single transaction. If the updates of the transaction are committed, another user may update the IODF without requiring the first user to release it. Though a user's changes are not immediately refreshed in the views of the other users, each user has a consistent view of the data either from the initial access to the IODF or after each last update that he had applied to the IODF.

N

navigation dialog. This is a type of dialog that enables you to navigate to related dialogs.

NIP console. A NIP (nucleus initialization program) console is a device that NIP uses as a console to display system messages. To define a device as a NIP console, it must first be defined to the channel subsystem and the current operating system (OS) configuration.

O

online mode. The mode of operation when a connection to a host session (running HCD) is established for HCM.

Open Systems Adaptor (OSA). OSA refers to the Open Systems Adapter-Express3 (OSA-Express3), and OSA-Express2 adaptors, which consist of a number of integrated hardware features that can be installed in a System z I/O cage, becoming integral components of the server's I/O subsystems. The adapters provide high function, connectivity, bandwidth, data throughput, network availability, reliability, and recovery

option button. Dialog option: click the button to select the option; all other options will be deselected.

operation mode. The *operation mode* for CHPIDs defines how partitions may access I/O devices using this CHPID. The following operation modes are available:

- Dedicated; see also dedicated CHPID
- Reconfigurable; see also reconfigurable CHPID
- Shared; see also shared CHPID
- Spanned; see also spanned CHPID

option button. Dialog option: click the button to select the option; all other options will be de-selected.

P

panel. Each cabinet or general box can have one or more panels, arranged one above the other. Panels are organized into *port groups* of *patchports*. They can be numbered starting from zero or one, from the top or the bottom of the cabinet.

panel space. A cabinet has a number of places to hold panels, called *panel spaces*.

Parallel Sysplex InfiniBand (PSIFB). PSIFB coupling links are high-speed links on System z10 and System z9 servers.

partition. The logical processor may be divided into a number of logical partitions (LPARs). Each partition has access to the processor's resources for a limited amount of time. Partitions may be restricted from using certain CHPIDs and allowed to use others, by being assigned to each CHPID's Access or Candidate Lists. Restricting partitions to certain subsets of CHPIDs can provide system security; for example, company departments may each be assigned to a separate partition.

patchport. A patchport consists of a pair of fiber adapters or couplers. Any number of patchports can participate in a fiber link. To determine the total number of patchports in a cabinet, you must add the number of patchports of each defined panel of the cabinet.

PCHID. See physical channel identifier.

peer coupling channel. A peer coupling channel is a coupling channel operating in peer mode, which means it can be used as a sender and receiver at the same time. It may be shared by several logical OS partitions (such as CF sender channels) and by a CF logical partition. In addition, peer channels provide more buffer sets and channel bandwidth than their counterparts. Peer channels are supported only on zSeries 900 servers and their successors.

peer-to-peer remote copy (PPRC). PPRC connections are direct connections between DASD controller subsystems that are used primarily to provide a hot standby capability. These connections can be point-to-point from one DASD controller to another, or they may pass through switches, in the same way as connections from CHPIDs to control units can.

permanent connection. This types of connection is usually made between cabinets with fiber trunk cables. Patchports that are permanently connected remain so, even when they are not in use.

physical channel identifier (PCHID). The physical address of a channel path in the hardware. Logical CHPIDs have corresponding physical channels. Real I/O hardware is attached to a processor through physical channels. Channels have a physical channel identifier (PCHID) which determines the physical location of a channel in the processor. For XMP processors, the PCHIDs must be defined in the configuration. The PCHID is a three hexadecimal digit number and is assigned by the processor. One logical channel path (CHPID) provided by a channel subsystem may be associated with a physical channel (PCHID). There is no standard mapping between CHPIDs and PCHIDs. The CHPID Mapping Tool aids the customer in developing a CHPID-to-PCHID relationship.

See also CHPID Mapping Tool.

physical description. A physical description is a template associated with a controller which describes its physical characteristics, for example, how to label controller interfaces. Most controllers can be associated with the generic physical description built into HCM. For those common IBM controllers unable to use the generic description, other physical descriptions are provided. Sample templates or PDFs (physical description files) for other equipment are provided as examples to allow you to extend HCM's physical capabilities. Physical descriptions are also used where required to handle unusual characteristics of physical strings containing I/O devices.

