Abstract
This document provides information and instructions to guide you in servicing and upgrading the HPE 3PAR StoreServ 8000 Storage system without the assistance of an authorized service provider. If assistance is needed, contact your HPE Sales Representative or HPE Partner.
Notices

The information contained herein is subject to change without notice. The only warranties for Hewlett Packard Enterprise products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. Hewlett Packard Enterprise shall not be liable for technical or editorial errors or omissions contained herein.


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Preparation

Videos for service and upgrade

Customer self repair video

With HPE 3PAR OS 3.3.1, the customer self repair (CSR) video is available at the hpe.com website:

www.hpe.com/support/3PAR8000CSRVideo

With HPE 3PAR OS 3.2.2, the customer self repair (CSR) videos are available at the CSR Services Media Library website:

www.hpe.com/support/sml-csr

1. From the Product category list, select Storage.
2. From the Product family list, select 3PAR StoreServ Storage.
3. From the Product series list, select the product.
   Links to the available videos are displayed.

Customer self upgrade video

With HPE 3PAR OS 3.3.1, the customer self upgrade (CSU) video is available at the hpe.com website:

www.hpe.com/support/3PAR8000CSUVideo
Service

Customer self repair

Customer self repair (CSR) is a key component of Hewlett Packard Enterprise warranty terms. Once the failure of a hardware component has been confirmed, CSR enables Hewlett Packard Enterprise to ship replacement parts directly to you. Parts are usually shipped overnight. CSR warranty terms and conditions are included in the warranty statement for the product, which can be found in the box with the product.

For more details about CSR, contact an authorized service provider or see the Hewlett Packard Enterprise Customer Self Repair website:

www.hpe.com/info/selfrepair

IMPORTANT: Some components are not designed for CSR. To satisfy the customer warranty for service of non-CSR components, an authorized service provider has to service the non-CSR components.

CSR types

• Mandatory CSR parts (warranty only)—On-site or return-to-depot support for replacement of this part is not provided under the warranty. You can install a mandatory CSR part yourself or pay Hewlett Packard Enterprise service personnel to do the installation. A mandatory CSR part typically does not need tools to replace, consists of a single part, has minimum cabling, and is plug-and-play.

• Optional CSR parts—You can replace this optional CSR part yourself or have it replaced by Hewlett Packard Enterprise service personnel at no additional charge during the warranty period. Replacement may require tools, the removal of other parts, more involved cabling, and configuration and setup following replacement.

Breaker panel replacement

The E-T-A Breaker Panel is a direct-current component supported for the HPE 3PAR StoreServ 8000 Storage system.

WARNING: Since there is a risk of injury from electric shock or high energy levels, only a certified electrician who knows about the procedures, precautions, and hazards associated with direct-current (DC) power should perform the power wiring, cabling, routine maintenance, and service of a storage system installed in a direct-current power environment. Hewlett Packard Enterprise and partner service personnel are not authorized to perform DC power wiring or cabling.

IMPORTANT: The storage system ordered for installation in a direct-current (DC) power environment requires the installation of DC-specific components. Use of components with alternating-current (AC) power in the DC storage system is prohibited.

IMPORTANT: The direct-current components are qualified and supported only with a direct-current HPE 3PAR StoreServ 8000 Storage system running HPE 3PAR OS 3.3.1 and later versions.

When support is needed for the direct-current E-T-A Breaker Panel, see www.e-t-a.com/ for support contact information.
Controller node replacement—Two-node system only

**IMPORTANT:** Only a controller node for a two-node system that does not contain a host PCIe adapter qualifies for customer self repair (CSR). It is the entire controller node that qualifies for CSR and excludes the repair of internal components within the controller node. Any internal components within the controller node are only serviceable by an authorized service provider (ASP).

Replacing a controller node—Two-node system only—SP 4.x

This procedure is for the replacement of an HPE 3PAR StoreServ 8000 Storage controller node using HPE 3PAR Service Processor (SP) 4.x.

**IMPORTANT:**
- To avoid possible data loss, shut down (halt) and remove only one controller node at a time from the storage system.
- To prevent overheating, do not leave the controller node bay empty for more than 30 minutes.
- Verify that host multipathing is functional.

Prerequisites

Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.

Shut down (halt) the failed controller node by contacting your Hewlett Packard Enterprise authorized service provider for assistance.

Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.
2. Connect to the HPE 3PAR Service Processor.
   Browse to either the IP address or hostname: https://<sp_ip_address> or https://<hostname>.
3. Log in to the HPE 3PAR Service Processor (SP).
   With the 3parcust account credentials, the Service Processor Onsite Customer Care (SPOCC) interface displays.
4. Initiate a maintenance window to stop the system from sending alerts to Hewlett Packard Enterprise.
   a. From the SPOCC interface main menu, select SPMAINT in the left navigation pane.
   b. From the SPMaint interface main menu under Service Processor - SP Maintenance, select StoreServ Configuration Management.
   c. Under Service Processor - StoreServ Configuration, select Modify under Action.
   d. Under Service Processor - StoreServ Info, select On for the Maintenance Mode setting.
5. Initiate Check Health on the storage system.
a. From the SPOCC interface main menu, click **Support** in the left navigation pane.

b. From the **Service Processor - Support** page, under **StoreServs**, click **Health Check** in the **Action** column.

   A pop-up window displays a status message while the health check runs.

   When running the **Health Check** using Internet Explorer, the screen might remain blank while information is gathered. This process could take a few minutes before displaying results. Wait for the process to complete and do not attempt to cancel or close the browser.

c. To review the report, click either **Details** or **View Summary**.

   ▶ **CAUTION:** If health issues are identified during the **Check Health** scan, resolve these issues before continuing. Refer to the details in the **Check Health** results and contact Hewlett Packard Enterprise Support if necessary.

6. Locate the failed and shut down controller node by referring to the LEDs.

   Some faults illuminate the blue UID/Service LED, which helps you locate the failed component. When the UID/Service LED is solid blue and the Status LED is rapidly flashing green, a controller node is shut down. Depending on the nature of the controller node failure, the Fault LED might be solid amber.

   The Fault LED for the other active controller node in the cluster will be flashing, indicating that one of the other controller nodes in the cluster is shut down.

7. Verify that all cables are labeled with their location.

**Removal**

8. Remove the cables from the controller node.

9. Remove the controller node. See **Figure 1: Removing the controller node** on page 10.

   a. Pull to extend the gray rod of the controller node to the extracted position (1).

   b. When the controller node is halfway out of the enclosure, support it from underneath and slide it out completely (2).

   c. Place the controller node on the ESD safe mat.

**Figure 1: Removing the controller node**

10. Push in the gray rod to ready it for packaging and to provide differentiation from the replacement controller node.

**Replacement**

11. Partially install the controller node.
a. Pull to extend the gray rod of the controller node to the extracted position.

![Figure 2: Extending the controller node rod](image)

b. Confirm that the controller node is correctly oriented. In the controller node enclosure, the pair is installed with each controller node oriented 180° from each other.

![Figure 3: Orientation of a controller node pair](image)

c. Partially install the controller node into the slot. Using two hands to grasp each side of the replacement controller node, align it with the grooves in the slot, and slide it into the slot until it halts against the insertion mechanism that is inside of the slot. **Do not fully insert the controller node in the slot at this time**, because the cables must be reconnected before it is fully seated.

![Figure 4: Partially install the controller node into the slot](image)

12. Reconnect the cables to the controller node.

   While the controller node is still only partially inserted in the slot, reconnect the cables to the controller node.

13. Fully install and seat the controller node into the slot. See **Figure 5: Fully install and seat the controller node into the slot** on page 12.
Slide in the controller node (1) while pushing in on the gray rod until it stops (2).

If the UID LED is flashing blue after two minutes, this LED status indicates that the replacement controller node is not properly seated, so repeat this step.

![Diagram of controller node installation](image)

**Figure 5: Fully install and seat the controller node into the slot**

Once inserted, the replacement controller node powers up and goes through the automatic node-to-node rescue before joining the cluster. This process might take up to 10 minutes.

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**IMPORTANT:** If the automatic node-to-node rescue does not start automatically, contact your authorized service provider.

---

**Verification**

14. Verify that the controller node has joined the cluster.

   Confirm that the green Status LED on the controller node is flashing in synchronization with the other controller nodes, indicating that it has joined the cluster.

15. From the SPOCC interface, verify that the State for the component and the storage system are **Normal** (green).

16. After the component replacement, initiate **Check Health** on the storage system.

   a. From the SPOCC interface main menu, click **Support** in the left navigation pane.

   b. From the **Service Processor - Support** page, under **StoreServs**, click **Health Check** in the **Action** column.

17. If significant time is left in the maintenance window, end the **Maintenance Mode**.

   a. From the SPOCC interface main menu, select **SPMAINT** in the left navigation pane.

   b. From the SPMaint interface main menu under **Service Processor - SP Maintenance**, select **StoreServ Configuration Management**.

   c. Under **Service Processor - StoreServ Configuration**, select **Modify** under **Action**.

   d. Under **Service Processor - StoreServ Info**, select **Off** for the **Maintenance Mode** setting.

