



Hitachi Virtual Storage Platform G1000

Hitachi Compatible PAV User Guide

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Preface

This document describes and provides instructions for using Hitachi Compatible PAV to configure and perform operations on Hitachi Virtual Storage Platform G1000 storage system.

Please read this document carefully to understand how to use these products, and maintain a copy for your reference.

- [Intended audience](#)
- [Product version](#)
- [Release notes](#)
- [Document revision level](#)
- [Changes made in this revision](#)
- [Related documents](#)
- [Document conventions](#)
- [Conventions for storage capacity values](#)
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Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and authorized service providers who install, configure, and operate the Hitachi Virtual Storage Platform G1000 storage system.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- The Hitachi Device Manager - Storage Navigator software for Hitachi Virtual Storage Platform G1000 and the *Hitachi Command Suite User Guide* or the *Hitachi Virtual Storage Platform G1000 System Administrator Guide*.
- The IBM® Parallel Access Volume host software.

Product version

This document revision applies to Hitachi Virtual Storage Platform G1000 microcode 80-02-4x or later.

Release notes

Read the release notes before installing and using this product. They may contain requirements or restrictions that are not fully described in this document or updates or corrections to this document.

Document revision level

Revision	Date	Description
MK-92RD8026-00	April 2014	Initial release.
MK-92RD8026-01	October 2014	Supersedes and replaces MK-92RD8026-00.
MK-92RD8026-02	February 2015	Supersedes and replaces MK-92RD8026-01.
MK-92RD8026-03	May 2015	Supersedes and replaces MK-92RD8026-02.

Changes made in this revision

- Converted command line screen shots to text.

Related documents

The documents below are referenced in this document or contain more information about the features described in this document.

Hitachi Virtual Storage Platform G1000 documents:

- *Hitachi Virtual Storage Platform G1000 Hardware Guide*, MK-92RD8007
- *Hitachi Virtual Storage Platform G1000 System Administrator Guide*, MK-92RD8016
- *Hitachi Command Suite User Guide*, MK-90HC172
- *Hitachi Device Manager - Storage Navigator Messages*, MK-92RD8017

For a list of all documents for the Hitachi Virtual Storage Platform G1000, see the *Hitachi Virtual Storage Platform G1000 Product Overview*.

IBM documentation:

- *DFSMS/MVS® Software Support for IBM Enterprise Storage Server*, SC26-7318
- *Enterprise Storage Server Performance Monitoring and Tuning*, SG24-5656
- *DS8000 Performance Monitoring and Tuning*, SG24-7146
- *System/390® Command Reference 2105 Models E10, E20, F10, F20*, SG26-7298
- *IBM HCD Planning*, SG28-1750
- *IBM HCD Users Guide*, SG28-1848
- *MVS Initialization and Tuning Reference*, SG28-1752





Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click OK .
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: <i>copy source-file target-file</i> Note: Angled brackets (< >) are also used to indicate variables.
Monospace	Indicates text that is displayed on screen or entered by the user. Example: <code>pairdisplay -g oradb</code>
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: <code>pairdisplay -g <group></code> Note: Italic font is also used to indicate variables.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.

Convention	Description
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.

This document uses the following icons to draw attention to information:

Icon	Label	Description
	Note	Calls attention to important or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions or consequences (for example, disruptive operations).
	WARNING	Warns the user of severe conditions or consequences (for example, destructive operations).

Conventions for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 kilobyte (KB)	1,000 (10 ³) bytes
1 megabyte (MB)	1,000 KB or 1,000 ² bytes
1 gigabyte (GB)	1,000 MB or 1,000 ³ bytes
1 terabyte (TB)	1,000 GB or 1,000 ⁴ bytes
1 petabyte (PB)	1,000 TB or 1,000 ⁵ bytes
1 exabyte (EB)	1,000 PB or 1,000 ⁶ bytes

Logical storage capacity values (for example, logical device capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes

Logical capacity unit	Value
1 KB	1,024 (2 ¹⁰) bytes
1 MB	1,024 KB or 1,024 ² bytes
1 GB	1,024 MB or 1,024 ³ bytes
1 TB	1,024 GB or 1,024 ⁴ bytes
1 PB	1,024 TB or 1,024 ⁵ bytes
1 EB	1,024 PB or 1,024 ⁶ bytes

Accessing product documentation

Product user documentation is available on the Hitachi Data Systems Portal: <https://portal.hds.com>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

[Hitachi Data Systems Support Portal](https://portal.hds.com) is the destination for technical support of your current or previously-sold storage systems, midrange and enterprise servers, and combined solution offerings. The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Support Portal for contact information: <https://portal.hds.com>.

[Hitachi Data Systems Community](https://community.hds.com) is a new global online community for HDS customers, partners, independent software vendors, employees, and prospects. It is an open discussion among these groups about the HDS portfolio of products and services. It is the destination to get answers, discover insights, and make connections. The HDS Community complements our existing Support Portal and support services by providing an area where you can get answers to non-critical issues and questions. **Join the conversation today!** Go to community.hds.com, register, and complete your profile.

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Thank you!

Overview

This topic provides an overview of Hitachi Compatible PAV (PAV).

- [About Hitachi Compatible PAV](#)
- [Devices used in Compatible PAV operations](#)
- [Compatible PAV modes](#)
- [Workload Manager](#)
- [Compatible Hyper PAV](#)
- [I/O request workflow using Compatible PAV](#)
- [I/O request workflow using Compatible Hyper PAV](#)

About Hitachi Compatible PAV

The Hitachi Compatible PAV (Compatible PAV) feature enables an IBM® zSeries® or S/390® host system to issue multiple I/O requests in parallel to individual logical devices (LDEVs) in the Hitachi Virtual Storage Platform G1000 (VSP G1000) storage system.

When Compatible PAV is not used, the host system can start only one I/O request to a device at a time, and must wait for the I/O to complete before starting another I/O request to the same device. Compatible PAV enables the host system to start multiple I/O requests to the same device at the same time via alias addresses assigned to a device. When Compatible PAV is used, the host system has substantially faster access to the data stored in the VSP G1000.

Devices used in Compatible PAV operations

The two device types used in Compatible PAV operations are base devices and alias devices:

- [Base devices on page 14](#)
- [Alias devices on page 15](#)

VSP G1000 supports up to 256 devices per CU (control unit).

Base and alias devices are defined to the host OS using a combination of HCD/IODF/IOCDS.

Base devices

A base device is an installed and formatted device (for example, 3390-9) that contains user data. A base device must be defined to the host as a "B" device type (for example, 3390B). Base devices are defined by the storage system when the mainframe emulated volumes are defined and installed.



Caution: The following volumes cannot be defined as base devices:

- Journal volumes for Universal Replicator for Mainframe
 - Migration volumes
-

A Cross-OS File Exchange volume is defined as a base, but a Cross-OS File Exchange volume cannot use Compatible PAV.

Related tasks

- [Defining base or alias devices to host operating systems](#) on page 30

Alias devices

An alias device is an LDEV ID (address), where no actual LDEV is defined in the storage system, that can be used with the defined base addresses in the same CU to issue parallel requests to a base address that already has one or more active I/Os in process. Alias devices cannot be varied online. Each alias must be in the same logical CU image as the base device to which it is assigned. An alias device must be defined to the host as an "A" device type (for example, 3390A). To use alias devices, they must be configured in the storage system using Hitachi Command Suite or Hitachi Device Manager - Storage Navigator.

Related tasks

- [Defining base or alias devices to host operating systems](#) on page 30

Compatible PAV modes

Compatible PAV operations can be performed in one of three operational modes (dynamic, static, or Compatible Hyper PAV). The Compatible PAV mode is controlled by the Dynamic alias management parameter setting for the IBM® Workload Manager® (WLM) and the WLMPAV parameter setting in the HCD file.

The VSP G1000 storage system uses the I-2107 control unit emulation. You can use one of the following modes:

- Dynamic Compatible PAV mode
For more information about this mode, see [Compatible PAV in dynamic mode on page 16](#).
- Static Compatible PAV mode
For more information about this mode, see [Compatible PAV in static mode on page 16](#).
- Compatible Hyper PAV (Hyper PAV) mode
You can specify the PAV feature (Compatible PAV or Compatible Hyper PAV) to use for each host computer. Therefore, an alias device may accept I/O requests from PAV or Hyper PAV.
For more information about this mode, see [Compatible Hyper PAV on page 18](#).

For more information:

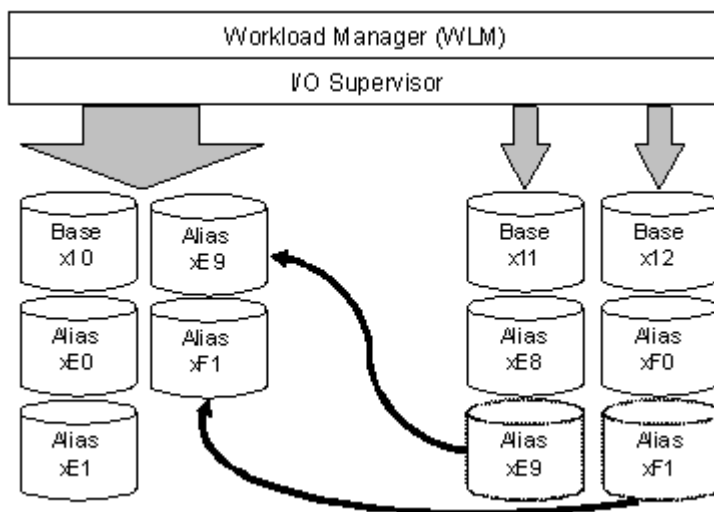
- About WLM, see [Workload Manager on page 17](#) and [Setting the WLM operational mode on page 40](#).
- About the WLMPAV parameter and HCD file, see [Compatible PAV in dynamic mode on page 16](#).

Compatible PAV in dynamic mode

In Compatible PAV dynamic mode, the number of alias devices assigned to each base device may dynamically increase or decrease based on the number of I/O requests to each device. Dynamic mode assists in balancing workloads on base devices and can optimize the speed of accessing data in the VSP G1000. A dynamic Compatible PAV operation is implemented when the WLM feature for Dynamic alias management setting and the WLM PAV parameter setting in the HCD file are both set to Yes.

For more information about setting the WLM operational mode, see [Setting the WLM operational mode on page 40](#).

In the following figure, the x10, x11, and x12 base devices were originally assigned two alias devices each. In this example, as I/O requests converge on the base device x10 (indicated by the large arrow), the number of alias devices for base device x10 increases to four, while the number of alias devices assigned to the base devices x11 and x12 decreases to one each.



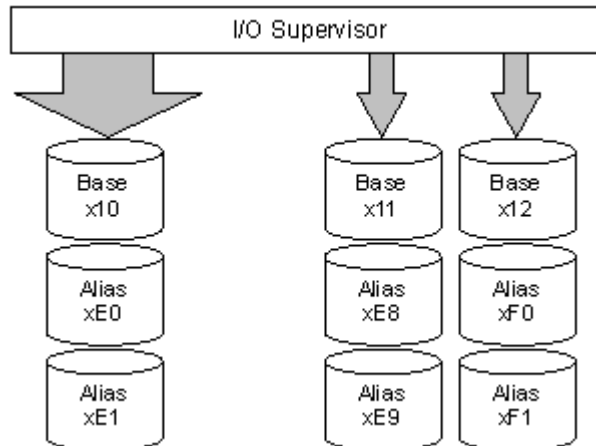
Compatible PAV in static mode

In Compatible PAV static mode, the number of alias devices assigned to each Compatible PAV base device remains the same, even when the number of I/O requests to each device changes.

To use static Compatible PAV, set the WLM operational mode to compatibility mode. The WLM operational mode must be set to compatibility mode to support static Compatible PAV operations. While in compatibility mode, WLM manages the system according to parameters in IPS and ICS (IEAIPSxx and IEAICSxx parmlib members).

For more information about setting the WLM operational mode, see [Setting the WLM operational mode on page 40](#).

The following figure shows an example of Compatible PAV base devices assigned to alias devices.



In this example, the x10, x11 and x12 base devices were originally assigned two alias devices each. As I/O requests converge on the base device x10 (indicated by the large arrow), the number of alias devices for each base device does not change.

Workload Manager

The host computer uses WLM for Compatible PAV. It is a software component of the IBM ® MVS/ESA and z/OS ® operating systems.

WLM supports dynamic and static Compatible PAV operations and manages workloads using one of the following operational modes:

- Goal mode
For more information about this mode, see [WLM in goal mode on page 17](#).
- Compatibility mode
For more information about this mode, see [WLM in compatibility mode on page 17](#).

WLM in goal mode

The WLM must be in goal mode to support dynamic Compatible PAV operations. The WLM is in goal mode when the Dynamic alias management setting in the **WLM Service Coefficient/Service Definition Options** screen is set to Yes. While in goal mode, the WLM manages the system to meet a performance goal.

WLM in compatibility mode

The WLM must be in compatibility mode to support static Compatible PAV operations. The WLM is in compatibility mode when the Dynamic alias

management setting in the **WLM Service Coefficient/Service Definition Options** screen is set to No. While in compatibility mode, the WLM manages the system according to parameters in IPS and ICS (IEAIPSxx and IEAICSxx parmlib members).

Compatible Hyper PAV

You can use the Compatible Hyper PAV feature to map an entire collection of alias devices to a single Compatible PAV base device in a CU and to have all other base devices in the same CU share these aliases.

The Hyper PAV feature does not require that you change the number of alias devices assigned to each base device. With the Compatible Hyper PAV feature, a whole collection of alias devices can be mapped to one base device in a CU when configuring the aliases using Hitachi Command Suite or Hitachi Device Manager - Storage Navigator in the storage system.

