
Using the SYMCLI Configuration Manager for Managing CKD Devices

Abstract

This paper provides an introduction to the Configuration Manager mainframe functionality that allows you to map a range of CKD devices to front-end director ports and assign alias addresses for PAV operation.

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Introduction

The Symmetrix[®] Manager in the EMC[®] ControlCenter[™] Symmetrix Management package¹ allows you to manage some aspects of the configuration of the Symmetrix array to which your host is attached. This paper describes how to manage CKD devices in a mainframe environment. Beginning with EMC Solutions Enabler version 6.0 and Enginuity[™] version 5x71, the Configuration Manager allows the following configuration change operations if either ESCON (EA) or FICON (EF) directors are present in the Symmetrix array:

- Mapping a range of CKD devices to a front-end director port.
- Unmapping CKD devices from front-end director ports.
- Copying a CU (Controller Unit) image of device mappings from one port to another port.
- Assigning alias addresses for devices that need to function as Parallel Access Volumes (PAVs).
- Removing alias addresses.

You manage Symmetrix devices in the mainframe environment by assigning them to a CU during the mapping operation. A CU image is created or modified each time you map or unmap a device to an EA or EF port.

A *CU image definition* is constructed from SYMAPI database structures to form a picture of the CU image in terms of data structures and SYMCLI output. The CU image definition includes the devices, the base and alias addresses of the devices, the front-end ports to which the devices are mapped, and the SSID (sub-system identifier) assigned to the image. The CU image also indicates whether it uses PAVs and whether the CU is online or offline.

Symmetrix devices in a mainframe environment are managed in groups as part of a CU image. You usually map and unmap CKD devices as a group. A group of devices becomes part of the CU image when you map the group to a front-end port and assign device base addresses. If you are enabling Symmetrix devices for PAV operation, you will also want to add one or more alias addresses for a device.

PAV technology allows a z/OS host to simultaneously process multiple non-conflicting I/Os to the same logical device. Before PAV, unit control blocks (UCBs) and z/OS queues kept track of I/O requests so that they were processed one after the other. With a PAV-enabled device, instead of one UCB per logical device, a z/OS host can use a base UCB and several alias UCBs to access the same device simultaneously.

Purpose and Scope

This paper provides an introduction to the Configuration Manager functionality that allows you to manage the accessibility of CKD devices from a mainframe host. This functionality is included in EMC Solutions Enabler version 6.0 (and higher) running on Symmetrix arrays using Enginuity versions 5x71 and higher.

Caution: Only experienced storage administrators should change a Symmetrix configuration.

¹ Part of the EMC ControlCenter/Open Edition suite of software products.

Related Documentation

The following manual and white papers provide information related to concepts discussed in this paper:

- *EMC Solutions Enabler Symmetrix Configuration Change CLI Product Guide*
- *Using the SYMCLI Configuration Manager (P/N 300-000-475)*
- *Using SYMCLI to Obtain Symmetrix Configuration Information (P/N 300-000-285)*

Practical Uses

Storage requirements are never permanent. Your needs for storage are most likely to grow over time. Consequently, the ability to utilize free disk space on your Symmetrix array to create new CKD emulation devices makes the SYMCLI Configuration Manager a valuable asset in expanding your storage capabilities.

The amount of storage made available to a host depends on what is known as *host-allocated capacity*. In a direct-connect mainframe environment, logical devices are considered allocated as soon as they are mapped to a front-end port. Beginning with EMC Solutions Enabler version 6.0 and Enginuity version 5x71, the Configuration Manager provides the convenience and speed of mapping a range of CKD devices rather than mapping a single device at a time as was done previously.

The Configuration Manager also allows you to configure static or dynamic PAVs for a Symmetrix array and assign alias addresses to devices to support PAV operation. PAV technology allows the host system to send multiple writes to the same device by assigning multiple addresses to it. Using PAV aliases, the mainframe environment permits multiple I/Os to be concurrently active on a given device at the same instant in time. Consequently, the time required for queuing disk access (that is, the time the UCB in z/OS is blocked for other I/Os to the same volume because the UCB is busy) is greatly reduced.

You can also perform other CKD management operations by controlling a group of devices that belong to a CU image. For example, you can copy a CU image mapping to another port for multi-path access. Being able to control a range of devices by way of the CU image allows the Configuration Manager to perform more efficiently in mainframe environments.

Mapping a Range of CKD Devices

To access a CKD device from a mainframe host system, you need to map the device to one or more front-end EA or EF director ports and then update the host. Front-end mapping is a Symmetrix mechanism for exporting the logical view of a device to a host system. When you map a device to a front-end director, you are making the device ready to be visible to a host. The host is usually unaware of the device until you run a host utility that allows the host to recognize it.

As shown in Figure 1, a group of CKD devices becomes part of a CU image when you map the group to a front-end EA or EF port and assign device addresses. A unit control block (UCB) represents a device address within the z/OS operating system. Unmapped devices are configured devices that either have never been mapped or were mapped and later explicitly unmapped. Any unconfigured physical disk space represents storage capacity capable of being configured as CKD devices.

