

CHAPTER 10

Configuring FlexAttach Virtual pWWN

This chapter describes the FlexAttach virtual port world-wide name (pWWN) feature and includes the following sections:

- [About FlexAttach Virtual pWWN, page 10-1](#)
- [FlexAttach Virtual pWWN Guidelines and Requirements, page 10-2](#)
- [Configuring FlexAttach Virtual pWWN, page 10-2](#)
- [Using the Server Admin FlexAttach Wizards, page 10-9](#)
- [Difference Between San Device Virtualization and FlexAttach Port Virtualization, page 10-25](#)

About FlexAttach Virtual pWWN

FlexAttach virtual pWWN feature facilitates server and configuration management. In a SAN environment, the server installation or replacement, requires interaction and coordination among the SAN and server administrators. For coordination, it is important that the SAN configuration does not change when a new server is installed, or when an existing server is replaced. FlexAttach virtual pWWN minimizes the interaction between the server administrator and the SAN administrator by abstracting the real pWWN using virtual pWWNs.

When FlexAttach virtual pWWN is enabled on an interface, a virtual pWWN is assigned to the server interface. The real pWWN is replaced by a virtual pWWN, which is used for a SAN configuration such as zoning.

Server administrators can benefit from FlexAttach in the following scenarios:

- **Pre-configure**—Pre-configure SAN for new servers that are not available physically yet. For example, they may be on order. FlexAttach can be enabled on the ports designated for the new servers and use the virtual WWNs assigned for configuring SAN. The new servers are then plugged into the fabric without any change needed in the SAN.
- **Replacement to the same port**—A failed server can be replaced onto the same port without changing the SAN. The new server gets a same pWWN as the failed server because the virtual pWWN is assigned to the port.
- **Replacement to (spare)**—A spare server, which is on the same NPV device or a different NPV device) can be brought online without changes to the SAN. This action is achieved by moving the virtual port WWN from the current server port to the spare port.

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- **Server Mobility**—A server can be moved to another port on the same NPV device or another NPV device without changing the SAN. This is accomplished by moving the virtual pWWN to the new port. No change is needed if FlexAttach was configured using the physical port WWN of the server to the virtual port WWN mapping.

FlexAttach Virtual pWWN Guidelines and Requirements

Following are recommended guidelines and requirements when deploying FlexAttach virtual pWWN:

- FlexAttach configuration is supported only on NPV switches.
- Cisco Fabric Services (CFS) IP version 4 (IPv4) distribution should be enabled.
- Virtual WWNs should be unique across the fabric.

Configuring FlexAttach Virtual pWWN

This section describes how to configure FlexAttach virtual pWWN feature and includes the following topics:

- [Enabling FlexAttach Virtual pWWN, page 10-2](#)
- [Debugging FlexAttach Virtual pWWN, page 10-8](#)
- [Security Settings for FlexAttach Virtual pWWN, page 10-8](#)
- [FlexAttach Virtual pWWN CFS Distribution, page 10-9](#)

Enabling FlexAttach Virtual pWWN

The FlexAttach virtual pWWN feature is enabled automatically, manually, or by mapping pWWN to virtual pWWN. [Figure 10-1](#) shows how the FlexAttach virtual pWWN feature is enabled.

Automatically Enabling FlexAttach Virtual pWWN

The virtual pWWN is enabled automatically on all the NPV switches or per port on the NPV box. When enabled automatically, a virtual WWN is generated from the device switch WWN. This WWN is used as the virtual pWWN. Virtual pWWNs are generated using the local switch WWNs.



Note

The port must be in a shut state when the virtual pWWN is enabled.

To enable virtual pWWN automatically for all the interfaces, follow these steps:

-
- Step 1** From the Device Manager menu bar, select **FC > FlexAttach**. ([Figure 10-1](#)).

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Figure 10-1 ***FlexAttach in Device Manager***



You see the FlexAttach window. (Figure 10-2).

Figure 10-2 ***FlexAttach Window in Device Manager***



- Step 2** Check the **VirtualPwwnAuto** check box to enable automatic generation of virtual WWNs on all the fabric port interfaces.