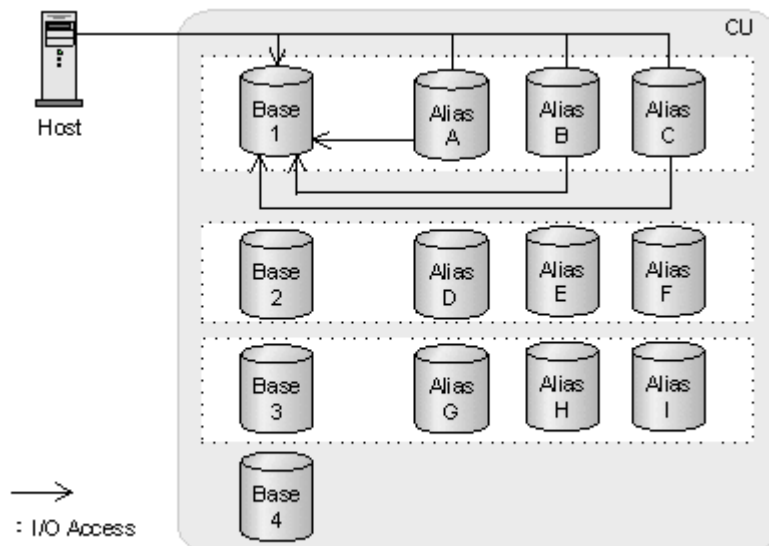
You can specify the PAV feature (Compatible PAV or Compatible Hyper PAV) to use for each host computer. Therefore, an alias device may accept I/O requests from Compatible PAV or Compatible Hyper PAV.

I/O request workflow using Compatible PAV

Multiple alias devices are assigned to a base device in a CU to enable the base device to handle multiple I/O requests.

The existence of defined aliases devices allows the operating system to issue parallel I/Os by issuing I/O to the base address and associated alias addresses for the base device. The maximum number of parallel I/Os is the number of aliases assigned to the base plus 1 for static or dynamic configurations. When Hyper PAV is used, the maximum number of parallel I/Os to a base address is the number of aliases configured in the CU plus 1. If multiple base devices are using aliases, the maximum number for any individual base device is reduced accordingly.

In the following figure, three alias devices are each assigned to base devices 1, 2 and 3.

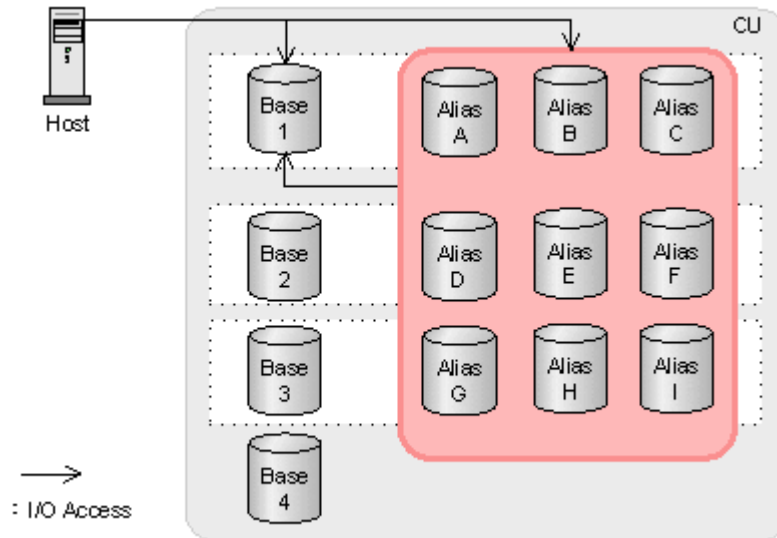


As illustrated with the arrows in the figure, I/O requests converge on base device 1 when a host computer accesses the device using Compatible PAV. Since alias devices A, B, and C were assigned to base device 1 in advance of the operation, I/O requests are automatically issued to these alias devices. Similarly, if a host computer accesses base devices 2 and 3, the I/O requests are automatically issued to the alias devices assigned to those two base devices. Base device 4 is not able to process multiple I/O requests since an alias device is not assigned to the device.

I/O request workflow using Compatible Hyper PAV

Multiple alias devices are assigned to a base device in a CU to enable the base device to handle multiple I/O requests. In Hyper PAV, alias devices are pooled together in each CU. All base devices in the CU share the alias devices as a pool. The aliases are assigned to a specific base address for the duration of the I/O and then returned to the alias pool for the CU.

In the following figure, three alias devices each are assigned to base devices 1, 2, and 3.



As illustrated with the arrows in the figure, I/O requests converge on base device 1 when a host computer accesses the device using PAV. I/O requests are automatically issued to unused alias devices among the nine alias devices in the CU.

Similarly, if a host computer accesses base devices 2, 3, and 4, the I/O requests are automatically issued to unused alias devices among the nine alias devices. Base device 4 can process multiple I/O requests even though an alias device was not specifically assigned to the device when the aliases were configured with Hitachi Command Suite or Hitachi Device Manager - Storage Navigator.

Requirements and specifications

This topic contains requirements and specifications.

- [Requirements](#)
- [Functions incompatible with Compatible PAV](#)
- [Compatible PAV shared across multiple sysplexes](#)

Requirements

The following table lists the requirements for PAV and Hyper PAV operations.

Item	Requirements	
	PAV	Hyper PAV
Software License Keys	PAV	PAV Hyper PAV
Host OS	<ul style="list-style-type: none"> Dynamic mode: z/VM5.2 with PTF or later Static mode: VM/ESA2.4.0 or later 	z/OS ® 1.8 or later z/OS ® 1.6 with PTF or later z/TPF OS 1.1 with APAR PJ41092 or later z/VM ® 5.3 or later When you use z/VM ®, you must use z/OS ® or z/TPF as a guest OS on z/VM ®.
Controller emulation type	I-2107	I-2107 or I-2107-TPF
Device emulation type for base device	3390-1, 3390-2, 3390-3, 3390-9, 3390-L, 3390-M, 3390-A Cross-OS File Exchange devices listed below are not supported: 3390-3A, 3390-3B, 3390-3C 3390-9A, 3390-9B, 3390-9C, 3390-LA, 3390-LB, 3390-LC 3390-MA, 3390-MB, 3390-MC For z/TPF OS, only the DKU emulation types listed below are supported: 3390-3, 3390-9, 3390-L, 3390-M	
Channel interface	FICON	
Storage system ID setting	One storage system ID for each set of 256 LDEVs	
Maximum number of aliases for one base device	255	
Alias device management	Alias device and its base device must belong to the same logical CU image	
Device Manager - Storage Navigator	PAV and Hyper PAV need the Device Manager - Storage Navigator secondary window. To use the Device Manager - Storage Navigator secondary window, install JRE and set up Java, see the chapter about how to use the Device Manager - Storage Navigator secondary window in the <i>Hitachi Virtual Storage Platform G1000 System Administrator Guide</i> .	
Compatible functions	<ul style="list-style-type: none"> Virtual LVI Cache Residency Manager for Mainframe Volume Migration TrueCopy for Mainframe 	

Item	Requirements	
	PAV	Hyper PAV
	<ul style="list-style-type: none"> • ShadowImage for Mainframe • Universal Replicator for Mainframe • IBM ® Concurrent Copy (CC) with restrictions • Compatible XRC with restrictions • PPRC • Dynamic Provisioning for Mainframe • Dynamic Tiering for Mainframe <p>For z/TPF OS, only the functions listed below can be used:</p> <ul style="list-style-type: none"> • Virtual LVI • Cache Residency Manager for Mainframe • ShadowImage for Mainframe • TrueCopy for Mainframe • Universal Replicator for Mainframe 	

Functions incompatible with Compatible PAV

Devices using Compatible PAV cannot be used concurrently with the following functions:

- Cross-OS File Exchange
- Open Volume Management
- Cache Residency Manager
- ShadowImage (open system version)
- TrueCopy (open system version)
- Universal Replicator (open system version)
- Global-active device

Devices using Cross-OS File Exchange cannot coexist in the same CU with devices using Compatible PAV.

Compatible PAV shared across multiple sysplexes

You can share Compatible PAV functionality across multiple sysplexes on a storage system.

To share static PAV, all connected systems must be in compatibility mode. To share dynamic PAV, the following requirements and restrictions apply:

- Only one sysplex must be running in Dynamic Alias Management mode. This master sysplex is the only sysplex connected to the storage system that assigns aliases.
- For all other connected sysplexes, set the WLMPAV (HCD) and Dynamic Alias Management (WLM) settings to No.



Note: If you have enabled Dynamic Alias Management for more than one sysplex, unsynchronized alias transition and unpredictable response times may occur.

For more information about setting the WLM mode, [Setting the WLM operational mode on page 40](#).

Defining devices

This topic contains information on selecting base and alias device ratios and procedures on how to use the hardware configuration definition (HCD) software application to define the mapping of devices to LCUs that you have defined to the host systems using Hitachi Command Suite or Hitachi Device Manager - Storage Navigator.

- [Unused device addresses usage as alias devices](#)
- [Defining logical control units](#)
- [Defining base or alias devices to host operating systems](#)
- [Finding a device eligible for dynamic Compatible PAV management](#)
- [Address mapping between base and alias devices](#)

Unused device addresses usage as alias devices

You can use unused device addresses in a CU as aliases for base devices. An optimum base-to-alias device ratio ensures maximum efficiency in processing I/O requests.

Determining an optimum ratio depends on the type of PAV being used as well as the I/O rate for the individual base devices. While some ratios are suggested, the best method is to use a tool that analyzes your RMF data and recommends the appropriate number of aliases to configure for a base address. The best tools will make recommendations for each type of PAV (static, dynamic, and Hyper PAV).

Optimal Compatible PAV results and base-to-alias device ratios

A ratio of 1:3 is recommended as a starting point for each base when using static PAV.



Note: The optimal device ratio will vary based on how often a base device is accessed by the host system.

For example, if you define all 256 devices of a CU to the host system, 64 base devices and 192 alias devices would exist. Three alias devices could be assigned to each base device.

Optimal dynamic PAV results and alias devices

Since dynamic PAV will change alias assignments, it is recommended that you start with a ratio of 1:1 for a CU.



Note: If multiple host systems access devices, you can experience less than optimal results. In this case, use Multiple Allegiance (MA) host software.

Compatible Hyper PAV optimum base/alias device ratio

For Hyper PAV, Hitachi Data Systems recommends between 16 and 32 alias addresses in a CU. These addresses can be assigned to a single base address when performing configuration using Hitachi Command Suite or Hitachi Device Manager - Storage Navigator. All the aliases in a CU will be placed in a pool and used as required for any base address.

Defining logical control units

You can use the **HCD main** screen to modify and view configuration data.

Prerequisites

- The channel paths are defined.
- You are using z/OS ® or z/VM ®.

Procedure

1. From the **ISPF/PDF primary options** menu, select the **HCD** option.
2. On the HCD main screen, for **I/O definition file**, for **Work I/O definition file** (IODF), verify the file is the one you want to use and then select menu item 1, **Define, modify, or view configuration data**.

```
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 . . . 'SYS1.IODF00.WORK'          +
```

3. On the **Define, Modify or View Configuration Data** screen, select menu item 1, **Operating system configurations**.

```
z/OS V1.11 HCD
C          Define, Modify, or View Configuration Data          _

Select type of objects to define, modify, or view data.

S          4_ 1. Operating system configurations
           consoles
1          system-defined generics
           EDTs
           esoterics
           user-modified generics
           2. Switches
           ports
           switch configurations
           port matrix
           3. Processors
           channel subsystems
           partitions
           channel paths
F          4. Control units
I          5. I/O devices
```

4. The Control Unit List screen is displayed. Press F11 to add information.

```

Goto Filter Backup Query Help
-----
Control Unit List                               Row xxx of yyy
Command ==> _____ Scroll ==> CSR

Select one or more control units, then press Enter. To add, use F11.

      ---#---
/ CU  Type +      CUADD CSS MC  Serial-# + Description
/ 1600 2107      0    2      _____
- 1700 2107      1    2      _____
- 1800 2107      2    2      _____
- 1900 2107      3    2      _____
- 1A00 2107      4    2      _____
- 1B00 2107      5    2      _____
- 1C00 2107      6    2      _____
- 1D00 2107      7    2      _____
- 1E00 2107      0    2      _____
- 1E40 2107      1    2      _____
- 1E80 2107      2    2      _____
- 1EC0 2107     3F    2      _____
- 1EE0 2107     40    2      _____
- 1F00 2107     FE    2      _____
- 2000 3990      1    1      _____
- 2400 2105     14    2      _____
- 2480 2105     15    2      _____

```

5. On the Add Control Unit screen, enter the following information and then press Enter to continue:

- Control unit number
- Control unit type - 2107
- Switch connection information

```

Goto Filter Backup Query Help
-----
Control Unit List                               Scroll ==> CSR

Select one or more control units, then press Enter. To add, use F11.

      ---#---
/ CU                               Add Control Unit
- 000
- 00A
- 010 Specify or revise the following values.
- 011
- 012 Control unit number . . . . . _____ +
- 013 Control unit type . . . . . _____ +
- 014
- 015 Serial number . . . . . _____
- 016 Description . . . . . _____
- 017
- 020 Connected to switches . . . . . _____ +
# 030 Ports . . . . . _____ +
# 034
- 038 If connected to a switch:
- 03E
- 040 Define more than eight ports . . 2 1. Yes
- 041
- 042 Propose CHPID/link addresses and
- 043 unit addresses . . . . . 2 1. Yes
- 044

```

The **Select Processor / Control Unit** screen opens.