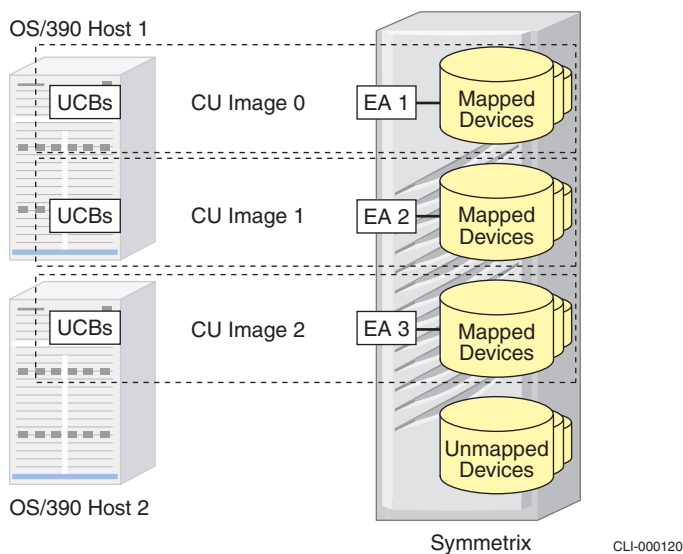


Figure 1. Mapping Groups of CKD Devices as Part of a CU Image

A mainframe host can see up to 16 CU images (numbered 0x0 through 0xF).² A CU image can contain up to 256 device addresses (numbered 0x000 through 0x0FF). A device can be in only one CU image.

² If required, a host can see more than 16 CU images by changing the SSID associated with the image. For example, there can be two CU images with the same image number but with different SSIDs. Thus, the same CU image numbers can be in use multiple times within the Symmetrix array and the host as long as each image has a unique SSID. The second CU image with the same number is known as a *split*. A Symmetrix array can have up to 64 splits.

Devices become part of a CU image as a result of the CU image number that you specify during the mapping operation. To map a group of CKD devices, use the `map` command file entry to specify:

- Front-end EA or EF director/port number
- Range of Symmetrix device numbers
- Starting base address for the device group (from which the CU image number is derived)
- Optionally, an SSID (sub-system identifier). By default, the SSID of the first device mapped into a new CU image is used.

The following entry maps a range of 64 devices (0 through 63) to director 01C, port 1, assigning base addresses beginning with 200. The first digit of the starting base address represents the CU image number (in this case, CU image 2), and the next two digits (00) specify its position within the image's device list.

```
map dev 0:63 to dir 01C:1 starting base_address=200;
```

Mainframe systems use the SSID to locate physical disk controllers, and all devices in the CU image must have the same SSID. If the CU image that you specify does not exist yet, the SSID of the first device is used as the SSID of the CU image. If the CU image already exists and contains other devices (and thus an SSID), the SSIDs of the newly mapped devices are changed to match the existing SSID of the CU image.³

The first base address that you assign to a CU image's device set must be a multiple of 0x010. Although not required, it is recommended that you assign consecutive base addresses.

Restrictions for Mapping CKD Devices

The following restrictions apply when you map CKD devices:

- With Enginuity version 5x71, the configuration server implements a new set of CKD mapping rules. If your system is not compliant with these rules, host-based mapping changes are not allowed.
- One new requirement with Enginuity version 5x71 is that the base address and alias addresses for a device be the same across all director ports to which the device is mapped. By adding a new device to a CU image that changes the alias addresses, you change the addressing for that CU image on multiple ports, necessitating an update to all hosts that see that CU image. If an earlier configuration does not adhere to the requirement of same addresses across all ports, the configuration is considered invalid for purposes of host-based configuration changes.
- It is common for port A and port B to be mapped exactly the same. But in some configurations, port A is configured to one range of devices and port B is configured to a different range of devices. Once PAV is enabled, these mixed configurations are no longer valid.

³ If you use the `mvs_ssid` option with the `map` command to specify a different SSID for an existing CU image, a second CU image called a *split* is created with the same image number but with a unique SSID. The second set of devices is assigned a different serial number, allowing the host to differentiate between the devices and the CU image that controls them. This technique, when required, allows a host to see more than 16 CU images by assigning a unique SSID to the same CU image number.

Unmapping a Range of CKD Devices

You can unmap a range of CKD devices from one or all EA or EF ports. If the devices being unmapped have alias addresses, those aliases are removed.

All devices with the same SSID (such as those defined in a CU image) must be either all mapped or all unmapped. Thus, if you are unmapping only a subset of CU image's devices, you must provide a different SSID for the devices being unmapped.

The following example unmaps a range of five devices (13B through 13F) from all director ports and assigns these devices an SSID that is different from the one used by the CU image.

```
unmap dev 13B:13F from dir all:all new_ssid=0160;
```

After a mapping or unmapping change session, update the host so that it recognizes the new Symmetrix configuration.

Copying a CU Image Mapping to Another Port

After mapping a CU image of devices to an EA or EF port, you may want to copy the entire mapping to another port for multi-path access. Redundancy is important in the event that one of the paths fails. You can copy a range of devices to another port as long as all devices in the range are part of the same CU image.⁴

The following example copies the addresses of devices 10 through 50 from port 03C:0 to port 03D:0.

```
map dev 10:50 to dir 03D:0 copying dir 03C:0;
```

For more information about mapping to multiple ports, refer to the "Example" sections of this paper.

⁴ The range of mapped devices to copy may also include special devices, like save devices, that are never mapped.

Assigning Alias Addresses to a Device for PAV Operation

Parallel Access Volume (PAV) technology allows a single z/OS host to simultaneously process multiple I/O operations to the same logical volume.⁵ Before PAV capability, unit control blocks (UCBs) and z/OS queues kept track of I/O requests so that they were processed one after the other. With a PAV-enabled device, instead of one UCB per logical device, a z/OS host can use a base UCB and several alias UCBs to access the same logical device.

Figure 2 shows the presentation of multiple UCBs for the same PAV-enabled logical device through the assignment of a base address (000) and two alias addresses (080 and 0C0).