Note

- When the *interface-list* value is not included in the command, virtual pWWN is enabled globally.
- All the interfaces mentioned in the *interface-list* value must be in a shut state.

Launching FlexAttach in Fabric Manager

To launch FlexAttach in Fabric Manager, follow these steps:

- Step 1** In the Logical Domains pane, select a switch.
- Step 2** In the Physical Attributes pane, expand **Switches > NPIV**.
- Step 3** Select **NPIV > N_Port Virtualizer (NPV) > FlexAttach**.
- The FlexAttach configuration pane appears to the right. (Figure 10-3).

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Figure 10-3 **FlexAttach Menu**



Manually Enabling FlexAttach Virtual pWWN

You can manually assign a WWN to the interface, without generating it through the switch. Several checks are done by the NPV core to ensure the uniqueness of virtual pWWNs in the switch. When duplicate virtual pWWNs are configured, the subsequent logins are rejected by the NPV core switch.



Note

- Some ports may be in automode, some in manual mode, and the virtual pWWNs need not be assigned.
- The port must be in a shut state when a virtual pWWN is enabled.

To enable virtual pWWN on each interface manually, follow these steps:

Step 1 Click the **Virtual PWWN** tab.

A list of interfaces is displayed. ([Figure 10-4](#)).

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Figure 10-4 Virtual PWWN Tab View in Device Manager



The Virtual pWWN tab view displays a list of the interfaces.

Step 2 Check the **Auto** check box to automatically generate the virtual pWWN value for the selected interface.



Note The interface mentioned in the interface value must be in a shut state.

The virtual port WWN value for the selected interface in Fabric Manager is automatically generated. (Figure 10-5).

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Figure 10-5 Virtual pWWN Tab View in Fabric Manager



Note

The interface mentioned in the *interface* value must be in a shut state.

Mapping pWWN to Virtual pWWN

You can configure virtual pWWNs through real pWWNs. This process is required for NPIV hosts containing multiple pWWNs, of which only FLOGI is mapped to the virtual pWWN. Subsequent FDSIDs will have different mappings.

Several checks are done by the NPV core to ensure the uniqueness of virtual pWWNs in the switch across the NPV switches. When duplicate virtual pWWNs are configured, the subsequent logins are rejected by the NPV core switch.

To map pWWN to virtual pWWN, follow these steps:

- Step 1** In the FlexAttach window, select the **Physical to Virtual WWNs** tab.
You see the **Physical to Virtual WWNs** tab view (see [Figure 10-6](#)).

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Figure 10-6 *Physical to Virtual WWNs Tab View in Device Manager*



The LastChange field displays the time when the virtual pWWN was changed.



Note

The interface must be in a shut state and the specified virtual pWWN should not be logged in.

The [Figure 10-7](#) shows the Physical to Virtual pWWNs tab view in the Fabric Manager.

Figure 10-7 *Physical to Virtual pWWNs Tab View in Fabric Manager*



Note

The specified virtual pWWN and the real pWWN must not be logged in.

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Debugging FlexAttach Virtual pWWN

Table 10-1 lists the errors that might be displayed and provides the workarounds.

Table 10-1 FlexAttach Errors and Workarounds

Error	Description	Workaround
fc1/1 : interface is not down	FlexAttach configuration fails because the configuration is enabled for an active interface with the operation state as up.	To move the port to the shut state, enable the FlexAttach configuration, and then move the port to no shut state.
FlexAttach configuration is not distributed to the peers	The FlexAttach configuration on one peer NPV is not available to any other peer NPV.	FlexAttach configuration will not be distributed if cfs ipv4 distribute , or cfs ipv6 distribute is disabled. Enable cfs ipv4 distribute , or cfs ipv6 distribute .
Even with CFS distribution enabled Inagua does not become a peer with other NPVs	CFS over IP is enabled, and the Inagua in one blade center is not the peer NPV for other NPVs.	CFS over IP uses IP multicast to discover the NPV peers in the network. IBM MM does not support multicast and cannot act as a peer with NPV. This prevents the FlexAttach configuration from getting distributed to other peer NPVs in the network.
NP port uses physical pWWN instead of virtual pWWN configured through FlexAttach	This occurs when NP port uses physical pWWN instead of virtual pWWN, that is configured through FlexAttach.	FlexAttach is supported on server interfaces like F ports, and not on external interfaces such as NP ports.
real port WWN and virtual WWN cannot be same	This occurs when you try to configure FlexAttach with a similar value for pWWN and virtual pWWN.	Use different values for pWWN and virtual pWWN, as similar values for pWWN and virtual pWWN are not allowed.
Virtual port WWN already exists	This occurs when you try to configure an already defined pWWN to a different interface.	Use an undefined virtual pWWN for a new interface.