6. Select the processor complex to which the control unit attaches with slash (/) at the beginning of the line, and then press **Enter**.

```

                                Select Processor / CU      Row xxx of yyy More:  >
Command ==> _____ Scroll ==> CSR

Select processors to change CU/processor parameters, then press Enter.

Control unit number . . : 0000      Control unit type . . . : 2107

-----Channel Path ID . Link Address + -----
/ Proc.CSSID 1----- 2----- 3----- 4----- 5----- 6----- 7----- 8-----
  SYSTEM.0
***** Bottom of data *****

```

The next **Select Processor / Control Unit** screen opens.

7. Select menu item 2, **Group connect**, and then press **Enter**.

```

                                Select Processor / CU
                                Actions on selected processors
Command ==>

Select proces          Select by number or action code and press Enter.
Control unit
    ___ 1. Select (connect, change) . . . . . (s)
        2. Group connect . . . . . (g)
/ Proc.CSSID          3. Disconnect . . . . . (n)
/ SYSTEM.0
***** Bottom of data *****

```

The next **Select Processor / Control Unit** screen opens.

8. Enter the following information:
 - chpids that attach to the control unit
 - the logical control unit address
 - the device starting address
 - the number of devices supported

```

                                Select Processor / CU
                                Change Control Unit Definition

Specify or revise the following values.

Control unit number . . : 0000      Type . . . . . : 2107
Processor ID . . . . . : SYSTEM
Channel Subsystem ID . . : 0

Channel path IDs . . . . 2E      2F      34      35      ___      ___      ___      ___      +
Link address . . . . . ___      ___      ___      ___      ___      ___      ___      ___      +

Unit address . . . . . 00      ___      ___      ___      ___      ___      ___      ___      +
Number of units . . . . 256      ___      ___      ___      ___      ___      ___      ___

Logical address . . . . 0      + (same as CUADD)

Protocol . . . . . ___      + (D, S or S4)
I/O concurrency level . 2      + (1, 2 or 3)

```

The LCU is defined.

Defining base or alias devices to host operating systems

Use the HCD program to define the mapping between a base or alias device to the host operating system LCU.

Procedure

1. From the **ISPF/PDF primary options** menu, select the **HCD** option.
2. On the HCD main screen, for **I/O definition file**, verify the name of the IODF or IODF.WORK I/O definition file you want to use, and then select menu item 1, **Define, modify, or view configuration data**.

```
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 . . . 'SYS1.IODF00.WORK'
```

3. On the **Define, Modify, or View Configuration Data** screen, select **I/O devices** (menu item 5) as the type of object you want to define.

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

5. I/O devices

F1=Help F2=Split F3=Exit F9=Swap F12=Cancel

4. On the **I/O Device List** screen, complete the following:
 - a. Select the device you want to define and add.
 - b. Press **Enter**.
 - c. Press **F11**.


```

Goto Filter Backup Query Help
-----
I/O Device List      Row 4854 of 9653 More:
Command ==>         Scroll ==> CSR

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

-----Device----- --#-- -----Control Unit Numbers + -----
/ Number Type +      PR OS 1--- 2--- 3--- 4--- 5--- 6--- 7--- 8--- Base
8100  3390B          1  1  8100
8102  3390B          1  1  8100
8103  3390B          1  1  8100
8104  3390B          1  1  8100
8105  3390B          1  1  8100
8106  3390B          1  1  8100
8107  3390B          1  1  8100
8108  3390B          1  1  8100
8109  3390B          1  1  8100
810A  3390B          1  1  8100
810B  3390B          1  1  8100
810C  3390B          1  1  8100
  
```

5. On the **Add Device** screen, complete the following information, and then press **Enter**.
 - For **Device number**, type the device number.
 - For **Number of devices**, type the number of devices.
 - For **Device type**, type the PAV type.
Supported base device types: 3390B
Supported alias device types: 3390A

 **Note:** The 3390A alias device and the 3390B base device are not related to the 3390-3A/B/C multiplatform devices or the 3390-A volume emulation.

- For **Description**, type a description of the PAV device.
- For **Connected to CUs**, type the CU to which the device is connected.

Add Device

Specify or revise the following values.

```

Device number . . . . . 8101 (0000 - FFFF)
Number of devices . . . . . 1
Device type . . . . . 3390B
Serial number . . . . .
  
```

```
Description . . . . . 9980V PAV
Volume serial number . . . . . (for DASD)
```

```
Connected to CUs . . 8100
```

```
F1=Help      F2=Split    F3=Exit     F4=Prompt   F5=Reset    F9=Swap
F12=Cancel -
```

- On the **Device / Processor Definition** screen, for **Preferred Explicit Device**, select the processor ID/system combination that you want to change and then press **Enter**.

```

                                Device / Processor Definition
                                Row 1 of 1
Command ===>                                Scroll ===> CSR

Select processors to change device/processor definitions, then press
Enter.

Device number . . . : 8101                    Number of devices . . : 1
Device type . . . . : 3390B

/ Processor ID  UA + Time-Out STADET  Preferred Explicit Device
/ SYSTEM#S      No      Yes      CHPID + Candidate List
***** Bottom of data *****

F1=Help      F2=Split    F3=Exit     F4=Prompt   F5=Reset
F6=Previous  F7=Backward F8=Forward  F9=Swap     F12=Cancel
F22=Command
```

- On the **Define Device / Processor** screen, complete the following and then press **Enter**.

```

                                Define Device / Processor

Specify or revise the following values.

Device number . . . : 8101                    Number of devices . . . . : 1
Device type . . . . : 3390B
Processor ID . . . . : SYSTEM#S                Lab System - F9 - Skyline

Unit address . . . . . 01 + (Only necessary when different from
                           the last 2 digits of device number)
Time-Out . . . . . No (Yes or No)
STADET . . . . . Yes (Yes or No)

Preferred CHPID . . . . . +
Explicit device candidate list . No (Yes or No)

F1=Help      F2=Split    F3=Exit     F4=Prompt   F5=Reset    F9=Swap
F12=Cancel -
```

- On the **Define Device to Operating System Configuration** screen, select the operating system to which you want to connect the devices and press **Enter**.
 - For **Unit address**, if the address is different than the last two digits of the device number, type the unit address.

- For **Time-Out**, select **Yes** or **No**.
Default: **No**
- For **STADET**, select **Yes** or **No**.
Default: **Yes**
- For Explicit device candidate list, select **Yes** or **No**.
Default: **No**

```

Define Device to Operating System Configuration Row 1 of 1
Command ==>                               Scroll ==> CSR
Select OSs to connect or disconnect devices, then press Enter.

Device number . . : 8101                    Number of devices : 1
Device type . . . : 3390B

/ Config. ID   Type      Description                               Defined
/ LABSYSTM    MVS       OS Configuration List (EDT's)
***** Bottom of data *****

F1=Help      F2=Split    F3=Exit     F4=Prompt   F5=Reset
F6=Previous  F7=Backward F8=Forward  F9=Swap     F12=Cancel
F22=Command

```

- 9.** On the **Actions on selected operating systems** screen, select menu item 1, **Select (connect, change)** and then press **Enter**.

```

Actions on selected operating systems

Select by number or action code and press Enter.

1. Select (connect, change) . . . . . (s)
2. Disconnect from OS . . . . . (n)

F1=Help      F2=Split    F3=Exit     F9=Swap     F12=Cancel -

```

- 10.** On the **Define Device Parameters / Features** screen, complete the following values, and then press **Enter** on your keyboard.
- For **DYNAMIC**, type whether PAV is dynamic or static.
Values:
 - **Yes:** The device supports a dynamic configuration.
 - **No:** The device supports a static configuration.
 Default: **Yes**
 - For **WLMPAV**, type whether the device is supported by WLM.
Values:
 - **Yes:** The device supports WLM.
 - **No:** The device supports WLM.

Default: **Yes**

```
Define Device Parameters / Features                               Row 1 of 6
Command ==>                                                    Scroll ==> CSR

Specify or revise the values below.

Configuration ID . . : LABSYSTEM      OS Configuration List (EDT's)
Device number . . . : 8101           Number of devices : 1
Device type . . . . : 3390B

Parameter/
Feature      Value      P Req.  Description
OFFLINE      No          P       Device considered online or offline at IPL
DYNAMIC      Yes          P       Device supports dynamic configuration
LOCANY       No          P       UCB can reside in 31 bit storage
WLMPAV       Yes          P       Device supports work load manager
SHARED       Yes          P       Device shared with other syst
SHAREDUP     No          P       Shared when system physically partitioned
***** Bottom of data *****

F1=Help      F2=Split    F3=Exit     F4=Prompt   F5=Reset
F7=Backward  F8=Forward  F9=Swap     F12=Cancel  F22=Command -
```

The base or alias device is defined.

Finding a device eligible for dynamic Compatible PAV management

The Hardware Configuration Definition (HCD) program is used to view configuration parameters. This information is useful for determining if a specific device is eligible for dynamic PAV management by WLM.

Procedure

1. From the ISPF/PDF primary options menu, select the **HCD** option.
2. On the HCD main screen, verify the name of the IODF or IODF.WORK I/O definition file you want to use, and then select menu item 1, **Define, modify, or view configuration data**.

```
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 . . . 'SYS1.IODF00.WORK' +

3. On the Define, Modify, or View Configuration Data screen, select menu item 5, I/O devices.

----- Define, Modify, or View Configuration Data -----

Select type of objects to define, modify, or view data.

- 5 1. Operating system configurations
 - consoles
 - system-defined generics
 - EDTs
 - esoterics
 - user-modified generics
2. Switches
 - ports
 - switch configurations
 - port matrix
3. Processors
 - partitions
 - channel paths
4. Control units
5. I/O devices

F1=Help F2=Split F3=Exit F9=Swap F12=Cancel

4. On the I/O Device List screen, select the desired device by entering a slash (/) by the device number, and press Enter.

The following figure shows **device 8101** is selected.

```

Goto Filter Backup Query Help
-----
I/O Device List      Row 4854 of 9653 More:  >
Command ==>                Scroll ==> CSR

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

-----Device----- --#-- -----Control Unit Numbers + -----
/ Number Type +      PR OS 1--- 2--- 3--- 4--- 5--- 6--- 7--- 8--- Base
/ 8100 3390B         1  1  8100
/ 8101 3390B         1  1  8100
8102 3390B         1  1  8100
8103 3390B         1  1  8100
8104 3390B         1  1  8100
8105 3390B         1  1  8100
8106 3390B         1  1  8100
8107 3390B         1  1  8100
8108 3390B         1  1  8100
8109 3390B         1  1  8100
810A 3390B         1  1  8100
810B 3390B         1  1  8100
810C 3390B         1  1  8100

```

- On the **Actions on selected devices** screen, select menu item 8, **View device definition**, and press **Enter**.

Actions on selected devices

Select by number or action code and press Enter.

- ```

8 1. Add like (a)
 2. Change (c)
 3. CSS group change (g)
 4. OS group change (o)
 5. Device type group change (t)
 6. Prime serial number and VOLSER . . (i)
 7. Delete (d)
 8. View device definition (v)
 9. View logical CU information (l)
 10. View related CTC connections . . . (k)
 11. View graphically (h)

```

F1=Help    F2=Split    F3=Exit    F9=Swap    F12=Cancel

- On the **View Device Definition** screen, review the information for accuracy and then press **Enter**.

View Device Definition

```

Device number : 8101
Device type : 3390B

Serial number :
Description : 9980V PAV - 8101 (B)

Volume serial number : (for DASD)

Connected to CUs : 8100

ENTER to continue.

```

F1=Help    F2=Split    F3=Exit    F9=Swap    F12=Cancel -

- On the **View Device / Processor Definition** screen, select a Processor/System ID combination.

View Device / Processor Definition

```

Command ==>
Row 1 of 1
Scroll ==> CSR

```

Select one or more processors to view the device candidate list, or ENTER to continue without selection.