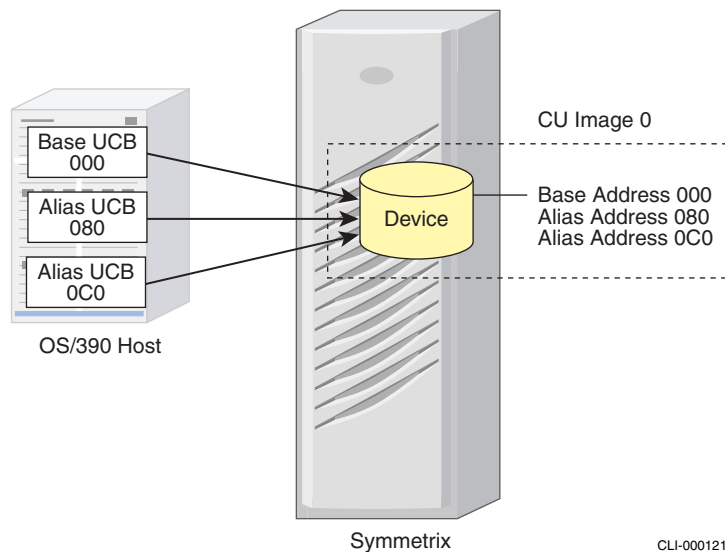


Figure 2. Multiple Addresses for a PAV-Enabled Logical Device

A base device is real device represented by a UCB in the host, uses a real channel address, and consumes real space in the back-end disks of the control unit. An alias device is also represented by a UCB in the host, uses a real channel address, but while defined in the control unit, consumes no real disk space.

The relationship between base and alias devices can be either static or dynamic. If you set a Symmetrix array for *static PAV*, the result is a fixed relationship between a base device and its aliases. This means that you cannot reassign an alias to a different base device without changing the configuration in the control unit.

Setting the Symmetrix array for *dynamic PAV* allows the Workload Manager component of z/OS to dynamically reassign alias devices to different base devices depending on the performance needs of the workload at a particular time.

⁵ Multiple Allegiance (MA) is a control unit capability that allows the processing of non-conflicting I/Os from *multiple* z/OS hosts in parallel. Multiple Allegiance I/O executes concurrently with PAV I/O. The Symmetrix array treats them equally and guarantees data integrity by serializing write I/Os where extent conflicts exist.

Assigning Alias Addresses

The Configuration Manager allows you to assign alias addresses to a device that you have already mapped. An alias is propagated to all director ports to which a device is mapped.

The following example adds alias A60 (CU image A, address 60) to device 01D, which is already mapped.

```
add pav alias to dev 01D starting alias=A60;
```

The following example adds aliases for a range of devices (01D through 023), starting at address A60.

```
add pav alias to dev 01D:023 starting alias=A60;
```

If there are any devices in this range that are not mapped, those devices are skipped. If the device range has base addresses with gaps (that is, the addresses are not consecutive), the alias addresses will also have gaps.

An error is returned if any devices in the range are mapped to a different CU image than CU image A.

A common setup is to assign 64 base addresses as 0x000 through 0x03F and 64 alias addresses as 0x0C0 through 0x0FF, leaving a gap from 0x040 to 0x0BF for expansion (refer to the section “Planning Alias Addresses”).

Although uncommon, it is possible to have a CU image in which you assign 255 alias addresses to one base address. The assigning of aliases to base addresses is limited only by the maximum of 256 total addresses (base addresses plus alias addresses) for a CU image.

Removing Alias Addresses

The Configuration Manager allows you to remove alias addresses from a device in the event that you need to free up addresses to be used as base addresses for new devices.

The following example removes alias addresses (beginning at 50) for a range of devices from CU image 7.

```
remove pav alias from dev 012:052, starting alias=750;
```

The following example removes alias addresses (beginning at 90) for the same range of devices from CU image 7.

```
remove pav alias from dev 012:052, starting alias=790;
```

The starting alias to be removed applies to the first device (012) in the range. As the alias removal is processed, the alias value is incremented from the starting alias address. Any gaps in the base addresses of the device range generate gaps in the range of alias addresses.

Planning Alias Addresses

When setting up base/alias addressing assignments within a 256-device addressing range, it is recommended that the base addresses be in the low end of the range and that the alias addresses be in the high end of the range. The base address should begin at 000 and increase in ascending order. For planning purposes, you need to first decide the number of alias addresses needed in the 256-device addressing range before you can determine the high-end address range to use for the aliases.

Planning Addresses for Static PAV

When setting *static PAV*, you create a fixed relationship between a base device and its aliases. You cannot reassign a static alias to a different base device without changing the configuration in the control unit.

Table 1 shows assigning two alias addresses for each of 64 base devices within the 256-device addressing range of a CU image (for example, CU image 0). The base addresses for these devices are 000 to 03F. The number of aliases required is 128. Thus, the high-end alias device range is 080 to 0BF, and 0C0 to 0FF. The remaining device addresses in the range 040 to 07F can be used as base devices with no aliases.

Table 1. Two Aliases Each for 64 Base Devices

Base	Alias #1	Alias #2
000	080	0C0
001	081	0C1
002	082	0C2
003	083	0C3
“	“	“
“	“	“
03F	0BF	0FF
040		
041		
“		
“		
07F		

If you intend to assign alias addresses to base devices 040 to 04F some time in the future, you should plan it carefully. Table 2 shows a possibility that leaves room in CU image 0 for devices 050 to 05F.

Table 2. Adding Two Aliases Each for Base Devices 040 to 04F

Base	Alias #1	Alias #2
040	060	070
041	061	071
042	062	072
043	063	073
“	“	“
“	“	“
04F	06F	07F

On the other hand, if you added three aliases each for base devices 040 to 04F, you would complete the addressing capacity of CU image 0. For additional addressing, you would then need to use another CU image (for example, CU image 1). Table 3 shows how adding three aliases to base devices 040 to 04F completes CU image 0.