Note*:* The file name extension for physical description files was changed from `.pdf` to `.txt` for HCM 2.9 Service Level 3 and higher. Nevertheless, HCM 2.9 Service Level 3 and higher can still read physical description files having the `.pdf` extension.

physical-logical inconsistency. This can occur when a physical route exists but a logical definition is missing, or when a logical definition exists without a physical pathway.

physical object. Physical objects exist; for example, the physical processor or machine has a serial number and a set of channels. Each physical object generally has a corresponding logical object; exceptions are physical cabinets, patchports and crossbar switches. You can add these physical objects to your configuration diagram after the IODF load, to more accurately portray your hardware configuration.

physical route. A physical route or connection provides a pathway between logical objects (such as control units and CHPIDs) that can be used by logical definitions.

power-on reset (POR). POR enables you to select operating mode and IOCDS, then reloads licensed internal code for the CPC.

port group. Panels are organized into *port groups* of *patchports*, arranged side by side.

PPRC. See peer-to-peer remote copy.

primary processor. *Primary* refers to a processor which is the current logical view of its assigned machine. At IODF Load / Resync time, the machine connections are built only for primary processors.

processor. The physical processor, or machine, has a serial number, a set of channels, and a logical processor associated with it. The logical processor has a number of channel path IDs, or CHPIDs, which are the logical equivalent of channels. The logical processor may be divided into a number of logical partitions (LPARs).

production IODF. The production IODF is used by z/OS/IPL to build UCBs and EDTs. It is also used to build IOCDSs and IOCP input data sets. Several users can view a production IODF concurrently and make reports of it, but it cannot be modified. The production IODF that is used for IPL must be specified by a LOADxx member. The LOADxx member can reside either in SYS1.PARMLIB or SYSn.IPLPARM. If the LOADxx member resides in SYSn.IPLPARM, then SYSn.IPLPARM must reside on the IODF volume. If the LOADxx member resides in SYS1.PARMLIB, then SYS1.PARMLIB can reside on either the system residence (sysres) volume or the IODF volume.

production configuration file. The production configuration file (*.HCR file) is the equivalent of the production IODF, but is located on the PC. You are not allowed to modify the content of a production configuration file. The production configuration file and the production IODF form an associated pair. See also configuration files.

PSIFB. See Parallel Sysplex InfiniBand.

R

reconciliation of VOLSERs. The term reconciliation describes the process of synchronizing the VOLSER values in the PC configuration file with those in the IODF.

reconfigurable CHPID. A reconfigurable CHPID is an unshared CHPID that you can reconfigure offline from one partition, then online to another. That is, the CHPID can be reconfigured between logical partitions after a power-on reset. Only one partition can access I/O devices on this CHPID at a time. All CHPID types can operate in REC (reconfigurable) mode.

report. You can specify certain parameters to compile and print HCM information as a report.

resync [IODF resync]. If an IODF file has been replaced or updated since its associated configuration file was saved, the IODF file and configuration file will be out of sync. HCM will resynchronize with the host IODF in these cases by reloading the IODF and making any appropriate physical changes.

S

SAID. See system adapter identifier.

SAP. See system assist processor.

SE. See Support Element.

section. Dialog option: groups similar dialog options together for easier viewing.

segment. Certain types of controller, such as the 3990, are divided into two separate sections, or *segments*. Note that in the 3990 controller, segments may be referred to as *storage clusters* ; other controllers may refer to them as *busses*. DASD controllers typically contain two segments; most other types of controller contain only one.

Server Time Protocol (STP) link. This link is a coupling facility connection which will be used as a timing-only link, providing the STP function. The STP is a time synchronization feature, which provides the capability for multiple System z9 and zSeries servers to maintain time synchronization with each other. STP allows events occurring in separate System z9 and zSeries servers to be properly sequenced in time.

shared CHPID. A shared CHPID can be configured online to one or more partitions at the same time. One or more partitions can access I/O devices at the same time using this CHPID. SMP processor. In this book, this term designates processors supporting a single channel subsystem. For SMP processors, the single channel subsystem is implicitly defined with the processor. This term is used in contrast to the term XMP processor, which designates processors supporting multiple logical channel subsystems.

SMP. This term designates processors that support a single channel subsystem. For SMP processors the single channel subsystem is implicitly defined within the processor. This term is used in contrast to XMP processor which designates processors supporting multiple logical channel subsystems.

spanned CHPID. With XMP processors, supporting multiple logical channel subsystems, certain types of channel paths can be shared across partitions from multiple logical channel subsystems. It is dependent on the processor support, which channel types can be defined as spanned. Such a channel path is called a *spanned channel path*. A spanned channel path will be created with the same CHPID number in all channel subsystems that are using it. For example, if you have a processor MCSSPRO1 with channel subsystems 0 through 3, and you create CHPID 1A (type IQD, SPAN) and let it access partitions from CSS 0, 2, and 3, you will get this CHPID 1A in CSSs 0, 2, and 3, but not in CSS 1.