Security Settings for FlexAttach Virtual pWWN

Security settings for the FlexAttach virtual pWWN feature are done by port security at the NPV core. Node WWN of the end device is used to provide physical security.

For more details on enabling port security, refer to the *Cisco MDS 9000 Family NX-OS Security Configuration Guide*.

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FlexAttach Virtual pWWN CFS Distribution

The FlexAttach virtual pWWN configuration is distributed for CFS through IPv4, and is enabled by default. The FlexAttach virtual pWWN distribution, by default, is on CFS region 201. The CFS region 201 links only to the NPV-enabled switches. Other CFS features such as syslog is on region 0. Region 0 will be linked through IPv4 for all NPV switches on the same physical fabric. If CFS has an option to link through IPv4 or ISL, then CFS will select the ISL path.

**Note**

NPV switches do not have ISL (E or TE ports) and are linked through IPv4.

Using the Server Admin FlexAttach Wizards

As in Fabric Manager Release 4.1(1) and later, the Server Admin perspective view of the Fabric Manager GUI provides the following FlexAttach wizards, which the Fabric Manager users with server-admin role can use to configure FlexAttach:

- [Pre-Configuring FlexAttach for a New Server, page 10-9](#)
- [Moving a Server to Another Port or Switch, page 10-15](#)
- [Replacing a Server with Another Server, page 10-19](#)

To access the FlexAttach wizards, follow these steps:

- Step 1** Log in to Fabric Manager with a username and password that has the server-admin role assigned.
- Step 2** Discover and open the fabric on which you want to configure FlexAttach.
- Step 3** In the Fabric Manager window displayed, select **Tools > FlexAttach** to display the list of wizards. ([Figure 10-8](#)).

Figure 10-8 FlexAttach Wizards Menu Bar



Pre-Configuring FlexAttach for a New Server

Using the Pre-configure Server wizard, you can configure FlexAttach for servers that are not physically available currently. FlexAttach can be enabled on the ports designated for the new servers and can use the virtual WWNs assigned for configuring SAN. When the new servers are available, the servers can then be plugged into the fabric without any change needed in the SAN.

The Pre-Configure Server wizard can be used to accomplish the following tasks:

- [Pre-Configuring FlexAttach for All the Ports, page 10-10](#)
- [Pre-Configuring FlexAttach for Each Port Individually, page 10-12](#)

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Pre-Configuring FlexAttach for All the Ports

Using the Pre-Configure Server Basic configuration wizard, you can set the following port configurations for all the ports in one or more switches in common:

- Enable or disable FlexAttach Auto on all ports
- Set the default VSAN ID for all the ports
- Set the interface status for all the ports.

To pre-configure a common setting for all the ports in one or more switches, follow these steps:

Step 1 In the Fabric Manger window, select **Tools > FlexAttach > Pre-configure Server**.

The Pre-Configure Wizard is displayed. (Figure 10-9)

Figure 10-9 *Pre-Configure Server Wizard*



Step 2 In the Pre-Configure Server window, click the **Basic** radio button to configure a common setting to all the ports on one or more switches.

The Basic Configuration window is displayed. (Figure 10-10)

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Figure 10-10 **Pre Configure Server - Basic Configuration**



- Step 3** In the Basic Configuration window, check the check box to select one or more switches from the list of NPV switches in the fabric.
- Step 4** Check the **Enable FlexAttach Auto on every port** check box to enable FlexAttach on all the ports of all the selected switches.
- Step 5** (Optional) From the VSAN ID drop-down list, select a VSAN ID to assign the selected VSAN ID to all the ports.