Table 3. Adding Three Aliases Each for Base Devices 040 to 04F

Base	Alias #1	Alias #2	Alias #3
040	050	060	070
041	051	061	071
042	052	062	072
043	053	063	073
“	“	“	“
“	“	“	“
04F	05F	06F	07F

If you needed to assign *three* alias addresses for each of 64 base devices within the 256-device addressing range of CU image 0, then the address range in the image would be full. As Table 4 illustrates, you would have 64 base addresses and 192 alias addresses. If you needed to add more aliases for these devices, you would need to convert this one image into two CU images (for example, CU image 0 and CU image 1).

Table 4. Adding Three Aliases Each for 64 Base Devices

Base	Alias #1	Alias #2	Alias #3
000	040	080	0C0
001	041	081	0C1
002	042	082	0C2
003	043	083	0C3
“	“	“	“
“	“	“	“
“	“	“	“
“	“	“	“
“	“	“	“
“	“	“	“
“	“	“	“
“	“	“	“
“	“	“	“
03F	07F	0BF	0FF

If you intended to assign base addresses and aliases to another set of 64 devices, you could accomplish this by configuring a new CU image (CU image 2, for example).

Once an addressing configuration is set up for a Symmetrix array, any change you make to the mix of addresses requires management work on the host (an I/O gen), which is highly disruptive. All involved devices, perhaps an entire CU, have to be taken offline during the reassignment of addresses.

Planning Addresses for Dynamic PAV

When setting *dynamic PAV* operation, you allow the Workload Manager component of z/OS to dynamically reassign alias devices to different base devices depending on the performance needs of the workload at a particular time. Although the Workload Manager manages the alias UCBs dynamically and changes base/alias assignments on the fly as workload changes occur, you still need to make the initial assignment of alias addresses to UCB base devices.

Table 5 shows assigning 128 alias addresses to 128 base devices in a CU image. Once the Symmetrix array is brought online to the z/OS host, the Workload Manager will determine base/alias relationships dynamically as workloads change.

Table 4. Adding One Alias for Each Dynamic PAV Device

Base	Alias
000	080
001	081
002	082
003	083
“	“
“	“
03F	0BF
040	0C0
041	0C1
“	“
“	“
07D	0FD
07E	07E
07F	0FF

Displaying the CU Images on a Symmetrix Array

The following `symcfg list` command with the `-CUimages` option provides information about three CU images (0, 1, and 3) configured on the Symmetrix array whose ID is 000000006185.

`symcfg -sid 6185 list -CUimages`

```
Symmetrix ID      : 000000006185
PAV Aliasing      : DynamicStandardPAV
```

```
CU image number: 0x00
CU status       : Online
```

```
Sub System ID      : 0x6C00
Director Port Assignments
: EF-04A:0
: EA-13A:0
: EA-13A:1
: EF-04B:0
: EA-13B:0
: EA-13B:1
: EF-04C:0
: EA-13C:0
: EA-13C:1
: EF-04D:0
: EA-13D:0
: EA-13D:1
Number of Devices   : 64
Device Ranges       : 0000:003F
Number of Base Addresses : 64
Number of Alias Addresses : 192
```

```
CU image number: 0x01
CU status       : Mixed
```

```
Sub System ID      : 0x6C01
Director Port Assignments
: EF-04A:0
: EA-13A:0
: EA-13A:1
: EF-04B:0
: EA-13B:0
: EA-13B:1
: EF-04C:0
: EA-13C:0
: EA-13C:1
: EF-04D:0
: EA-13D:0
: EA-13D:1
Number of Devices   : 256
Device Ranges       : 0040:013F
Number of Base Addresses : 256
Number of Alias Addresses : 0
```

```
CU image number: 0x03
```

.....

The display, truncated at the ellipsis (...), shows that each CU image has the maximum 256 addresses assigned (the sum of the base devices and aliases assigned). Aliasing in the Symmetrix array is set for dynamic standard PAV. The “CU status” can be online, offline, or mixed. The mainframe host controls whether a range of devices is online or offline using `vary on` and `vary off` commands. When a CU image contains some devices that are online and some that are offline, its CU status is mixed.

If you specify a different SSID when mapping additional devices to an existing CU image, a second CU image called a *split* is created with the same image number but with a unique SSID. The second set of devices is assigned a different serial number, allowing the host to differentiate between the devices and the CU image that controls them. This technique, when required, allows a host to see more than 16 CU images by assigning a unique SSID to the same CU image number. The following display shows CU image 0 with two unique Sub System IDs that identify the mapping of two different device ranges.

`symcfg -sid 200 list -CUimages`

```
Symmetrix ID           : 000183600200
PAV Aliasing           : N/A
```

```
CU image number: 0x00
CU status       : N/A
```

```
Sub System ID           : 0x7000
Director Port Assignments : EA-15A:0
                        : EA-15A:1
                        : EA-16A:0
                        : EA-16A:1
                        : EA-15B:0
                        : EA-15B:1
                        : EA-16B:0
                        : EA-16B:1
Number of Devices        : 64
Device Ranges            : 0000:003F
Number of Base Addresses : 64
Number of Alias Addresses : 0
```

```
CU image number: 0x00
CU status       : N/A
```

```
Sub System ID           : 0x7001
Director Port Assignments : EA-15A:0
                        : EA-15A:1
                        : EA-16A:0
                        : EA-16A:1
                        : EA-15B:0
                        : EA-15B:1
                        : EA-16B:0
                        : EA-16B:1
Number of Devices        : 64
Device Ranges            : 0040:007F
Number of Base Addresses : 64
Number of Alias Addresses : 0
```

Displaying the Addressing Details of a CU Image

The following `symcfg show` command with the `-CUimages` option displays detailed information about CU image number 3 configured on the Symmetrix array whose ID is 000000006185.