SSID. See subsystem identifier.

stand-alone mode. This mode of operation of HCM allows you to open a configuration without a connection to the host.

STP link. See Server Time Protocol link.

string. A string refers to a collection of one or more I/O devices. The term usually refers to a physical string of units, but may mean a collection of I/O devices which are integrated into a control unit.

string interface. A string has a number of string interfaces on the top which connect to controller device interfaces, and eventually to processor CHPIDs.

subchannel set. With a subchannel set you can define the placement of devices either relative to a channel subsystem or to an operating system. Starting with IBM System z9 Enterprise Class (z9 EC) processors and z/OS V1R7, users can define an additional subchannel set with ID 1 (SS 1) on top of the existing subchannel set (SS 0) in a channel subsystem. This function relieves the constraint for the number of devices that can be accessed by an LPAR. The machine implementation for IBM System z9 Enterprise Class processors or later supports 63.75K devices in subchannel set 0, and up to 64K-1 devices in the additional subchannel set 1. The z/OS V1R7 implementation limits the exploitation of subchannel set 1 to parallel access volume (PAV) alias devices only (device types 3380A, 3390A of the 2105, 2107 and 1750 DASD control units).

subsystem identifier. A subsystem identifier (SSID) represents the four-digit hexadecimal number that is programmed into the hardware when it is installed, which uniquely identifies a logical control unit to a host system. For HCM purposes, the SSID is required only for integration with other PPRC tools (like RCMF). Typically, each DASD logical subsystem involved in a PPRC connection is labeled with a unique SSID, but it is usually not applied to non-DASD logical subsystems.

Support Element (SE). The SE is a dedicated workstation that is directly attached to the System z server. The SE, plus an alternate SE, is supplied with each server to provide a console for monitoring and operating the system, usually used by service personnel to perform maintenance operations on the system.

switch. A device that provides connectivity capability and control for attaching any two ESCON or FICON links together.

switch configuration. You can create a set of connection rules called a switch configuration, which can be used to determine which switch ports are connected internally (activated) at any one time. That is, you can dynamically restrict connections between switch ports. Each switch configuration deems that only certain connections are *on*; that is, only certain intersections between internal switch ports are active. Any switch port may connect to any other switch port. The control unit inside the switch can receive messages from the processor, dynamically setting the configuration for the switch ports at that time. HCM allows you to create, view, edit or delete switch configurations.

switch connectivity. The switch connectivity is the internal connections between switch ports. Switch connectivity is dynamically set by switch configurations.

switch controller. The switch controller contained in an ESCON or FICON director receives and interprets processor messages to set the switch configuration dynamically. This controller is not drawn in the configuration diagram.

The switch controller contains the switch's control unit, which is always connected to its switch port with the address FE. The switch's control unit is connected to a *device*, also within the switch. You can edit the control unit and device as you normally do.

switch's control unit. The switch's control unit resides in the controller within a switch. It can receive messages from the processor, dynamically setting the configuration for the switch's ports at that time. This control unit is always connected to the switch port with the address FE, and to a device, also in the switch.

switch's devices. The devices that are defined to the switch's control unit to control a switch are called switch's devices, they are internal to the switch. See also switch controller.

switch port. A switch port is an interface on the switch which can connect to a processor CHPID either directly or through another switch, or to a controller channel interface.

sysplex. A sysplex is set of operating systems communicating and cooperating with each other through certain multisystem hardware components and software services to process customer workloads.

system adapter identifier (SAID). This represents the two or four-digit hexadecimal number that is programmed into the hardware when it is installed, which uniquely identifies a physical channel interface on the controller.

system assist processor (SAP). A SAP takes responsibility for some of the processing during the execution of an I/O operation.

T

text box. In a dialog box, the field where you type in data. Use TAB or SHIFT-TAB to move between text boxes in a dialog box.

trunk cable. This is generally used to make permanent connections between cabinets which remain even when not in use.

U

unit. A unit is a collection of I/O devices in a physical box. There can be several units in a string; the first unit, known as the head of string, contains string interfaces which connect to controller device interfaces.

unit control block (UCB). The UCB is software representation of devices.

unit control word (UCW). The UCW is a hardware representation of devices in the channel subsystem (subchannel)

unit information module (UIM). UIMs perform the device-dependent part of the operating system configuration definition. There is a UIM for each supported device or device group. Each UIM recognizes and processes the values coded for its device or device group. HCD routines load all UIMs, either IBM or customer supplied, into virtual storage and make calls to the UIMs:

- During initialization
- During processing of an Add device or Change device request
- During generation of a print report
- During IPL

unused cable. Unused cables are physical cables that have been recently disconnected, but not yet placed in inventory. Think of them as lying on the floor, ready to be reused. Unused cables "remember" where they were last used.