Note Only the set of VSANs to which all the selected switches belong are listed. If no VSAN ID is selected, then the existing VSAN configuration is retained.

- Step 6** Click the **Up** or **Down** radio button to assign the selected interface status.



Note The status of only the F ports in the selected switches will be brought to up or down state.

- Step 7** Click **Finish** to pre-configure the selected settings to all the ports on all the selected switches. The Configuration window is displayed with the finished message. (Figure 10-11)

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Figure 10-11 **Pre-Configure Server - Finish**



Pre-Configuring FlexAttach for Each Port Individually

Using the Pre-Configure Server Advanced configuration wizard, you can set the following port configurations for each port in one or more switches individually:

- Enable FlexAttach Auto on all ports.
- Enable FlexAttach Auto or Manual on individual ports.
- Set the virtual PWWN for ports where FlexAttach is enabled Manually.
- Set pWWN to vPWWN mapping.
- Set the default VSAN ID for each port.
- Set the Interface status for each port.

To pre-configure FlexAttach on each port individually, follow these steps:

-
- Step 1** In the Fabric Manger window, select **Tools > FlexAttach > Pre-configure Server**.
The Pre-Configure Server window is displayed. ([Figure 10-9](#))
- Step 2** In the Pre-Configure Server window, click the **Advanced** radio button to configure FlexAttach on each port individually.
The Pre-Configure Server Advanced configuration window is displayed. ([Figure 10-12](#))

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Figure 10-12 **Pre-Configure Server - Advanced Configuration**



Note From the **Interface tab**, you can select a switch from the list of switches displayed in the left pane and click **Disable FlexAttach** to change the switches to manual configuration. Select **Undo Changes** to return to the previous configuration.

Step 3 In the Interface tab, click to select a switch from the list of switches displayed in the left pane. The switch configuration details are displayed in the right pane with tabs and columns.

Step 4 Configure the following settings, for each interface:

- In the Status column corresponding to the interface, double-click and then select up or down from the drop-down list.
- In the VSAN column corresponding to the interface, double-click and then select the VSAN ID from the drop-down list of existing VSAN IDs.
- In the Auto column corresponding to the interface, double-click and then select Auto to automatically enable FlexAttach or select Manual to manually enable FlexAttach later.
 - In the Interface vPWWN cell, enter the vPWWN if Manual was selected in the Auto FlexAttach configuration cell.



Note You can click **Set All Auto** to change all the interfaces with manual FlexAttach configuration to Auto on the selected switch. However, if a valid vPWWN value is already configured, then changing it to Auto does not change the configuration. Before you change from Manual to Auto, update the Interface vPWWN column with the 00:00:00:00:00:00:00:00 value.

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- Step 5** Repeat Step 3 through Step 4 for each switch.
- Step 6** Click the **PWWN to vPWWN** tab to configure pWWN to vPWWN mapping.
The Advanced Configuration window is displayed. (Figure 10-13)

Figure 10-13 *Pre-Configure Server - PWWN to vPWWN Configuration*



- Step 7** From the Select Switch drop-down list, select the switch to display the existing pWWN to Virtual PWWN mapping table for the CFS region to which the switch belongs, and then follow these steps to add vPWWN to vPWWN automap entries:
- Click **Add Row** to display the PWWN to vPWWN dialog box.
 - Enter the pWWN and the corresponding virtual pWWN.
 - Click **Create** to add the mapping list.



Note To delete an existing mapping, select the row, and then click **Delete Row**. Only one pWWN to vPWWN table can be updated at a time. To update the table for each CFS region, perform Step 6 though Step 8 for a switch from each CFS region.

- Step 8** Click **Finish** to complete the configurations for each port.

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Moving a Server to Another Port or Switch

Using the Move Server wizard, you can move a server to another port on the same NPV device or another NPV device without changing the SAN. This is accomplished by moving the virtual pWWN to the new port. No change is needed if FlexAttach was configured using the physical port WWN of the server to the virtual port WWN mapping.