`symcfg -sid 6185 -CUimages show 3`

```
Symmetrix ID           : 000000006185
PAV Aliasing           : DynamicStandardPAV
```

CU image number: 0x03

```
Sub System ID          : 0x6C03
Director Port Assignments
                        : EF-04A:0
                        : EA-13A:0
                        : EA-13A:1
                        : EF-04B:0
                        : EA-13B:0
                        : EA-13B:1
                        : EF-04C:0
                        : EA-13C:0
                        : EA-13C:1
                        : EF-04D:0
                        : EA-13D:0
                        : EA-13D:1
Number of Devices       : 256
Number of Base Addresses : 256
Number of Aliases Addresses : 0
```

SymDev	Base Address	Aliases
0240-027F	300-33F	
02B0-02CF	340-35F	
0330-035F	360-38F	
03E2-0451	390-3FF	

The display shows the base address range for each range of Symmetrix CKD devices in the SymDev column. For example, Symmetrix devices 0240 through 027F have been assigned base addresses 300 through 33F. No alias addresses have been defined.

Displaying SSID Information

When mapping or unmapping CKD devices, you may need to specify an SSID. The SSID that you specify must be one that is available. You can assign the same SSID to as many as 256 devices. The SSIDs for a Symmetrix array can range from 0 to 1024, but you do not have to choose them in consecutive order.

The following `symcfg list` command with the `-ssid` option displays information about SSIDs currently configured on the Symmetrix array whose ID is 000187900769. The output display shows that SSID 140 already has the maximum number of devices that can be assigned to it, but that SSIDs 141 and 143 are still well below the maximum.

`symcfg -sid 769 -ssid list`

Symmetrix ID: 000187900769

Symmetrix ID : 000187900769

Sub System Information:

Sub System ID : 0x0140
Maximum Number of Devices Allowed : 256
Number of Devices Currently Present: 256

Sub System ID : 0x0143
Maximum Number of Devices Allowed : 256
Number of Devices Currently Present: 1

Sub System ID : 0x0141
Maximum Number of Devices Allowed : 256
Number of Devices Currently Present: 24

Setting the Symmetrix Parameter for PAV Operation

To perform PAV operations, you need to use the Configuration Manager to set a Symmetrix-wide configuration parameter for either static or dynamic PAV. Setting a Symmetrix array for PAV operation means that all devices are PAV-capable. You can set the PAV mode value⁶ to STANDARD (static PAV) or DYNAMIC_STANDARD (dynamic PAV). To turn off PAV mode once it is set, please contact EMC.

- **STANDARD**
Creates a fixed relationship between a base device and its aliases. You cannot reassign an alias to a different base device later without changing the configuration in the control unit.
- **DYNAMIC_STANDARD**
Allows the Workload Manager component of z/OS to dynamically reassign alias devices to different base devices depending on the performance needs of the workload at a particular time.

The following command file entry enables dynamic standard PAV on the Symmetrix array:

```
set symmetrix pav_mode=dynamic_standard;
```

⁶ The Configuration Manager cannot set the additional `pav_mode` values of NONE, SIEMENS, or DYNAMIC_SIEMENS. If your configuration requires a SIEMENS setting, or if you need to turn off PAV mode once it is set, please contact EMC.

Mapping Devices in Mixed Environments (FBA and CKD)

When mapping devices on a Symmetrix array that has both mainframe (CKD) and open system (FBA) devices, you may need to plan for third-party mainframe products that back up all Symmetrix devices, regardless of whether they are CKD or FBA. Performing such a backup operation requires that the FBA devices be mapped to an ESCON (EA) or FICON (EF) port without interfering with their FBA port mappings.

To allow you to map an FBA device to an EA or EF port, the following mapping rules exist:

- You can map and unmap an FBA device to an EA/EF port without interfering with its FBA port mappings. In mapping an FBA device, you may need to change its SSID to match the SSID of the CU image that it will be in. You are permitted to change the device's SSID number, because open system hosts do not use the SSID.
- You can map and unmap an FBA device to an FBA port without interfering with its EA/EF port mappings. Configuration changes to FBA devices that require all FBAs to be unmapped (such as meta devices) will ignore mappings to EA/EF ports.
- If you map an FBA meta head device to an EA/EF port, you must also map all its meta members to that same port. The mainframe system is unaware of open system meta management, and accesses each member as an independent device.
- You can map an FBA device to an EA or EF director/port using a base address that has no relationship to its LUN address.

For more information about mapping devices in mixed FBA/CKD environments, refer to the white paper *Using the SYMCLI Configuration Manager* (P/N 300-000-475).

Example 1: Mapping a Single Device on Multiple EA Ports

The following example was performed using Solutions Enabler version 6.0. The hardware setup is a Symmetrix array set to dynamic PAV operation and connected to a mainframe z/OS host. Although you would normally map multiple devices in a CU image (as in Example 2), this example describes the simple case of mapping a single device and copying this mapping to all director/ports on an EA board.

The `symcfg list` command with the `-CUimages` option provides information about the CU images configured on the Symmetrix array whose ID is 000000006219. CU images 1 and 2 are currently configured. The “CU status” pertains to the status of the devices in the image: online, offline, or mixed.

```
# symcfg -sid 6219 list -CUimages
```

```
Symmetrix ID          : 000000006219
PAV Aliasing          : DynamicStandardPAV
```

```
CU image number: 0x01
CU status       : Offline
```

```
Sub System ID          : 0x0185
Director Port Assignments : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
Number of Devices       : 16
Device Ranges           : 0231:0240
Number of Base Addresses : 16
Number of Alias Addresses : 48
```

```
CU image number: 0x02
CU status       : Mixed
```

```
Sub System ID          : 0x0186
Director Port Assignments : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
Number of Devices       : 20
Device Ranges           : 0271:0280
                        : 033B:033E
Number of Base Addresses : 20
Number of Alias Addresses : 0
```