```

Device number . : 8101 Device type . : 3390B

```

| / Processor ID | UA | Time-Out | STADET | Preferred CHPID | Explicit Device Candidate List |
|----------------|----|----------|--------|-----------------|--------------------------------|
| / SYSTEM#S     | 00 | No       | Yes    |                 | Yes                            |

\*\*\*\*\* Bottom of data \*\*\*\*\*

F1=Help      F2=Split      F3=Exit      F6=Previous      F7=Backward  
 F8=Forward    F9=Swap      F12=Cancel    F22=Command

- 8. On the **View Device Candidate List** screen, review the candidate list for this device and then press **Enter**.**

```

View Device Candidate List
Command ==>
Row 1 of 5
Scroll ==> CSR

The following partitions are allowed to have access to the
device.
```

```

Device number . : 8101 Device type . . . : 3390B
Processor ID . . : SYSTEM#S Lab System - F9 - Skyline
```

ENTER to continue.

| Partition Name | Description                  | Reachable |
|----------------|------------------------------|-----------|
| AS04           | System A / LPAR 4            | Yes       |
| DASDPERF       | DASD Performance & Testing   | Yes       |
| MVSLAB         | MVS Lab System - OS/390 2.9  | Yes       |
| OS390          | OS/390 Testing (ie. SYSPLEX) | Yes       |
| VMLAB          | VM Lab System - VM/ESA 1.2.0 | Yes       |

\*\*\*\*\* Bottom of data \*\*\*\*\*

F1=Help      F2=Split      F3=Exit      F7=Backward    F8=Forward  
 F9=Swap      F12=Cancel    F22=Command -

- 9. On the **View Device / OS Configuration Definitions** screen, select the operating system for which you want to view more details and press **Enter**.**

```

View Device / OS Configuration Definitions
Command ==>
Row 1 of 1
Scroll ==> CSR

Select OSs to view more details, then press Enter.
```

```

Device number . : 8101 Device type . . : 3390B
```

| / Config. ID | Type | Description                   |
|--------------|------|-------------------------------|
| / LABSYSTEM  | MVS  | OS Configuration List (EDT's) |

\*\*\*\*\* Bottom of data \*\*\*\*\*

F1=Help      F2=Split      F3=Exit      F6=Previous    F7=Backward  
 F8=Forward    F9=Swap      F12=Cancel    F22=Command -

- 10. On the **View Device Parameter / Feature Definition** screen, verify that **WLMPAV** is set to **Yes**.**

```

View Device Parameter / Feature Definition
Command ==>
Row 1 of 6
Scroll ==> CSR
```

```

Configuration ID . : LABSYSTEM OS Configuration List (EDT's)
Device number . . : 8100 Device type . . . : 3390B
Generic / VM device type : 3390
```

ENTER to continue.

Parameter/

| Feature                    | Value | Req. | 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 ***** |       |      |                                            |

F1=Help            F2=Split            F3=Exit            F7=Backward        F8=Forward  
F9=Swap            F12=Cancel          F22=Command -

## Address mapping between base and alias devices

To avoid serious failures that can occur during data processing, complete the following:

- Define the unit address mapping for base and alias devices to the host operating system.
- Match the address mapping defined in the storage system using Hitachi Command Suite or Hitachi Device Manager - Storage Navigator.

The following figure shows examples of mappings between base devices and alias devices.

|                   |                   |                    |                    |
|-------------------|-------------------|--------------------|--------------------|
| (A) x 00-x3F:Base | (B) x 00-x3F:Base | (C) x 00-x7F:Alias | (D) x 00-x3F:Alias |
| x 40-xFF:Alias    | x 40-x7F:Alias    | x 80-xFF:Base      | x 40-x7F:Base      |
|                   | x 80-xBF:Base     |                    | x 80-xBF:Alias     |
|                   | x C0-xFF:Alias    |                    | x C0-xFF:Base      |

## Preparing for Compatible PAV operations

This topic describes the operations you must complete to prepare PAV to use with your storage system.

- [Setting the WLM operational mode](#)
- [Compatible Hyper PAV enablement from z/OS ® on z/VM ® workflow](#)
- [MIH timer value setting workflow](#)

# Setting the WLM operational mode

The WLM operational mode setting depends on the PAV mode used.

- To use dynamic Compatible PAV, the WLM must be set to goal mode. In goal mode, WLM can assign more or fewer aliases to a base device based on the host I/O activity to that device.
- To use static Compatible PAV, the WLM must be set to compatibility mode. In compatibility mode, the number of aliases assigned to each base device remains the same regardless of host I/O activity to that device.
- To use Compatible Hyper PAV, you do not need to set the WLM operation modes.

## Procedure

1. On the WLM startup screen, press **Enter**.
2. On the **Choose Service Definition** screen, select menu item 1, **Read saved definition**, and press **Enter**.

```
File Help

Command ==>

| |
| Choose Service Definition |
| |
| Select one of the following options. |
| 1 1. Read saved definition |
| 2. Extract definition from WLM |
| couple data set |
| 3. Create new definition |
| |
| F1=Help F2=Split F5=KeysHelp |
| F9=Swap F12=Cancel |
| ENTER to continue |
| |
```

3. On the **WLM primary options** screen, select menu item 8, **Service Coefficients/Options** and press **Enter**.

```
File Utilities Notes Options Help

Functionality LEVEL008 Definition Menu WLM Appl LEVEL011
Command ==>

Definition data set . . . : none

Definition name STANDARD (Required)
Description Standard Definition

Select one of the
following options. 8 1. Policies
 2. Workloads
 3. Resource Groups
 4. Service Classes
 5. Classification Groups
 6. Classification Rules
```



- 7. Report Classes
- 8. Service Coefficients/Options
- 9. Application Environments
- 10. Scheduling Environments

4. On the **Service Coefficient/Service Definition Options** screen, complete the following:

- For **Dynamic alias management**, choose the mode.

Values:

- **Yes:** Sets the WLM mode to goal mode. In goal mode, the number of alias devices assigned to each PAV base device can dynamically increase or decrease based on the number of I/O requests to each device.
- **No:** Sets the WLM mode to compatibility mode. In compatibility mode, the number of alias devices assigned to each PAV base device remains the same, even when the number of I/O requests to each device changes.

Default: **Yes**

- For **I/O priority management**, enter a priority. The effect of this field setting depends on the setting for **Dynamic alias management**. The following table shows how the setting of for these items controls whether the Dynamic Alias Algorithm is in effect.

| Dynamic Alias Management | I/O Priority Management | Dynamic Alias Algorithm in Effect |
|--------------------------|-------------------------|-----------------------------------|
| No                       | No                      | None (static PAV only)            |
| No                       | Yes                     | None (static PAV only)            |
| Yes                      | No                      | Efficiency only                   |
| Yes                      | Yes                     | Both efficiency and goal          |

```

Coefficients/Options Notes Options Help

 Service Coefficient/Service Definition Options
Command ==>

Enter or change the Service Coefficients:

CPU 1.0 (0.0-99.9)
IOC 0.1 (0.0-99.9)
MSO 0.0000 (0.0000-99.9999)
SRB 1.0 (0.0-99.9)

Enter or change the service definition options:

I/O priority management YES (Yes or No)
Dynamic alias management YES (Yes or No)

```

5. (If you want to set the WLM to goal mode) In the **WLM View Device Parameter / Feature Definition** screen, verify that **DYNAMIC** and **WLMPAV** are set to **Yes**.

# Compatible Hyper PAV enablement from z/OS® on z/VM® workflow

Complete the following process to enable Hyper PAV on z/OS® and z/VM® guest:

## Procedure

1. Enable Hyper PAV on z/OS®.  
For more information about enabling Hyper PAV on z/OS®, see [Enabling Compatible Hyper PAV on z/OS on page 42](#)
2. Enable Hyper PAV from z/OS® on z/VM® guest.  
For more information about enabling Hyper PAV from z/OS® on z/VM® guest, see [Enabling Compatible Hyper PAV from z/OS on z/VM on page 42](#).

## Enabling Compatible Hyper PAV on z/OS®

Run the following command from the host system console:

```
SETIOS HYPERPAV=YES
```

An example of the command is shown below:

```
SETIOS HYPERPAV=YES
IOS189I HYPERPAV MODE CHANGE INITIATED - CONTROL UNIT CONVERSION WILL
COMPLETE ASYNCHRONOUSLY
```



**Note:** You can set the `SETIOS` command for each logical partition (LPAR).

---

## Enabling Compatible Hyper PAV from z/OS® on z/VM®

To enable Hyper PAV from the z/OS® on z/VM®, Hyper PAV must be enabled on z/VM® and z/OS®.

### Procedure

1. Run the following command from z/OS® system console to all base devices in the corresponding CU to take those base devices offline:  

```
V base_device_number1 base_device_number2,OFFLINE
```
2. Run the following commands from z/VM® system console to all alias devices that are used for Hyper PAV in the corresponding CU to enable Hyper PAV:  

```
DET alias_device_number1-alias_device_number2
```

```
VARY OFFLINE alias_device_number1-alias_device_number2
```

```
SET CU HYPERPAV ssid1-ssid2
```

```
VARY ONLINE alias_device_number1-alias_device_number2
```

```
ATT alias_device_number1-alias_device_number2*
```

3. Enable Hyper PAV on the z/OS ® by running the following command from the host system console:

```
SETIOS HYPERPAV=YES
```

4. Run the following command from the system console of z/OS ® to all base devices in the corresponding CU to make those base devices online:

```
V base_device_number1-base_device_number2,ONLINE
```

## MIH timer value setting workflow

Set the MIH timer value for PAV operations. You can set the value at any time.

### Procedure

1. During IPL, use the MIH parameter in the IECIOSxx parmlib member. Set the MIH timer value in MVS/ESA or z/OS ® to 30 seconds.
2. Run the **SETIOS** system command.



## Performing Compatible PAV operations

This topic describes performing PAV operations on the storage system using the GUI.

- [Assigning alias volumes to base volumes](#)
- [Deleting alias volumes from base volumes](#)
- [Assigning alias volumes to different base volumes](#)
- [Calculating Hitachi Compatible PAV used capacity](#)

## Assigning alias volumes to base volumes

You can assign aliases to base volumes in Hitachi Virtual Storage Platform G1000. You can assign up to 255 aliases to a base device in a single CU.

Aliases are assigned in the storage system by selecting LDEV addresses that do not have any provisioning (for example, emulated devices such as a 3390-x) assigned to them. These addresses are called free volumes. The list of free volumes is the list of addresses in the CU that can be used as aliases to assign to base volumes. It is important to note that any address that does not have a provisioned device assigned will be on the free volumes list. You must make sure that the free volumes assigned as aliases in Hitachi Command Suite or Device Manager - Storage Navigator are the corresponding device addresses that are defined as aliases in the IO configuration.

If the number of free volumes you select to assign to the selected base volumes is larger than the number of base volumes you have selected, the PAV function attempts to allocate the free volumes equally to the base volumes. For example, if you select six free volumes and two base volumes, three free volumes (aliases) are allocated to each base volume.

If you are using Hyper PAV to issue I/O requests only to a CU, complete the following:

1. Decide the number of aliases that are necessary for the CU.
2. Assign the aliases to arbitrary base volumes.

Assigned aliases function as aliases for all base volumes in a CU when using Hyper PAV.



**Caution:** Assigning alias volumes simultaneously in more than one CU can degrade host performance.

---

### Prerequisites

- The PAV and Hyper PAV (if applicable) license keys must be installed in the storage system using Hitachi Command Suite or Device Manager - Storage Navigator.
- You must have the Storage Administrator (Provisioning) role to perform this task.
- You must enable the Device Manager - Storage Navigator secondary window. For more information, see the chapter about how to use the Device Manager - Storage Navigator secondary window in the *Hitachi Virtual Storage Platform G1000 System Administrator Guide*.
- Base devices are defined in the storage system.

## Procedure


- Open the Compatible PAV window:
 

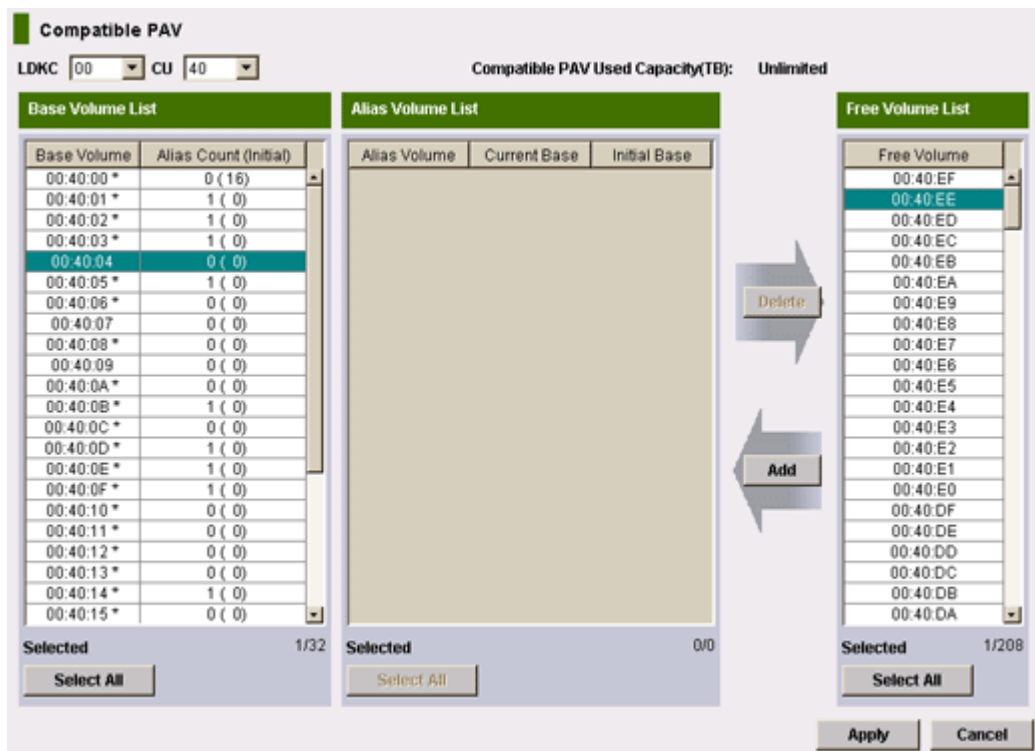
In Hitachi Command Suite:

  - On the **Resources** tab, expand the **Storage Systems** tree, right-click the target storage system, and then select **Other Functions**.
  - In the Device Manager - Storage Navigator main window, select **Actions > Mainframe Connection > Compatible PAV**.

In Device Manager - Storage Navigator (mainframe-only environments):

  - In the Device Manager - Storage Navigator main window, select **Actions > Mainframe Connection > Compatible PAV**.

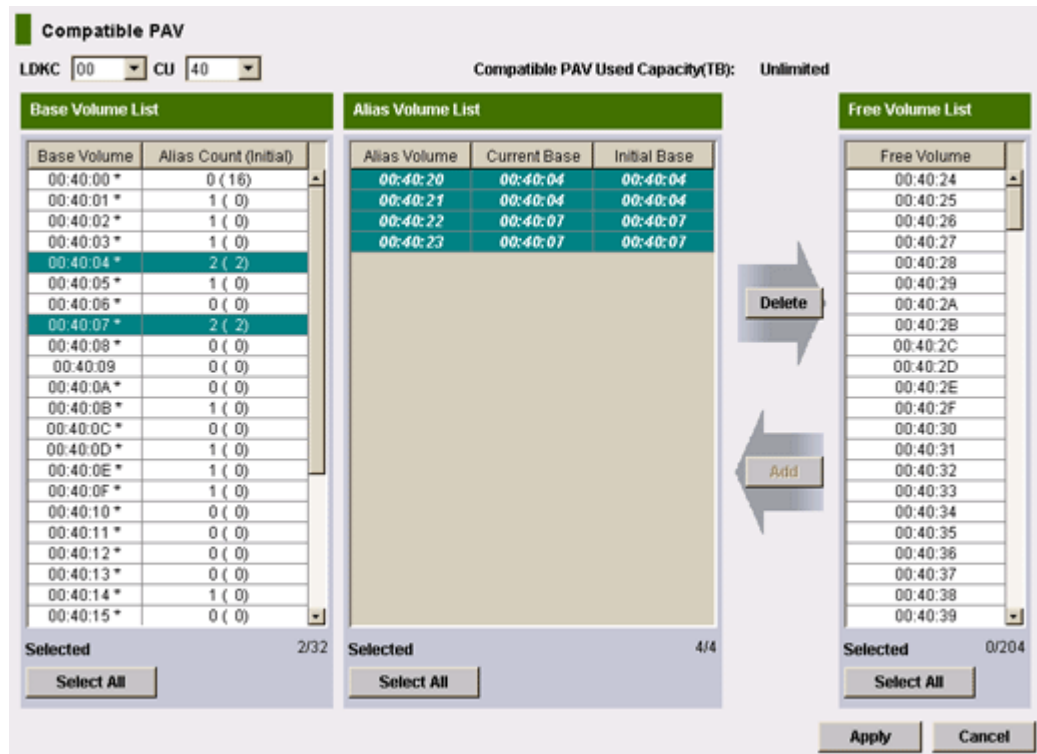
If you select **Actions** and do not see a **Mainframe Connection** item listed on the drop-down menu, the Device Manager - Storage Navigator secondary window function probably is not enabled.
- Click  to change to Modify mode.
- In the **Compatible PAV** window (shown in the following figure), select the LDKC which includes the CU image to be modified from the **LDKC** list.



- From the **CU** list, select the CU image which contains the desired base volumes.  
Base volumes are displayed in **Base Volume List**.

No volumes are displayed if the selected CU image only contains devices to which aliases cannot be assigned, such as 3390-V type devices or any type of open system volume. In these cases, select another CU image.

5. Select one or more base volumes in the **Base Volume List**.
6. Select one or more free volumes in the **Free Volume List**.
7. Click **Add** to assign the selected free volumes to the selected base volumes. The assignments appear in the **Alias Volume List** shown in the following figure.



8. Confirm the alias volumes assigned to the selected base volumes in the **Alias Volume List** are the intended assignments.
9. Click **Apply** to apply the current alias assignments in the **Alias Volume List**.

#### Related references

- [Hitachi Compatible PAV window](#) on page 76

## Deleting alias volumes from base volumes

Alias volumes may be deleted from base volumes using the Compatible PAV window.



## Prerequisites

- I/O operations are not currently being performed on the base device.



**Caution:** Deleting alias devices while I/O operations are occurring can cause a serious failure.

---

- You must have the Storage Administrator (Provisioning) role to perform this task.
- You must enable the Device Manager - Storage Navigator secondary window. To enable this feature, see the chapter about how to use the Device Manager - Storage Navigator secondary window in the *Hitachi Virtual Storage Platform G1000 System Administrator Guide*.

## Procedure

1. Open the Compatible PAV window:


In Hitachi Command Suite:

- a. On the **Resources** tab, expand the **Storage Systems** tree, right-click the target storage system, and then select **Other Functions**.
- b. In the Device Manager - Storage Navigator main window, select **Actions > Mainframe Connection > Compatible PAV**.

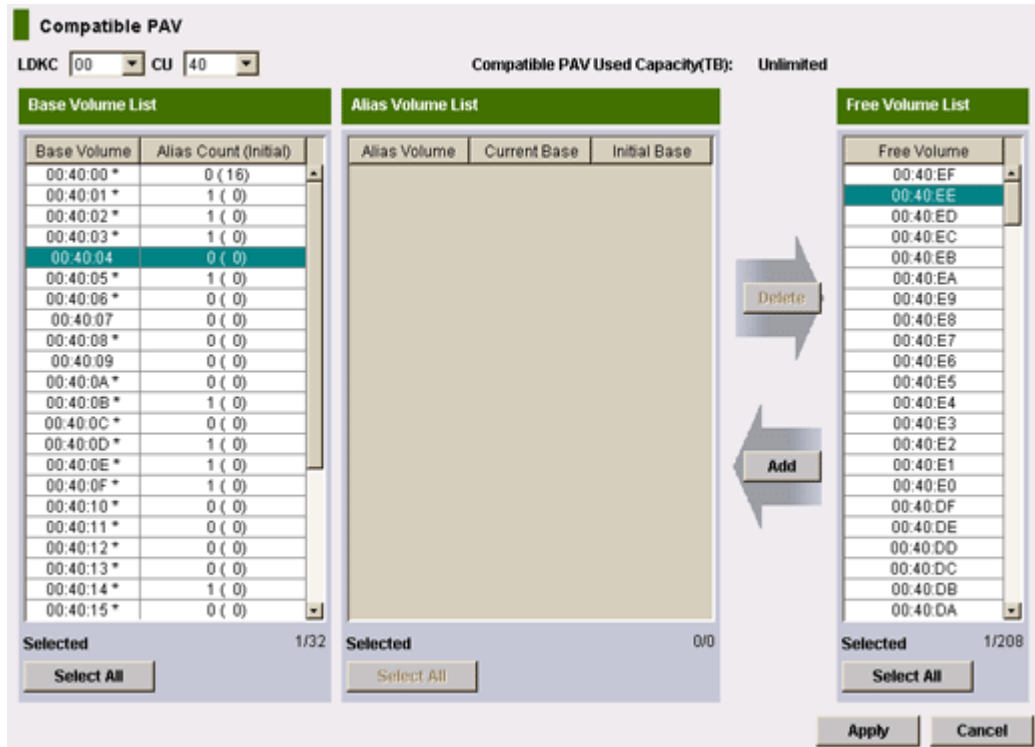
In Device Manager - Storage Navigator (mainframe-only environments):

- a. In the Device Manager - Storage Navigator main window, select **Actions > Mainframe Connection > Compatible PAV**.

If you select **Actions** and do not see a **Mainframe Connection** item listed on the drop-down menu, the Device Manager - Storage Navigator secondary window function probably is not enabled.

2. Click  to change to Modify mode.

- In the **Compatible PAV** window (shown in the following figure), select the LDKC which includes the CU image to be modified from the **LDKC** list.

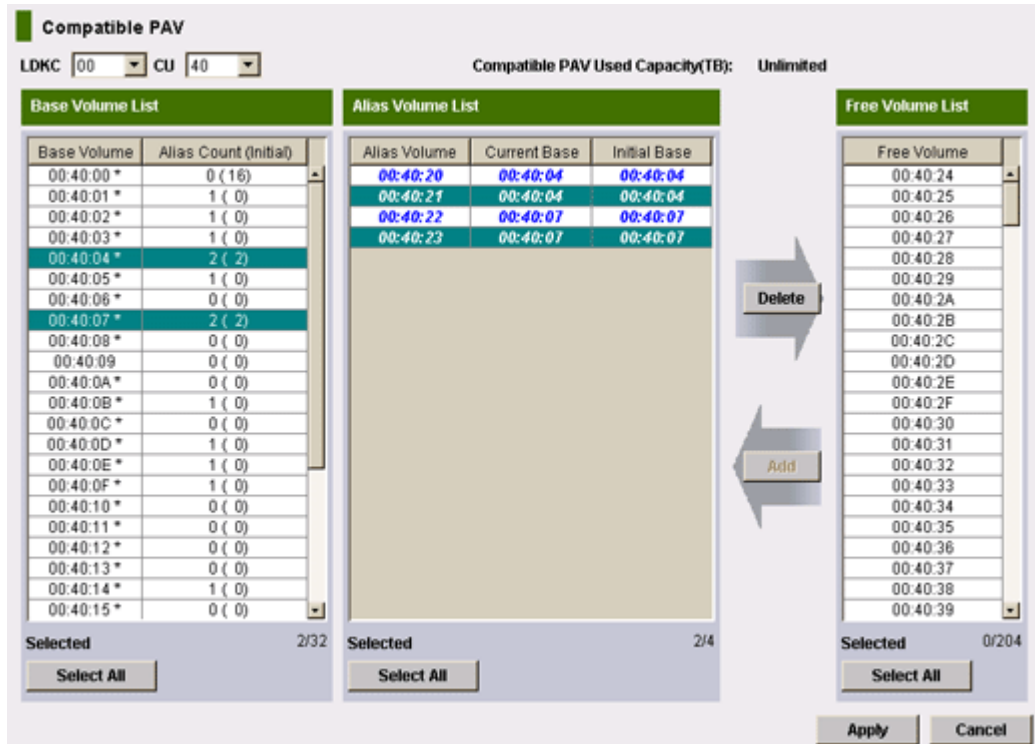


- From the **CU** list, select the CU image which contains the aliases to be removed.

Base volumes are displayed in the **Base Volume List**.

No volumes are displayed if the selected CU image only contains devices to which aliases cannot be assigned, such as 3390-V type devices or journal volumes. In these cases, select another CU image.

- Select one or more base volumes in the **Base Volume List**. Press **Ctrl** and click to select multiple base volumes, press **Shift** and click to select a series of base volumes, or click **Select All** to select all base volumes in the CU image. Alias volumes for each selected base volumes appear in the **Alias Volume List** as shown in the following figure.



- Select one or more alias volumes to remove in the **Alias Volume List**. Press **Ctrl** and click to select multiple alias volumes, Press **Shift** and click to select a series of alias volumes, or click **Select All** to select all alias volumes in the CU image.
- Once one or more alias volumes are selected, click **Delete** to remove the selected alias volumes from the selected base volumes and move these alias volumes back to the **Free Volume List**.
- Click **Apply** to apply the changes.

#### Related references

- [Hitachi Compatible PAV window](#) on page 76

## Assigning alias volumes to different base volumes

Alias volumes may be manually assigned to a different base volume in the same CU image using the Compatible PAV window. This only applies to static or dynamic Compatible PAV.

## Prerequisites

- The number of requests to the base volume to which you are moving the alias volume is less than 50 IOPS. Use the Resource Measurement Facility Report Analysis (RMF) or another available software application to get this performance information.



**Caution:** To avoid a decline in processing performance, do not assign alias volumes to a different base volume if more than 50 IOPS exist.


---

- You must have Storage Administrator (Provisioning) role to reassign aliases.
- You must enable the Device Manager - Storage Navigator secondary window. For more information, see the chapter about how to use the Device Manager - Storage Navigator secondary window in the *Hitachi Virtual Storage Platform G1000 System Administrator Guide*.

## Procedure

1. In Hitachi Command Suite:
  - a. On the **Resources** tab, click **Storage Systems**, expand the **Storage Systems** tree, right-click the target storage system, and then select **Other Functions**.

In Device Manager - Storage Navigator (mainframe-only environment):

- a. In the Device Manager - Storage Navigator main window, select **Actions > Mainframe Connection > Compatible PAV**.  
If you select **Actions** and do not see a **Mainframe Connection** item listed on the drop-down menu, the Device Manager - Storage Navigator secondary window function probably is not enabled.
2. In the **Compatible PAV** window, click  to change to Modify mode, and then complete the following:
    - For **LDKC**, select the LDKC that includes the CU image you want to modify.
    - For **CU**, select the CU image that contains the aliases to be reassigned.
    - For **Base Volume List**, select the base volumes. Alias volumes for each selected base volumes appear in the **Alias Volume List**.
    - For **Alias Volume List**, confirm the alias volumes assigned to the selected base volumes. Select one or more alias volumes to remove and click **Delete** to remove the selected alias volumes from the selected base volumes and move these alias volumes back to the **Free Volume List**.  
Select different base volumes. These base volumes can be in the same CU image. Or you can change the CU image using the **LDKC** and **CU** lists.

When one or more new base volumes are selected in the **Base Volume List** and one or more free volumes are selected in the **Free Volume List**, click **Add** to assign the selected free volumes to the selected base volumes. The assignments appear in the **Alias Volume List**.

3. Click **Apply** to apply the changes.

#### Related references

- [Hitachi Compatible PAV window](#) on page 76

## Calculating Hitachi Compatible PAV used capacity

The storage system recalculates the PAV used capacity after any PAV operation, such as:

1. Adding aliases to a base volume that has no aliases assigned.
2. Removing all aliases from a base volume or an entire CU.



**Note:** A base volume without assigned aliases is not counted as part of the used capacity.

---

3. Uninstalling base volumes using LVI or Universal Volume Manager.
4. Assigning the first alias to a base volume by Dynamic PAV or Hyper PAV.

The calculated used capacity is the total of the following:

- Base volume capacity that aliases are assigned to using Hitachi Command Suite or Device Manager - Storage Navigator.
- Base volumes which are accessed with alias volumes using Dynamic PAV or Hyper PAV.

The calculation of the used capacity can be time-consuming as it takes three minutes for each CU to calculate this value. If all 255 CUs have volumes, it can take up to 13 hours to calculate and display the updated used capacity. During calculation, the latest value for the used capacity is unavailable. All volumes defined to storage system are calculated. After the calculation has finished, the brackets disappear and the latest value of the used capacity is displayed.

#### Related references

- [Hitachi Compatible PAV window](#) on page 76



## Verifying and monitoring devices

This topic describes the procedures for verifying base and alias devices on the system, and the syntax and description of the commands used to monitor PAV activities from the host computer.

- [Verifying the device definitions](#)
- [Verifying the status of devices per channel path](#)
- [Verifying Compatible Hyper PAV aliases from z/OS ®](#)
- [Verifying Compatible Hyper PAV aliases from z/OS ® on z/VM ®](#)
- [Sample of commands run to all base devices and alias devices from z/VM ®](#)
- [MVS ® commands to monitor Compatible PAV](#)
- [GTF I/O tracing](#)
- [VM CP commands for z/VM ®](#)

# Verifying the device definitions

Use this task to verify that the host recognizes the devices as specified.

## Procedure

1. Run the **MVS DEVSERV QPAV** command, using the following syntax:

```
DS QPAV,device_unit_ID,VOLUME
```

Information about the base device and corresponding alias addresses are shown.

The following is sample output of this command on a PAV device.