To move a server to a different port in the same switch, or in a different switch, follow these steps:

Step 1 In the Fabric Manger window, select **Tools > FlexAttach > Move Server**.

The Move Server wizard is displayed. ([Figure 10-14](#))

Figure 10-14 *Move Server Wizard*



Step 2 In the Move Server window, click the **Another Port on the Same Switch** radio button or click the **Another Port on a Different Switch** radio button.

Step 3 Click **Next**.

The Move Port window is displayed. ([Figure 10-15](#))

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Figure 10-15 **Move Port Selection**



- Step 4** From the Select a Switch drop-down list, select the switch.
The switch ports are listed. To support moving a server from a failed port that is in down state, the ports in down state are also listed.
- Step 5** From the list of interfaces, select the port from which you want to move the server from.
- Step 6** Click **Next**.
The New Port window is displayed ([Figure 10-16](#)).

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Figure 10-16 ***New Port Selection***



Step 7 From the Select a Switch drop-down list box, select the switch.



Note If the **Another Port on the Same Switch** radio button was chosen, then the Select Switch drop-down list is disabled.

Step 8 From the list of interfaces, select the port to which you want to move the server to.

Step 9 Click **Next**.

The Server WWN window is displayed. ([Figure 10-17](#)).

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Figure 10-17 Existing Server Virtual Port WWN Entry



In the Server WWN window, if the FlexAttach global mapping table is empty, the wizard automatically prefills the drop-down table with the interface virtual VPWWN of the source port, and the VPWWN field is not editable.

If the FlexAttach global mapping table is not empty, the VPWWN field is blank and editable. From the drop-down list box that displays all existing entries from the global mapping table, select the VPWWN entry or type the required entry ([Figure 10-18](#)).

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Figure 10-18 **Select Server Virtual Port WWN Entry**



Step 10 Click **Finish**.

Replacing a Server with Another Server

You can use the Replace Server wizard to accomplish the following tasks:

- Replace a failed server with a new server onto the same port without changing the SAN. The new server gets the same virtual pWWN as the failed server because the virtual pWWN is assigned to the port.
- Replace a server with a spare server on the same NPV device or a different NPV device, which can be brought online without changes to the SAN. This is achieved by moving the virtual port WWN from the current server port to the spare port.

Replacing a Server on the Same Port

To replace a failed server with a new server on the same port, follow these steps:

-
- Step 1** In the Fabric Manger window, select **Tools > FlexAttach > Replace Server**.
The Replace Failed Server window is displayed. ([Figure 10-19](#))

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Figure 10-19 *Replace Server Wizard*



Step 2 In the Replace Server Wizard, click the **On Same Port** radio button.

Step 3 Click **Next**.

The Failed Port window is displayed. ([Figure 10-20](#))

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Figure 10-20 **Failed Port Selection**



- Step 4** In the Failed Port selection window, from the Select a Switch drop-down list, select the switch.
- Step 5** From the list of interfaces displayed, select the port on which the server needs to be replaced.
- Step 6** Click **Next**.
The Server WWN window is displayed. ([Figure 10-21](#))

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Figure 10-21 Server WWN Entries



- Step 7** In the Server WWN window, enter the existing FlexAttach server virtual port WWN that needs to be replaced, and the new server physical port WWN.
- Step 8** Click **Finish** to complete the FlexAttach configuration for the new server.
-

Replacing the Server to a Different Port on the Same Switch

To replace a server with a spare server on a different port in the same switch, follow these steps:

-
- Step 1** In the Fabric Manager window, select **Tools > FlexAttach > Replace Server**.
The Replace Failed Server wizard is displayed. (Figure 10-19)
- Step 2** In the Replace Failed Server wizard, click the **With Spare Server on Same NPV Switch** radio button.
- Step 3** Click **Next**.
The Choose Failed Port window is displayed. (Figure 10-20)
- Step 4** In the Choose Failed Port selection window, from the Select a Switch drop-down list, select the switch.
- Step 5** From the list of interfaces displayed, select the port from which the server needs to be detached.
- Step 6** Click **Next**.
The New Port window is displayed. (Figure 10-16)
- Step 7** In the New Port selection window, select the port on which the spare server is connected.
- Step 8** Click **Next**.