The following `vi` command uses the `vi` text editor to create a text file named `example1MapDev.cfg`. As was done here, you can enter into the file the `map dev` entries that define the director, port, and base addresses for one or more devices. The first entry maps one device (343) to director 12a, port 0, assigning a base address of 300. The first base address that you assign to a CU image's device set must be a multiple of 0x010. The first digit of the base address represents the CU image number (in this case, CU image 3). The SSID assigned to this device is 192 (only one SSID per command file is allowed). Subsequent entries map device 343 to other directors and ports on an EA board, copying the mapping from director 12a, port 0. EA boards are used to talk to the mainframe, and the mainframe needs to see the device on all ports on the EA board. The EA board has eight ports, and they are located on slot 12.

```
# vi example1MapDev.cfg
```

```
map dev 343 to dir 12a:0, starting BASE_ADDRESS=300 MVS_SSID=192;
map dev 343 to dir 12a:1, copying dir 12A:0;
map dev 343 to dir 12b:0, copying dir 12A:0;
map dev 343 to dir 12b:1, copying dir 12A:0;
map dev 343 to dir 12c:0, copying dir 12A:0;
map dev 343 to dir 12c:1, copying dir 12A:0;
map dev 343 to dir 12d:0, copying dir 12A:0;
map dev 343 to dir 12d:1, copying dir 12A:0;
```

The `symconfigure` command with the `commit` argument executes the command file and maps device 343 to the eight directors and ports. The ellipsis (...) indicates output omitted for brevity.

```
# symconfigure -sid 6219 -file example1MapDev.cfg -noprompt -v commit
```

```
Establishing a configuration change session.....Established.
Processing symmetrix 000000006219
{
  map dev 0343:0343 to dir 12A:0, starting base_address=300, ssid=0192;
  map dev 0343:0343 to dir 12A:1, copying dir 12A:0;
  map dev 0343:0343 to dir 12B:0, copying dir 12A:0;
  map dev 0343:0343 to dir 12B:1, copying dir 12A:0;
  map dev 0343:0343 to dir 12C:0, copying dir 12A:0;
  map dev 0343:0343 to dir 12C:1, copying dir 12A:0;
  map dev 0343:0343 to dir 12D:0, copying dir 12A:0;
  map dev 0343:0343 to dir 12D:1, copying dir 12A:0;
}

Performing Access checks.....Allowed.
Locking devices.....Locked.
Submitting configuration changes.....Submitted.
Validating configuration changes.....Validated.
Initiating PREPARE of configuration changes.....Queued.
PREPARE requesting required resources.....Obtained.
Step 011 of 017 steps.....Executing.
Step 013 of 017 steps.....Executing.
Step 015 of 017 steps.....Executing.
Step 016 of 017 steps.....Executing.
Local: PREPARE.....Done.
Initiating COMMIT of configuration changes.....Queued.
COMMIT requesting required resources.....Obtained.
.....
Step 085 of 108 steps.....Executing.
Local: COMMIT.....Done.
Terminating the configuration change session.....Done.
```

The `symcfg list` command displays the addition of CU image 3 that was just created. Device 343 is mapped to eight ports, and there are no alias assignments yet. The ellipsis (...) indicates omitted output.

```
# symcfg -sid 6219 list -CUimages
```

```
Symmetrix ID           : 000000006219
PAV Aliasing           : DynamicStandardPAV
```

```
CU image number: 0x01
CU status       : Offline
```

```
Sub System ID           : 0x0185
Director Port Assignments : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
Number of Devices       : 16
Device Ranges           : 0231:0240
Number of Base Addresses : 16
Number of Alias Addresses : 48
```

```
.....
```

```
CU image number: 0x03
CU status       : Offline
```

```
Sub System ID           : 0x0192
Director Port Assignments : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
Number of Devices       : 1
Device Ranges           : 0343
Number of Base Addresses : 1
Number of Alias Addresses : 0
```

The following `vi` command uses the `vi` text editor to create a text file named `example1AliasDev.cfg`. As was done here, you can enter into the file entries that assign seven alias addresses to device 343.

```
# vi example1AliasDev.cfg
```

```
add pav alias to dev 343 starting alias=303;
add pav alias to dev 343 starting alias=305;
add pav alias to dev 343 starting alias=307;
add pav alias to dev 343 starting alias=309;
add pav alias to dev 343 starting alias=311;
add pav alias to dev 343 starting alias=312;
add pav alias to dev 343 starting alias=313;
```

The `symconfigure` command with the `commit` argument executes the command file and begins the process of adding the alias addresses.

```
# symconfigure -sid 6219 -file example1AliasDev.cfg -noprompt -v commit
```

```
Establishing a configuration change session.....Established.
Processing symmetrix 000000006219
{
  add pav alias to dev 0343, starting alias=303;
  add pav alias to dev 0343, starting alias=305;
  add pav alias to dev 0343, starting alias=307;
  add pav alias to dev 0343, starting alias=309;
  add pav alias to dev 0343, starting alias=311;
  add pav alias to dev 0343, starting alias=312;
  add pav alias to dev 0343, starting alias=313;
}

Performing Access checks.....Allowed.
Locking devices.....Locked.
Submitting configuration changes.....Submitted.
Validating configuration changes.....Validated.
Initiating PREPARE of configuration changes.....Queued.
PREPARE requesting required resources.....Obtained.
Step 011 of 017 steps.....Executing.
Step 013 of 017 steps.....Executing.
Step 015 of 017 steps.....Executing.
Step 016 of 017 steps.....Executing.
Local: PREPARE.....Done.
Initiating COMMIT of configuration changes.....Queued.
COMMIT requesting required resources.....Obtained.
Step 012 of 064 steps.....Executing.
Step 014 of 064 steps.....Executing.
Step 015 of 064 steps.....Executing.
Step 023 of 064 steps.....Executing.
Step 028 of 064 steps.....Executing.
Step 030 of 064 steps.....Executing.
Step 035 of 064 steps.....Executing.
Step 037 of 104 steps.....Executing.
Step 045 of 104 steps.....Executing.
Step 050 of 104 steps.....Executing.
Step 054 of 104 steps.....Executing.
Step 056 of 104 steps.....Executing.
Step 057 of 104 steps.....Executing.
Step 058 of 104 steps.....Executing.
Step 058 of 104 steps.....Executing.
.....
Step 062 of 104 steps.....Executing.
Step 067 of 104 steps.....Executing.
Step 098 of 108 steps.....Executing.
Step 104 of 108 steps.....Executing.
Local: COMMIT.....Done.
Terminating the configuration change session.....Done.
```