V

Validated work IODF. A *validated work IODF* satisfies all validation rules for building production IODFs. It may lack physical channel identifiers (PCHIDs) for XMP processors. In cooperation with HCD and the CHPID Mapping Tool a validated work IODF is required to accept new or updated PCHIDs. From such a validated work IODF, an IOCP input deck suitable for the use with the CHPID Mapping Tool is generated. As soon as all PCHIDs are inserted or updated in the validated work IODF, the production IODF can be built.

VIO. Virtual I/O is the allocation of data sets that exist in paging storage only. Only DASDs are eligible for VIO. Data sets are allocated to a paging device instead of to a real device.

W

work configuration file. The work configuration file (*.HCM) contains HCM's interactive configuration diagram. You can modify and save separate versions of your hardware configuration in a number of work configuration files for historical and planning purposes. The work configuration file and the work IODF form an associated pair. See also configuration file.

Work IODF. This is used to update an I/O definition and reflects the most recent status of the hardware configuration. After you have completed the updates, you can use the work IODF to create a production IODF. Although you can update a work IODF and generate reports from it, it cannot be used to build UCBs and EDTs, nor can it be used to generate an IOCDS, or an IOCP input data set.

Workload Manager (WLM). The IBM Workload Manager is a z/OS component that is responsible for managing system resources, so that workloads, which have been identified as being the most important, can achieve their objectives.

X

XMP processor. In the z/OS context, this term designates processors that support multiple logical channel subsystems (MCSS). It is used in contrast to the term SMP processor, which designates processors of previous generations that support only one channel subsystem. In general, the various CSSs including their channel paths and logical partitions provided by an XMP processor operate independently from each other. Channel paths can be spanned over multiple logical channel subsystems on the same processor depending on the channel path type.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this book.

IBM Redbooks

For information about ordering these publications, see “How to get Redbooks” on page 436. Note that some of the documents referenced here may be available in softcopy only.

- *IBM System z Connectivity Handbook,* SG24-5444
- *IBM System z Enterprise Class Technical Guide,* SG24-7516

Other publications

These publications are also relevant as further information sources:

- *Hardware Configuration Definition (HCD) Messages,* SC33-7986
- *Hardware Configuration Definition (HCD) Planning,* GA22-7525
- *Hardware Configuration Definition (HCD) Reference Summary,* SX33-9032
- *Hardware Configuration Definition (HCD) User’s Guide,* SC33-7988
- *Hardware Configuration Manager (HCM) User’s Guide,* SC33-7989

Online resources

These Web sites are also relevant as further information sources:

- IBM Resource Link is a customized Web-based solution, providing access to information for planning, installing, and maintaining IBM Systems and IBM S/390 servers and associated software.

  `http://www.ibm.com/servers/resourcelink`

- IBM Terminology

  `http://www.ibm.com/ibm/terminology`

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I/O Configuration Using z/OS HCD and HCM

Understand the I/O configuration process, concepts, and terminology

Use HCD and HCM to define and manage hardware configurations

Review configuration examples of IOCP data sets

IBM System z servers offer a full range of connectivity options for attaching peripheral or internal devices for input and output to the server. At the other end of these connections are a variety of devices for data storage, printing, terminal I/O, and network routing.

This combination of connectivity and hardware offer System z customers solutions to meet most connectivity requirements. However, to make use of these features, the System z server must be properly configured.

This IBM Redbooks publication takes a high-level look at the tools and processes involved in configuring a System z server. We provide an introduction to the System z channel subsystem and the terminology frequently used in the hardware definition process.

We examine the features and functions of tools used in the hardware definition process, such as HCD, CHPID Mapping Tool, and HCM. We discuss the input and output of these tools (IODF, IOCP, IOCDS) and their relationship to one another.

We also provide a high-level overview of the hardware configuration process (the flow of generating a valid I/O configuration). We provide configuration examples using both HCD and HCM.

The book also discusses available new functions and guidelines for the effective use of HCD and HCM.

This document is intended for system programmers and administrators who are responsible for defining and activating hardware changes to z/OS and System z servers, and for the IBM representatives who need this information.

General knowledge of z/OS and IOCP is assumed.

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