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The Server WWN window is displayed. (Figure 10-22)

Figure 10-22 **Server WWN Entries**



In the Server WWN window, if the FlexAttach global mapping table is empty, the wizard automatically prefills the drop-down table with the interface virtual VPWWN of the source port to be replaced, and the VPWWN field is not editable. In this case, the **Allow wizard to change from “pWWN to vPWWN” mapping to “interface to vPWWN” mapping** is treated as true.

If the FlexAttach global mapping table is not empty, the VPWWN field is blank and editable. From the drop-down list box that displays all existing entries from the global mapping table, select the VPWWN entry or type the required entry, and the new server physical port WWN (Figure 10-23).

Figure 10-23 **Select Server WWN Entries**

Check the **Allow wizard to change from “pWWN to vPWWN” mapping to “interface to vPWWN” mapping** check box to remove the pWWN to vPWWN entry from the CFS Region mapping table, and configure the mapping only at the interface.

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Step 9 Click **Finish** to complete the FlexAttach configuration for the spare server.

Replacing with a Server on a Different Switch

To replace a server with a spare server on a different switch, follow these steps:

-
- Step 1** In the Fabric Manger window, select **Tools > FlexAttach > Replace Server**.
The Replace Server wizard is displayed. (Figure 10-19)
- Step 2** In the Replace Server wizard, click the **With Spare Server on a Different NPV switch** radio button.
- Step 3** Click **Next**.
The Failed Server Port window is displayed. (Figure 10-20)
- Step 4** In the Failed Server Port selection window, from the Select a Switch drop-down list, select the switch.
- Step 5** From the list of interfaces displayed, select the port from which the server needs to be detached.
- Step 6** Click **Next**.
The New Port window is displayed. (Figure 10-16)
- Step 7** In the New Port selection window, select the switch and the port on which the spare server is connected.
- Step 8** Click **Next**.
The Server WWN window is displayed. (Figure 10-22)
- In the Server WWN window, if the FlexAttach global mapping table is empty, the wizard automatically prefills the table with the interface virtual VPWWN of the source port to be replaced, and the VPWWN field is not editable. In this case, the **Allow wizard to change from “pWWN to vPWWN” mapping to “interface to vPWWN” mapping** is treated as true.

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If the FlexAttach global mapping table is not empty, the VPWWN field is blank and editable. From the drop-down list box which displays all existing entries from the global mapping table, select the VPWWN entry or type the required entry, and the new server physical port WWN (Figure 10-23).

Check the **Allow wizard to change from “pWWN to vPWWN” mapping to “interface to vPWWN” mapping** check box to remove the pWWN to vPWWN entry from the CFS Region mapping table, and configure the mapping only at the interface.

Step 9 Click **Finish** to complete the FlexAttach configuration for the spare server.

Difference Between San Device Virtualization and FlexAttach Port Virtualization

Table 10-2 describes the difference between SAN device virtualization (SDV) and FlexAttach port virtualization.

Table 10-2 Difference Between SDV and FlexAttach Virtualization

SAN Device Virtualization (SDV)	FlexAttach Virtualization
Facilitates target and disk management, and only facilitates disk and data migration.	Facilitates server management and has no restriction on the end devices used.
WWN NAT and Fibre Channel ID (FC-ID) are allocated on the virtual device, both primary and secondary.	WWN and Network Address Transport (NAT) is allocated to host bus adapter (HBA).
FC-ID rewrite on the switch indicates a rewrite-capable switch on the path.	No rewrite requirements.
Configuration is distributed. This allows programming rewrites and connectivity anywhere.	Configuration distribution is not required for any of the interface-based configurations.
Configuration is secured to device alias.	Does not require device alias for virtual pWWN.
Does not allow automapping to the secondary device.	Allows automapping to the new HBA. Mapping process is manual for NPIV.

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