Another `symcfg list` command shows the addition of 7 aliases for device 343 in CU image 3.

symcfg -sid 769 list -CUimages

Symmetrix ID : 000000006219
PAV Aliasing : DynamicStandardPAV

CU image number: 0x01
CU status : Offline

Sub System ID : 0x0185
Director Port Assignments : EA-12A:0
: EA-12A:1
: EA-12B:0
: EA-12B:1
: EA-12C:0
: EA-12C:1
: EA-12D:0
: EA-12D:1
Number of Devices : 16
Device Ranges : 0231:0240
Number of Base Addresses : 16
Number of Alias Addresses : 48

CU image number: 0x02
CU status : Offline

Sub System ID : 0x0186
Director Port Assignments : EA-12A:0

.....
: EA-12D:1
Number of Devices : 20
Device Ranges : 0271:0280
: 033B:033E
Number of Base Addresses : 20
Number of Alias Addresses : 0

CU image number: 0x03
CU status : Offline

Sub System ID : 0x0192
Director Port Assignments : EA-12A:0
: EA-12A:1
: EA-12B:0
: EA-12B:1
: EA-12C:0
: EA-12C:1
: EA-12D:0
: EA-12D:1
Number of Devices : 1
Device Ranges : 0343
Number of Base Addresses : 1
Number of Alias Addresses : 7

The `symcfg show` command displays the alias assignment details of CU image 3.

```
# symcfg -sid 6219 -CUimages show 3
```

```
Symmetrix ID           : 000000006219
PAV Aliasing           : DynamicStandardPAV
```

```
CU image number: 0x03
```

```
Sub System ID          : 0x0192
Director Port Assignments
                        : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
```

```
Number of Devices      : 1
Number of Base Addresses : 1
Number of Aliases Addresses : 7
```

SymDev	Base Address	Aliases
0343	300	303 305 307 309 311 312 313

Example 2: Mapping a Range of Devices and Adding Aliases

This example continues Example 1 by mapping three CKD devices as CU image 4, copying the device mappings to other ports, and adding aliases for each device.

The `symcfg list` command with the `-CUimages` option displays the three CU images that are currently configured for Symmetrix 6219.

```
# symcfg -sid 6219 list -CUimages

Symmetrix ID           : 000000006219
PAV Aliasing           : DynamicStandardPAV

CU image number: 0x01
CU status        : Offline

    Sub System ID           : 0x0185
    Director Port Assignments : EA-12A:0
                                : EA-12A:1
                                : EA-12B:0
                                : EA-12B:1
                                : EA-12C:0
                                : EA-12C:1
                                : EA-12D:0
                                : EA-12D:1
    Number of Devices        : 16
    Device Ranges            : 0231:0240
    Number of Base Addresses  : 16
    Number of Alias Addresses : 48

CU image number: 0x02
CU status        : Offline

    Sub System ID           : 0x0186
    Director Port Assignments : EA-12A:0
                                : EA-12A:1
                                : EA-12B:0
                                : EA-12B:1
                                : EA-12C:0
                                : EA-12C:1
                                : EA-12D:0
                                : EA-12D:1
    Number of Devices        : 20
    Device Ranges            : 0271:0280
                                : 033B:033E
    Number of Base Addresses  : 20
    Number of Alias Addresses : 0

CU image number: 0x03
CU status        : Offline

    Sub System ID           : 0x0192
    Director Port Assignments : EA-12A:0
                                : EA-12A:1
```

```

: EA-12B:0
: EA-12B:1
: EA-12C:0
: EA-12C:1
: EA-12D:0
: EA-12D:1
Number of Devices      : 1
Device Ranges         : 0343
Number of Base Addresses : 1
Number of Alias Addresses : 7

```

The following `vi` command uses the `vi` text editor to create a text file named `example2MapDevs.cfg`. As was done here, you can enter into the file the `map dev` entry that maps a range of three devices (344, 345, and 346) to director 12a, port 0, assigning base addresses beginning with 400. The first digit of the starting base address represents the CU image number (in this case, CU image 4), and the next two digits (00) specify its position within the image's device list. Subsequent entries map the devices to the other directors and ports on an EA board, copying the mapping from director 12a, port 0. The SSID assigned to these devices is 193.

```

# vi example2MapDevs.cfg

map dev 344:346 to dir 12a:0, starting BASE_ADDRESS=400 MVS_SSID=193;
map dev 344:346 to dir 12a:1, copying dir 12A:0;
map dev 344:346 to dir 12b:0, copying dir 12A:0;
map dev 344:346 to dir 12b:1, copying dir 12A:0;
map dev 344:346 to dir 12c:0, copying dir 12A:0;
map dev 344:346 to dir 12c:1, copying dir 12A:0;
map dev 344:346 to dir 12d:0, copying dir 12A:0;
map dev 344:346 to dir 12d:1, copying dir 12A:0;