```
DS QPAV, D222,VOLUME
IEE459I 08:20:32 DEVSERV QPAVS 591
HOST CONFIGURATION SUBSYSTEM CONFIGURATION

UNIT NUM UA TYPE STATUS SSID UNIT UA

D222 22 BASE 0102 22 BASE
D2FE FE ALIAS-D222 0102 FE ALIAS-22
D2FF FF ALIAS-D222 0102 FF ALIAS-22
***3 DEVICE(S) MET THE SELECTION CRITERIA
```

The following figure shows sample output of this command on a Hyper PAV device.

```
DS QP,5000,VOL
IEE459I 22.28.19 DEVSERV QPAVS 726
HOST CONFIGURATION SUBSYSTEM CONFIGURATION

UNIT NUM UA TYPE STATUS SSID UNIT UA

05000 00 BASE-H 5150 00 BASE
**** 1 DEVICE(S) MET THE SELECTION CRITERIA
```



**Note:** The relationship between base and alias devices does not appear as fixed to the operating system when using Hyper PAV. Therefore, only the information about base devices is shown.

2. Verify that the information shown matches the base and alias device definitions displayed by Hitachi Command Suite or Device Manager - Storage Navigator.





**Note:** When using Dynamic PAV, the assignments may be different from what you assigned using Hitachi Command Suite or Device Manager - Storage Navigator. This is because the WLM changes the assignments based on workload and goals. In such a situation, this is normal and does not cause issues.

## Verifying the status of devices per channel path

Use this task to verify the status of the devices for each CHP.

### Procedure

1. For each CHP ID connected to the storage system, run the following command:

**MVS Display Matrix**

Using the following syntax:

```
D M=CHP (CHP_ID)
```

The following figure shows a sample output of this command.

```
D M=CHP(80)
IEE174I 10.05.24 DISPLAY M 779
CHPID 80:TYPE=05, DESC=ESCON SWITCHED POINT TO POINT
DEVICE STATUS FOR CHANNEL PATH 80
 0 1 2 3 4 5 6 7 8 9 A B C D E F
680 + + + + + + + + + + + + + + +
681 + + + + + + + + + + + + + + +
682 + + + + + + + + + + + + + + +
683 + + + + + + + + + + + + + + +
684 AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL
685 AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL
686 AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL
687 AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL AL
688 + + + + + + + + + + + + + + +
689 + + + + + + + + + + + + + + +
68A + + + + + + + + + + + + + + +
68B + + + + + + + + + + + + + + +
68C UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL
68D UL UL UL UL UL UL AL AL AL AL AL AL AL AL AL AL
68E UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL
68F UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL UL
*****SYMBOL EXPLANATIONS*****
+ ONLINE @ PATH NOT VALIDATED - OFFLINE . DOES NOT EXIST
* PHYSICALLY ONLINE $ PATH NOT OPERATIONAL
BX DEVICE IS BOXED SN SUBCHANNEL NOT AVAILABLE
DN DEVICE NOT AVAILABLE PE SUBCHANNEL IN PERMANENT ERROR
AL DEVICE IS AN ALIAS UL DEVICE IS AN UNBOUND ALIAS
```

2. Verify that the information shown by running the command matches the device status that you defined when you created the IO configuration definition using HCD. If the information shown is incorrect, redefine the devices to the host operating system.

For more information about redefining devices to host operating systems, see [Defining base or alias devices to host operating systems on page 30](#).

## Verifying Compatible Hyper PAV aliases from z/OS ®

### Procedure

1. On the host computer, enable the **Compatible Hyper PAV** option.

```
SETIOS HYPERPAV=YES
```

2. Run the **DEVSERV QPAV** command from the host.

For more information about the proper syntax and an example of this command, see [DEVSERV QPAV commands on page 61](#).

3. Verify that the aliases that are shown are those assigned for Hyper PAV.

- If the correct aliases for Hyper PAV are not shown, and the host only accesses the one Virtual Storage Platform G1000 system, perform the following:

- Disable the **Compatible Hyper PAV** option on the host computer.
- Enable the option again.

- If the host accesses multiple storage systems that use Hyper PAV, run the following commands from the host to all base devices in the corresponding CU:

```
V base_device_number1-base_device_number2,OFFLINE
CF CHP(channel_path1-channel_path2),OFFLINE
CF CHP(channel_path1-channel_path2),ONLINE
V base_device_number1-base_device_number2,ONLINE
```

4. If you are using Cross-OS File Exchange on the host computer, run the following commands:

```
V Cross_OS_File_Exchange_Volume_1-Cross_OS_File_Exchange_Volume_2,OFFLINE
V Cross_OS_File_Exchange_Volume_1-Cross_OS_File_Exchange_Volume_2,ONLINE
```

5. Run the **DEVSERV QPAV** command.

6. Check the alias devices in the returned results.

## Verifying Compatible Hyper PAV aliases from z/OS ® on z/VM ®

If you restart the Virtual Storage Platform G1000 while using Hyper PAV, verify that the correct aliases on a z/OS ® system that is a guest operating system on z/VM ® are still configured for the CU.

### Procedure

1. Enable the **Compatible Hyper PAV** option on z/VM ® and z/OS ®.
2. Run the **QUERY PAV** command from z/VM ®.

For proper syntax and an example of this command, see [QUERY PAV command on page 66](#).

3. Verify that the displayed aliases are those assigned for Hyper PAV.
4. Run the **DEVSERV QPAV** command from z/OS ®.

For proper syntax and an example of this command, see [DEVSERV QPAV commands on page 61](#).

5. Verify that the displayed aliases are those assigned for Hyper PAV.
6. If the correct aliases for Hyper PAV are not shown, run the following commands:

```
QUERY PAV
```

```
DEVSERV QPAV
```

7. If the host only accesses one Virtual Storage Platform G1000, disable the **Compatible Hyper PAV** option on the host computer, and then enable the option again.
8. If the host accesses other storage systems that use Hyper PAV, complete the following:

- a. Run the following command from z/OS ® which is used as a guest operating system on z/VM ® to all base devices in the corresponding CU:

```
V base_device_number1-base_device_number2,OFFLINE
```

- b. Run the commands from z/VM ® to all base devices and alias devices used for Hyper PAV in the corresponding CU. For details about the commands, see [Sample of commands run to all base devices and alias devices from z/VM on page 59](#).

- c. Run the following command from z/OS ® to all base devices in the corresponding CU.

```
V base_device_number1 - base_device_number2,ONLINE
```

- d. Run the following command from z/OS ® to all channel paths configured on the corresponding CU. You must run this command for each channel path.

```
V PATH(base_device_number1-
base_device_number2,channel_path),ONLINE
```

9. Run the **DEVSERV QPAV** command.
10. Check for the alias devices in the returned results.

## Sample of commands run to all base devices and alias devices from z/VM ®

To verify the aliases of Compatible Hyper PAV from z/OS ® on z/VM ®, if the host accesses other storage systems that use Hyper PAV, run the following commands from z/VM ® to all base devices and alias devices used for Hyper PAV in the corresponding CU.

## Procedure

1. DET *alias\_device\_number1-alias\_device\_number2*
2. DET *base\_device\_number1-base\_device\_number2*
3. VARY OFFLINE *alias\_device\_number1-alias\_device\_number2*
4. VARY OFFLINE *base\_device\_number1-base\_device\_number2*
5. VARY OFFLINE CHPID *channel\_path1*
6. VARY OFFLINE CHPID *channel\_path2*
7. VARY ONLINE CHPID *channel\_path1*
8. VARY ONLINE CHPID *channel\_path2*
9. VARY ONLINE *base\_device\_number1-base\_device\_number2*
10. VARY ONLINE *alias\_device\_number1-alias\_device\_number2*
11. ATT *base\_device\_number1-base\_device\_number2\**
12. ATT *alias\_device\_number1-alias\_device\_number2\**

## MVS ® commands to monitor Compatible PAV

Use MVS ® commands to monitor the PAV activities on the Virtual Storage Platform G1000 from z/OS ®.

### DISPLAY command

The MVS ® **DISPLAY** command shows path information and alias count for the specified base device.

Run this command using the following syntax:

```
D M=DEV(device_unit_ID)
```

The following figure shows a sample output of this command for a PAV base device with six aliases.

```
D M=DEV(8300)
IEE174I 15.33.58 DISPLAY M 739
DEVICE 8300 STATUS=ONLINE
CHP 63 40 64 65
DEST LINK ADDRESS DD EA E9 E8
DEST LOGICAL ADDRESS 02 02 02 02
PATH ONLINE N Y Y Y
CHP PHYSICALLY ONLINE Y Y Y Y
PATH OPERATIONAL N Y Y Y
MANAGED N N N N
MAXIMUM MANAGED CHPID(S) ALLOWED: 0
ND = 002105. .HTC.02.000000012345
DEVICE NED = 2105. .HTC.02.000000012345
PAV BASE AND ALIASES 6
```

The following figure shows a sample output of this command for a Hyper PAV base device with 16 aliases.

```
D M=DEV(5000)
IEA494I 261F,SBF61F,PPRC PAIR FULL DUPLEX,SSID=C9F6,CCA=1F
IEE174I 22.30.30 DISPLAY M 746
DEVICE 5000 STATUS=ONLINE
CHP 48 4C
```

```

ENTRY LINK ADDRESS 31 34
DEST LINK ADDRESS 16 15
PATH ONLINE Y Y
CHP PHYSICALLY ONLINE Y Y
PATH OPERATIONAL Y Y
MANAGED N N
CU NUMBER 5000 5000
MAXIMUM MANAGED CHPID(S) ALLOWED: 0
DESTINATION CU LOGICAL ADDRESS = 00
SCP CU ND = 002107.900.HTC.55.000000063503.0008
SCP TOKEN NED = 002107.900.HTC.55.000000063503.0000
SCP DEVICE NED = 002107.900.HTC.55.000000063503.0000
HYPERPAV ALIASES CONFIGURED = 16
FUNCTIONS ENABLED = MIDAW

```

## DEVSERV PATHS command

The **MVS DEVSERV PATHS** command shows the status of the specified base device.

Run this command using the following syntax:

```
DS P,device_unit_ID
```

The following figure shows a sample output of this command.

```

DS P,8300
IEE459I 15.43.32 DEVSERV PATHS 755
UNIT DTYPE M CNT VOLSER CHPID=PATH STATUS
 RTYPE SSID CFW TC DFW PIN DC-STATE CCA DDC ALT CU-TYP
8300,33903 ,0,000,PA8300,63=< 40=+ 64=+ 65=+
 2105 8300 Y YY. YY. N SIMPLEX 00 00 2105
***** SYMBOL DEFINITIONS *****
O = ONLINE + = PATH AVAILABLE
< = PHYSICALLY UNAVAILABLE

```

## DEVSERV QPAV commands

You can use the **MVS DEVSERV QPAV** commands to complete the following operations:

- Show the status of PAV base devices.  
For more information about showing the status of PAV base devices, see [Showing the PAV base device status on page 62](#).
- Show the status of a Hyper PAV base device and its alias devices.  
For more information about showing the status of Hyper PAV base devices and its alias devices, see [Showing the status of Hyper PAV base devices and alias devices on page 62](#).
- Show the SSID status.  
For more information about showing the status of an SSID, see [Showing the SSID status on page 63](#).
- Show the status of the host and subsystem configuration.  
For more information about showing the host and subsystem configuration status, see [Showing the host and subsystem configuration status on page 63](#).

## Showing the PAV base device status

Use this task to the status of PAV base devices.

Run this command using the following syntax:

```
DS QP,device_unit_ID,4
```

The following figure shows a sample output of this command.

```
DS QP,8300,4
IEE459I 15.50.16 DEVSERV QPAVS 013
 HOST SUBSYSTEM
CONFIGURATION CONFIGURATION

UNIT UNIT UA
NUM. UA TYPE STATUS SSID ADDR. TYPE

8300 00 BASE
8301 01 BASE
8302 02 BASE
8303 03 BASE
**** 4 DEVICE(S) MET THE SELECTION CRITERIA
```

## Showing the status of Hyper PAV base devices and alias devices

Use the following task to show the status of a Hyper PAV base device and its alias devices.

Run this command using the following syntax.

```
DS QP,device_unit_ID,HPAV
```

The following figure shows a sample output of this command.