```

The `symconfigure` command with the `commit` argument executes the command file and begins the process of mapping the devices. The ellipsis (...) indicates output omitted for brevity.

```

# symconfigure -sid 6219 -file example2MapDevs.cfg -noprompt -v commit

Establishing a configuration change session.....Established.
Processing symmetrix 000000006219
{
    map dev 0344:0346 to dir 12A:0, starting base_address=400, ssid=0193;
    map dev 0344:0346 to dir 12A:1, copying dir 12A:0;
    map dev 0344:0346 to dir 12B:0, copying dir 12A:0;
    map dev 0344:0346 to dir 12B:1, copying dir 12A:0;
    map dev 0344:0346 to dir 12C:0, copying dir 12A:0;
    map dev 0344:0346 to dir 12C:1, copying dir 12A:0;
    map dev 0344:0346 to dir 12D:0, copying dir 12A:0;
    map dev 0344:0346 to dir 12D:1, copying dir 12A:0;
}

Performing Access checks.....Allowed.
Locking devices.....Locked.
Submitting configuration changes.....Submitted.
Validating configuration changes.....Validated.
Initiating PREPARE of configuration changes.....Queued.
PREPARE requesting required resources.....Obtained.
Step 011 of 017 steps.....Executing.
Step 013 of 017 steps.....Executing.

```

Step 015 of 017 steps.....Executing.

Local: COMMIT.....Done.

Terminating the configuration change session.....Done.

The `symcfg list` command displays the addition of CU image 4 for the Symmetrix array.

symcfg -sid 6219 list -CUimages

Symmetrix ID : 000000006219
PAV Aliasing : DynamicStandardPAV

CU image number: 0x01
CU status : Offline

Sub System ID : 0x0185
Director Port Assignments : EA-12A:0
: EA-12A:1
: EA-12B:0
: EA-12B:1
: EA-12C:0
: EA-12C:1
: EA-12D:0
: EA-12D:1
Number of Devices : 16
Device Ranges : 0231:0240
Number of Base Addresses : 16
Number of Alias Addresses : 48

CU image number: 0x04
CU status : Offline

Sub System ID : 0x0193
Director Port Assignments : EA-12A:0
: EA-12A:1
: EA-12B:0
: EA-12B:1
: EA-12C:0
: EA-12C:1
: EA-12D:0
: EA-12D:1
Number of Devices : 3
Device Ranges : 0344:0346
Number of Base Addresses : 3
Number of Alias Addresses : 0

The `vi` command uses the `vi` text editor to create a command file named `example2AliasDevs.cfg` to add three alias addresses for each of the three devices in CU image 4, beginning at alias addresses 410, 420, and 430.

```
# vi example2AliasDevs.cfg

add pav alias to dev 344:346 starting alias=410;
add pav alias to dev 344:346 starting alias=420;
add pav alias to dev 344:346 starting alias=430;
```

The `symconfigure` command with the `commit` argument executes the command file and begins the process of adding the alias addresses.

```
# symconfigure -sid 6219 -file example2AliasDevs.cfg -noprompt -v commit

Establishing a configuration change session.....Established.
Processing symmetrix 000000006219
{
  add pav alias to dev 0344:0346, starting alias=410;
  add pav alias to dev 0344:0346, starting alias=420;
  add pav alias to dev 0344:0346, starting alias=430;
}

Performing Access checks.....Allowed.
Locking devices.....Locked.
Submitting configuration changes.....Submitted.
Validating configuration changes.....Validated.
Initiating PREPARE of configuration changes.....Queued.
PREPARE requesting required resources.....Obtained.
Step 013 of 017 steps.....Executing.
Step 014 of 017 steps.....Executing.
Step 016 of 017 steps.....Executing.
Step 017 of 017 steps.....Executing.
Local: PREPARE.....Done.
Initiating COMMIT of configuration changes.....Queued.
COMMIT requesting required resources.....Obtained.
Step 002 of 064 steps.....Executing.
Step 011 of 064 steps.....Executing.
Step 014 of 064 steps.....Executing.
Step 015 of 064 steps.....Executing.
Step 022 of 064 steps.....Executing.
Step 028 of 064 steps.....Executing.
Step 030 of 064 steps.....Executing.
Step 035 of 064 steps.....Executing.
Step 037 of 104 steps.....Executing.
Step 045 of 104 steps.....Executing.
Step 050 of 104 steps.....Executing.
Step 054 of 104 steps.....Executing.
.....
Step 108 of 108 steps.....Executing.
Local: COMMIT.....Done.
Terminating the configuration change session.....Done.
```

Another `symcfg list` command displays the CU images again, including the addition of aliases for CU image 4.

```
# symcfg -sid 6219 list -CUimages
```

```
Symmetrix ID           : 000000006219
PAV Aliasing           : DynamicStandardPAV
```

```
CU image number: 0x01
CU status       : Offline
```

```
Sub System ID           : 0x0185
Director Port Assignments : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
Number of Devices       : 16
Device Ranges           : 0231:0240
Number of Base Addresses : 16
Number of Alias Addresses : 48
```

```
CU image number: 0x04
CU status       : Offline
```

```
Sub System ID           : 0x0193
Director Port Assignments : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
Number of Devices       : 3
Device Ranges           : 0344:0346
Number of Base Addresses : 3
Number of Alias Addresses : 9
```

The `symcfg show` command displays the alias assignment details for CU image 4.

```
# symcfg -sid 6219 -CUimages show 4
```

```
Symmetrix ID      : 000000006219
PAV Aliasing      : DynamicStandardPAV
```

```
CU image number: 0x04
```

```
Sub System ID      : 0x0193
Director Port Assignments : EA-12A:0
                        : EA-12A:1
                        : EA-12B:0
                        : EA-12B:1
                        : EA-12C:0
                        : EA-12C:1
                        : EA-12D:0
                        : EA-12D:1
```

```
Number of Devices      : 3
Number of Base Addresses : 3
Number of Aliases Addresses : 9
```

SymDev	Base Address	Aliases
0344-0346	400-402	410-412 420-422 430-432