```
DS QP,5000,HPAV
IEE459I 22.38.45 DEVSERV QPAVS 844
 HOST SUBSYSTEM
CONFIGURATION CONFIGURATION

UNIT UNIT UA
NUM. UA TYPE STATUS SSID ADDR. TYPE

05000 00 BASE-H
05040 40 ALIAS-H
05041 41 ALIAS-H
05042 42 ALIAS-H
05043 43 ALIAS-H
05044 44 ALIAS-H
05045 45 ALIAS-H
05046 46 ALIAS-H
05047 47 ALIAS-H
05048 48 ALIAS-H
05049 49 ALIAS-H
0504A 4A ALIAS-H
0504B 4B ALIAS-H
0504C 4C ALIAS-H
0504D 4D ALIAS-H
0504E 4E ALIAS-H
0504F 4F ALIAS-H
**** 16 DEVICE(S) IN HYPERPAV ALIAS POOL
```

## Showing the SSID status

Use the following task to show the SSID status.

Run this command using the following syntax:

```
DS QP,SSID=device_unit_ID
```

The following figure shows a sample output of this command.

```
DS QP,SSID=8300
IEE459I 15.56.03 DEVSERV QPAVS 026
 HOST SUBSYSTEM
 CONFIGURATION CONFIGURATION

UNIT UNIT UA
NUM. UA TYPE SSID ADDR. TYPE

8300 00 BASE 8300 00 BASE
8301 01 BASE 8300 01 BASE
8302 02 BASE 8300 02 BASE
8303 03 BASE 8300 03 BASE
8304 04 BASE 8300 04 BASE
8306 06 BASE 8300 06 BASE
8307 07 BASE 8300 07 BASE
8308 08 BASE 8300 08 BASE
8309 09 BASE 8300 09 BASE
830A 0A BASE 8300 0A BASE
830C 0C BASE 8300 0C BASE
830D 0D BASE 8300 0D BASE
830E 0E BASE 8300 0E BASE
830F 0F BASE 8300 0F BASE
8310 10 BASE 8300 10 BASE
8311 11 BASE 8300 11 BASE
8312 12 BASE 8300 12 BASE
8313 13 BASE 8300 13 BASE
8314 14 BASE 8300 14 BASE
8315 15 BASE 8300 15 BASE
8316 16 BASE 8300 16 BASE
8317 17 BASE 8300 17 BASE
8318 18 BASE 8300 18 BASE
8319 19 BASE 8300 19 BASE
831A 1A BASE 8300 1A BASE
831B 1B BASE 8300 1B BASE
831D 1D BASE 8300 1D BASE
831F 1F BASE 8300 1F BASE
8320 20 BASE 8300 20 BASE
8321 21 BASE 8300 21 BASE
8322 22 BASE 8300 22 BASE
83F6 F6 ALIAS-8301 8300 F6 ALIAS-01
83F7 F7 ALIAS-8301 8300 F7 ALIAS-01
83F8 F8 ALIAS-8301 8300 F8 ALIAS-01
83F9 F9 ALIAS-8301 8300 F9 ALIAS-01
83FA FA ALIAS-8301 8300 FA ALIAS-01
83FB FB ALIAS-8300 8300 FB ALIAS-00
83FC FC ALIAS-8300 8300 FC ALIAS-00
83FD FD ALIAS-8300 8300 FD ALIAS-00
83FE FE ALIAS-8300 8300 FE ALIAS-00
83FF FF ALIAS-8300 8300 FF ALIAS-00
**** 41 DEVICE(S) MET THE SELECTION CRITERIA
```

## Showing the host and subsystem configuration status

Use this task to show the status of the host and subsystem configuration.

Run the command using the following syntax:

```
DS QP,device_unit_ID,VOLUME
```

The following figure shows a sample output of this command.

```
DS QP,8300,VOLUME
IEE459I 16.00.15 DEVSERV QPAVS 041
 HOST
 CONFIGURATION

 UNIT
 NUM. UA TYPE STATUS
 ---- -- -
 8300 00 BASE
 83FB FB ALIAS-8300
 83FC FC ALIAS-8300
 83FD FD ALIAS-8300
 83FE FE ALIAS-8300
 83FF FF ALIAS-8300

 6 DEVICE(S) MET THE SELECTION CRITERIA

 SUBSYSTEM
 CONFIGURATION

 UNIT UA
 ADDR. TYPE
 ---- --
 8300 00 BASE
 8300 FB ALIAS-00
 8300 FC ALIAS-00
 8300 FD ALIAS-00
 8300 FE ALIAS-00
 8300 FF ALIAS-00
```

## DISPLAY IOS HYPERPAV command

The MVS ® **DISPLAY IOS HYPERPAV** command shows the current HYPERPAV enablement status.

Run this command using the following syntax:

```
D IOS,HYPERPAV
```

The following figure shows a sample output of this command.

```
D IOS,HYPERPAV
IOS098I 22.31.34 HYPERPAV DATA 776
HYPERPAV MODE IS SET TO YES
```

## GTF I/O tracing

PAV is compatible with GTF I/O tracing. When a device number is specified for a GTF I/O tracing operation, GTF determines if the device is a PAV base device and automatically includes the alias addresses currently assigned to the base device.

## VM CP commands for z/VM ®

You can use VM CP commands to monitor the PAV activities on the Virtual Storage Platform G1000 from z/VM ®.

The following syntax conventions are used for VM CP commands:

- **Bold and capitalized characters:** Indicate characters that must be entered.
- **Lowercase characters:** indicate characters that you can omit.
- **italic characters:** Indicate a type of operand. An arbitrary value that you can enter.
- **brackets ([ ]):** Indicate an operand that you can omit.



- braces ( { } ): Indicate that you must select an operand from the list of operands enclosed by the braces.



**Note:** Delimit operands enclosed within the braces using vertical bars (|).

---

## QUERY CU command

The **QUERY CU** command shows information about DASD CU.

Run this command using the following syntax:

```
Q CU [DASD] {ssid | ssid1 | ssid2} {ALiases | DEVices | PAVMode}
```

The following figure shows a sample output of this command.

```
q cu dasd b600 ali
DASD CU B600 ALIASES:
A0C0 A0C1 A0C2 A0C3 A0C4 A0C5 A0C6 A0C7
A0C8 A0C9 A0CA A0CB A0CC A0CD A0CE A0CF
A0D0 A0D1 A0D2 A0D3 A0D4 A0D5 A0D6 A0D7
A0D8 A0D9 A0DA A0DB A0DC A0DD A0DE A0DF
A0E0 A0E1 A0E2 A0E3 A0E4 A0E5 A0E6 A0E7
A0E8 A0E9 A0EA A0EB A0EC A0ED A0EE A0EF
A0F0 A0F1 A0F2 A0F3 A0F4 A0F5 A0F6 A0F7
A0F8 A0F9 A0FA A0FB A0FC A0FD A0FE A0FF
```

```
q cu dasd b600 dev
DASD CU B600 DEVICES:
A000 A001 A002 A003 A004 A005 A006 A007
A008 A009 A00A A00B A00C A00D A00E A00F
A040 A041 A042 A043 A044 A045 A046 A047
A048 A049 A04A A04B A04C A04D A04E A04F
A050 A051 A052 A053 A054 A055 A056 A057
A058 A059 A05A A05B A05C A05D A05E A05F
A060 A061 A062 A063 A064 A065 A066 A067
A068 A069 A06A A06B A06C A06D A06E A06F
A070 A071 A072 A073 A074 A075 A076 A077
A078 A079 A07A A07B A07C A07D A07E A07F
A080 A081 A082 A083 A084 A085 A086 A087
A088 A089 A08A A08B A08C A08D A08E A08F
A090 A091 A092 A093 A094 A095 A096 A097
A098 A099 A09A A09B A09C A09D A09E A09F
A0C0 A0C1 A0C2 A0C3 A0C4 A0C5 A0C6 A0C7
A0C8 A0C9 A0CA A0CB A0CC A0CD A0CE A0CF
A0D0 A0D1 A0D2 A0D3 A0D4 A0D5 A0D6 A0D7
A0D8 A0D9 A0DA A0DB A0DC A0DD A0DE A0DF
A0E0 A0E1 A0E2 A0E3 A0E4 A0E5 A0E6 A0E7
A0E8 A0E9 A0EA A0EB A0EC A0ED A0EE A0EF
A0F0 A0F1 A0F2 A0F3 A0F4 A0F5 A0F6 A0F7
A0F8 A0F9 A0FA A0FB A0FC A0FD A0FE A0FF
```



**Note:** You can only run **QUERY CU** on the z/VM ® instance that is directly connected to the LPAR. Attempting to run this command on z/VM ® that is operating as a guest operating system on another z/VM ® causes the command to be rejected.

---

## QUERY DASD DETAILS command

The **QUERY DASD DETAILS** command shows information about DASD (RDEV).

Run this command using the following syntax:

```
Query DASd DETAILS {rdev | rdev1 - rdev2}
```

The following figure shows a sample output of this command.

```
q dasd details a000
A000 CUTYPE = 2107-E8, DEVTYPE = 3390-0A, VOLSER = CMA000, CYLS = 3339
 CACHE DETAILS: CACHE NVS CFW DFW PINNED CONCOPY
 -SUBSYSTEM Y Y Y - N N
 -DEVICE Y - - Y N N
 DEVICE DETAILS: CCA = 00, DDC = --
 DUPLEX DETAILS: --
 HYPERPAV DETAILS: BASE VOLUME IN POOL 0
 CU DETAILS: SSID = B600, CUNUM = A000
```

## QUERY PAV command

Use the **QUERY PAV** command to show the list of PAV or Hyper PAV devices (including information on those devices) that are managed by the corresponding storage system.

Run this command using the following syntax:

```
Query PAV {rdev | rdev1 - rdev2 | ALL}
```

The following figure shows a sample output of this command.

```
q pav a000
Device A000 is a base HyperParallel Access Volume device in Pool 0
```

## QUERY VIRTUAL DASD DETAILS command

Use the **QUERY VIRTUAL DASD DETAILS** command to show information about all DASDs that z/VM ® can access.

Run this command using the following syntax:

```
Query Virtual DASd [DETAILS]
```

The following figure shows a sample output of this command.

```
Q V DASD details
 :
 :
DASD 1000 3390 CMA000 R/W 3339 CYL ON DASD A000 SUBCHANNEL = 005D
 HYPERPAVBASE(0)
DASD 3000 3390 R/W 1 CYL ON DASD A0C0 SUBCHANNEL = 005F
 HYPERPAVALIAS(A0C0,0)
DASD A001 ON DASD A001 R/W CMA001 SUBCHANNEL = 005E
 DEVCTL HYPERPAVBASE(0)
```



**Caution:** The DETAILS operand is only valid for dedicated DASD and mini-disk DASD.

---

## QUERY VIRTUAL PAV command

Use the **QUERY VIRTUAL PAV** command to show the status of all PAV and Hyper PAV devices that z/VM® can access.

Run this command using the following syntax:

```
Query Virtual PAV {vdev | vdev1 - vdev2 | ALL}
```

The following figure shows a sample output of this command.

```
<BASE>
q v pav 1000
HYPERPAV BASE 1000 ON A000 CMA000 ASSIGNED A000 POOL 0

<ALIAS>
q v pav 3000
HYPERPAV ALIAS 3000 ASSIGNED A0C0 POOL 0
```



# Troubleshooting

This topic provides PAV troubleshooting information.

- [General troubleshooting](#)
- [Calling the Hitachi Data Systems customer support](#)

## General troubleshooting

For more information about troubleshooting using Hitachi Command Suite or Device Manager - Storage Navigator, see the *Hitachi Virtual Storage Platform G1000 System Administrator Guide*.

For a complete list of Hitachi Command Suite or Device Manager - Storage Navigator error codes, see the *Hitachi Device Manager - Storage Navigator Messages*.

## Calling the Hitachi Data Systems customer support

If you need to call Hitachi Data Systems customer support, make sure you provide as much information about the problem as possible, including the following:

- The circumstances surrounding the error or failure.
- The exact content of any error messages displayed on the host systems.
- The exact content of any error messages displayed by Hitachi Command Suite or Hitachi Device Manager - Storage Navigator.
- The Hitachi Device Manager - Storage Navigator configuration information (use the Dump Tool).
- The service information messages (SIMs), including reference codes and severity levels, displayed by Hitachi Command Suite or Hitachi Device Manager - Storage Navigator.

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Portal for contact information: <https://portal.hds.com>

## Disabling Compatible Hyper PAV

This topic describes the procedures for disabling Hyper PAV on the storage system.

- [Disabling Compatible Hyper PAV from z/OS ®](#)
- [Disabling Compatible Hyper PAV from z/OS ® when using multiple storage systems](#)
- [Disabling Compatible Hyper PAV from z/OS ® on z/VM ®](#)

## Disabling Compatible Hyper PAV from z/OS ®

### Prerequisites

- All alias device assignments in the storage system must be deleted. For more information about deleting alias devices from base devices, see [Deleting alias volumes from base volumes on page 48](#).
- You must have Storage Administrator (Provisioning) role to perform this task.

### Procedure

1. Run the following commands to all base devices in the corresponding CU:

```
V base_device_number1-base_device_number2,OFFLINE
```

```
CF CHP(channel_path1-channel_path2),OFFLINE
```

2. Run the following command from the host system console to disable the **Compatible Hyper PAV** option on the host computer.

```
SETIOS HYPERPAV=NO
```

3. Remove the Hyper PAV license using Hitachi Command Suite or Device Manager - Storage Navigator.

4. Run the following DEVSERV command from the z/OS ® to an arbitrary device per CU:

```
DS QD,device_ID,VALIDATE
```

5. To verify that the aliases assigned for Hyper PAV are released, from the host, run the following command:

```
DEVSERV QPAV
```

For proper syntax and an example of this command, see [DEVSERV QPAV commands on page 61](#).

## Disabling Compatible Hyper PAV from z/OS ® when using multiple storage systems

Use this procedure when Hyper PAV and Cross-OS File Exchange are still used on other storage systems which are accessed from the corresponding host.

### Procedure

1. Run the following commands to all base devices in the corresponding CU.

```
V base_device_number1-base_device_number2,OFFLINE
```

```
CF CHP(channel_path1-channel_path2),OFFLINE
```



2. Remove the Hyper PAV license using Hitachi Command Suite or Device Manager - Storage Navigator.
3. Run the following commands to all base devices in the corresponding CU.
 

```
CF CHP(channel_path1-channel_path2),ONLINE
V base_device_number1-base_device_number2,ONLINE
```
4. Run the DEVSERV QPAV command from the host to verify that the aliases assigned for Hyper PAV are released.
 

See [DEVSERV QPAV commands on page 61](#) for proper syntax and an example of this command.

## Disabling Compatible Hyper PAV from z/OS ® on z/VM ®

You can disable Hyper PAV from z/OS ® on z/VM ®.

### Prerequisites

- All alias device assignments in the storage system must be deleted. For more information about deleting alias devices from bases devices, see [Deleting alias volumes from base volumes on page 48](#).
- You must have the Storage Administrator (Provisioning) role to perform this task.

### Procedure

1. From z/OS ® on z/VM ®, run the following commands to all base devices in the corresponding CU.

```
V base_device_number1-base_device_number2,OFFLINE
CF CHP(channel_path1-channel_path2),OFFLINE
```

2. Run the following command from the host system console to disable the **Compatible Hyper PAV** option on the host computer.

```
SETIOS HYPERPAV=NO
```

3. Run the following commands from z/VM ® system console to all alias devices that are used for Hyper PAV in the corresponding CU:

```
DET alias_device_number1-alias_device_number2
VARY OFFLINE alias_device_number1-alias_device_number2
SET CU PAV ssid1-ssid2
VARY ONLINE alias_device_number1-alias_device_number2
ATT alias_device_number1-alias_device_number2*
```

An asterisk (\*) is required at the end of the ATT command.

4. Remove the Hyper PAV license using Hitachi Command Suite or Device Manager - Storage Navigator.

5. Run the following DEVSERV command from the z/OS ® to an arbitrary device per CU:

```
DS QD,device_ID,VALIDATE
```

6. Run the QUERY PAV command from z/VM ® to verify that the aliases assigned for Hyper PAV are released.

For proper syntax and an example of this command, see [QUERY PAV command on page 66](#).

7. Run the DEVSERV QPAV command from the z/OS ® to verify that the aliases assigned for Hyper PAV are released.

See [DEVSERV QPAV commands on page 61](#) for proper syntax and an example of this command.



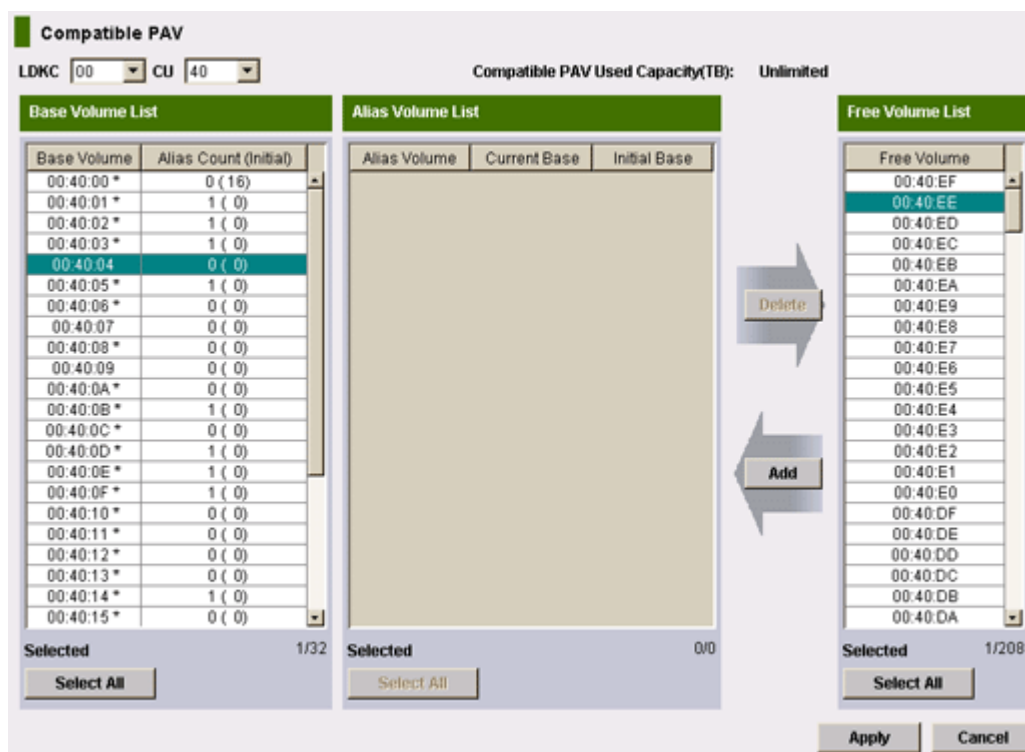
## Compatible PAV GUI reference

This topic describes the items and options available in the **Assign Alias Volumes** window.

- [Hitachi Compatible PAV window](#)

# Hitachi Compatible PAV window

Use the Compatible PAV window to assign alias devices to base devices.



Item	Description
LDKC	Selects the LDKC that contains the desired CUs and LDEVs.
CU	Selects the logical CU image that contains the desired LDEVs. The volume lists on the Compatible PAV window display only the LDEVs for the selected CU image. CU numbers are included in the currently selected LDKC. To indicate the CU numbers included in another LDKC, select the LDKC that includes the chosen CU number in the LDKC list.
Compatible PAV Used Capacity	Indicates the capacity currently being used by base volumes. The value in the parentheses indicates the total available capacity (in terabytes) in the storage system for Compatible PAV.  Values:  Unlimited: Indicates that the licensed capacity is unlimited.  --- : Indicates you are using a temporary key or the emergency key.  The used capacity is enclosed in angle brackets (< >): Indicates the calculation has not been completed.
Base Volume List	Displays the LDEVs that are currently in use in the selected CU image.

Item	Description
	For a description of the items, see <a href="#">Base Volume List on page 77</a> .
Alias Volume List	Displays the alias devices assigned to the selected base devices. For a description of the items, see <a href="#">Alias Volume List on page 77</a> .
Free Volume List	Displays the LDEV addresses of unused volumes in the selected CU. For a description of the items, see <a href="#">Free Volume List on page 78</a> .
Add	Assigns aliases to selected base devices. When you click Add, the selected free LDEVs are assigned to the selected base devices. The new alias devices are displayed in the Alias Volume List, and the LDEV addresses are no longer displayed in the Free Volume List. To complete your request to assign the new aliases as specified, you must click Apply.
Delete button	Removes aliases assigned to a selected base device. When you click Delete, the selected alias devices are removed from the Alias Volume List, and their LDEVs are displayed in the Free Volume List. To complete removing the aliases as specified, you must click Apply.
Apply button	Applies the settings to the storage system.
Cancel button	Discards any changes and restores the initial settings.

## Base Volume List

The Base Volume List displays the LDEVs that are currently defined in the selected CU image. Each of these LDEVs can be a Compatible PAV base device. When you assign and remove aliases for base devices, you select the base devices from this list. The following table describes the items in the Base Volume List.

Item	Description
Base Volume	Displays the LDKC number, CU number, and LDEV number of the base volume. For the volume used for Compatible PAV, an asterisk (*) is attached next to the LDEV number (for example, 00:00:00 *). The capacity of the volumes attached asterisks (*) is an object for calculation of used capacity.
Alias Count (Initial)	Displays the number of aliases currently assigned to the base volume in the disk storage system. The number of aliases set in the base volume by the user is also displayed in the parentheses.
Selected	Displays the number of selected base volumes and the total number of base volumes in the selected CU image. For example, 2/73 indicates that two base volumes are selected out of a total of 73 base volumes in the selected CU image.
Select All	Selects all volumes in the Base Volume List.

## Alias Volume List

The Alias Volume List displays the alias devices assigned to the selected base devices. To view all alias devices for the selected CU image, you must select all of the base devices. When you cancel aliases for base devices, you select the alias devices from this list. The following table describes the items in the Alias Volume List.

Item	Description
Alias Volume	Displays the LDKC, CU, and LDEV numbers of the alias volume.
Current Base	Displays the LDKC, CU, and LDEV numbers of the base volume currently assigned to the alias volume in the disk storage system.
Initial Base	Displays the LDKC, CU, and LDEV numbers of the base volume set by the user for the alias volume.
Selected	Displays the number of selected alias devices and the total number of alias devices in the selected CU image. For example, 2/4 indicates that two aliases are selected out of a total of four alias devices in the selected CU image.
Select All button	Selects all volumes in the Alias Volume List.

## Free Volume List

The Free Volume List displays the LDEV IDs of unused volumes in the selected CU. Any free volume can be used as a Compatible PAV alias device. Use this list to select aliases to assign to base volumes. The following table describes the items in the Free Volume List.

Item	Description
Free Volume	Displays the complete list of volumes available for assignment.
Selected	Displays the number of selected free devices and the total number of free devices in the selected CU image. For example, 8/47 indicates that eight free devices are selected out of a total of 47 free devices in the selected CU image.
Select All	Selects all volumes in the Free Volume List.

### Related tasks

- [Assigning alias volumes to base volumes](#) on page 46
- [Deleting alias volumes from base volumes](#) on page 48
- [Assigning alias volumes to different base volumes](#) on page 51
- [Calculating Hitachi Compatible PAV used capacity](#) on page 53



# Glossary

## A

### **alias device**

A formatted but unused mainframe logical device (LDEV) whose address can be used as an alias for a Hitachi Compatible PAV (PAV) base device. See also base device

### **APAR**

Authorized Problem Analysis Report

## B

### **base device**

A formatted mainframe logical device (LDEV) that contains user data and can be accessed through alias devices using Hitachi Compatible PAV (PAV) host software. A base device must be defined to the host as a "B" device type (e.g., 3390B-9). See also alias device

## C

### **cache**

A set of RAM (Random Access Memory) modules used to store data temporarily.

### **capacity**

The amount of data storage space available on a physical storage device, generally measured in bytes (MB, GB, TB, and so on).

## CH

Channel

## **CHA**

channel adapter

## **channel path**

The communication path between a channel and a control unit. A channel path consists of the physical channel path and the logical path.

## **control unit (CU)**

Created in an enterprise-class storage system. Also called a CU image. The LDEVs created in a storage system are connected to a single CU, and a number is assigned to each CU for identifying its LDEVs. Therefore, volumes (LDEVs) in a storage system are specified by the CU number (CU#) and LDEV number.

## **D**

### **DASD**

direct-access storage device

### **device (dev or DEV)**

A physical or logical unit with a specific function.

### **device emulation**

Indicates the type of logical volume. Mainframe device emulation types provide logical volumes of fixed size, called logical volume images (LVIs), which contain EBCDIC data in CKD format. Typical mainframe device emulation types include 3390-9 and 3390-M. Open-systems device emulation types provide logical volumes of variable size, called logical units (LUs), that contain ASCII data in FBA format. The typical open-systems device emulation type is OPEN-V.

## **I**

### **IPL**

initial program load

### **ISPF/PDF**

Interactive System Productivity Facility/package definition file



## **J**

### **JCL**

job control language

## **L**

### **LCU**

logical control unit

### **logical device (LDEV)**

A volume created in a storage system. See also LU.

### **logical volume**

An area on a disk consisting of device files that are logically integrated using a volume manager. Also referred to as an LDEV.

### **logical volume image (LVI)**

An LDEV that is configured for use by mainframe hosts (for example, 3390-3).

## **M**

### **MIH**

missing interrupt handler

### **MVS**

Multiple Virtual Storage

## **N**

### **NUM**

Number

## **P**

### **PAV**

Hitachi Compatible PAV

### **PPRC**

Peer-to-Peer Remote Copy

## **R**

### **R-SIM**

remote service information message

### **RAID**

redundant array of independent disks

A collection of two or more disk drives that presents the image of a single logical disk drive to the system. Part of the physical storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. In the event of a single device failure, the data can be read or regenerated from the other disk drives.

RAID employs the technique of disk striping, which involves partitioning each drive's storage space into units ranging from a sector (512 bytes) up to several megabytes. The stripes of all the disks are interleaved and addressed in order.

## **S**

### **SIM**

service information message

### **SIz**

ShadowImage for Mainframe

### **SMS**

Storage Management Subsystem

### **SSCH**

start subchannel

### **storage subsystem identifier (SSID)**

In a mainframe environment, SSIDs are used for reporting information from the control unit (CU) image to the mainframe operating system. An SSID is assigned to each group of 64 or 256 volumes to define one or four SSIDs per CU image. The user-specified SSIDs are assigned during storage system installation and must be unique to all connected host operating environments.

## **V**

### **virtual machine**

One instance of an operating system along with one or more applications running in an isolated partition within the computer. A VM enables different operating systems to run in the same computer at the same time as well as prevents applications from interfering with each other. All virtual machines run simultaneously.

### **volume (vol or VOL)**

A name for the logical device (LDEV), or logical unit (LU), or concatenated LDEVs, that are created in a storage system that have been defined to one or more hosts as a single data storage unit.

## **VTOC**

volume table of contents

## **W**

### **WLM**

Workload Manager

## **X**

### **XRC**

Extended Remote Copy

## **Z**

### **z/VM**

z/Virtual Machine





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