18. Follow the return instructions provided with the replacement component.

---

**Replacing a controller node—Two-node system only—SP 5.x**

This procedure is for the replacement of an HPE 3PAR StoreServ 8000 Storage controller node using HPE 3PAR Service Processor (SP) 5.x.
IMPORTANT:

- To avoid possible data loss, shut down (halt) and remove only one controller node at a time from the storage system.
- To prevent overheating, do not leave the controller node bay empty for more than 30 minutes.
- Verify that host multipathing is functional.

**Prerequisites**

Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.

**Procedure**

**Preparation**

1. Unpack the component and place on an ESD safe mat.
2. Connect to the service processor in the Service Console interface:
   
   Browse to the IP address: https://<sp_ip_address>:8443

3. Log in to the HPE 3PAR SP and enter the **admin** account credentials.
4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   
   a. From the Service Console interface, select **Systems**.
   
   b. Select **Actions > Set maintenance mode** and then follow the instructions.

   **TIP:** When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.

   To edit the maintenance window, select **Actions > Set maintenance mode** and then click the **Edit** icon next to the maintenance window.

5. Initiate **Check Health** on the storage system.
   
   a. From the Service Console interface, select **Systems**.
   
   b. Select **Actions > Check health**.

   A check of the storage system runs to ensure that there are no additional issues.

   **CAUTION:** If health issues are identified during the **Check Health**, resolve these issues before continuing. Refer to the details in the **Check Health** results and review the documentation.

6. Locate information about the failed controller node:
   
   a. From the Service Console interface, select **Storage Systems > Systems**.
   
   b. Review the following information:
      
      - The alert banner at the top of the page states that the controller node has failed and is offline.
To see the **Recommended Action**, click the banner and **Details**.

- **Under the Health pane, the State is Degraded.**
  
  This status refers to the state of the storage system, not the state of an individual component.

- **Under the Health pane, the Details indicate that the drive enclosures and drives connected to the failed controller node are Degraded.**
  
  To see a graphical overview of these degraded components, select the **Map** view.

- **Under the Configuration Summary pane, only one controller node is active in the system because the failed controller node is offline.**
  
  The failed controller node does not appear on the controller node page of the SC interface.

7. Locate the failed and shut down controller node by referring to the LEDs.

   Some faults illuminate the blue UID/Service LED, which helps you locate the failed component. When the UID/Service LED is solid blue and the Status LED is rapidly flashing green, a controller node is shut down. Depending on the nature of the controller node failure, the Fault LED might be solid amber.

   The Fault LED for the other active controller node in the cluster will be flashing, indicating that one of the other controller nodes in the cluster is shut down.

8. Verify that all cables are labeled with their location.

**Removal**

9. Remove the cables from the controller node.

10. Remove the controller node. See **Figure 6: Removing the controller node** on page 14.

   - Pull to extend the gray rod of the controller node to the extracted position (1).
   - When the controller node is halfway out of the enclosure, support it from underneath and slide it out completely (2).
   - Place the controller node on the ESD safe mat.

![Figure 6: Removing the controller node](image)

**Replacement**

12. Partially install the controller node.

   - Pull to extend the gray rod of the controller node to the extracted position.
b. Confirm that the controller node is correctly oriented. In the controller node enclosure, the pair is installed with each controller node oriented 180° from each other.

c. Partially install the controller node into the slot. Using two hands to grasp each side of the replacement controller node, align it with the grooves in the slot, and slide it into the slot until it halts against the insertion mechanism that is inside of the slot. **Do not fully insert the controller node in the slot at this time**, because the cables must be reconnected before it is fully seated.

13. Reconnect the cables to the controller node.

**While the controller node is still only partially inserted in the slot**, reconnect the cables to the controller node.

14. Fully install and seat the controller node into the slot. See **Figure 10: Fully install and seat the controller node into the slot** on page 16.

Slide in the controller node (1) while pushing in on the gray rod until it stops (2).
If the UID LED is flashing blue after two minutes, this LED status indicates that the replacement controller node is not properly seated, so repeat this step.

**Figure 10: Fully install and seat the controller node into the slot**

Once inserted, the replacement controller node powers up and goes through the automatic node-to-node rescue before joining the cluster. This process might take up to 10 minutes.

⚠️ **IMPORTANT:** If the automatic node-to-node rescue does not start automatically, contact your authorized service provider.

### Verification

15. Verify that the controller node has joined the cluster.

   Confirm that the green Status LED on the controller node is flashing in synchronization with the other controller nodes, indicating that it has joined the cluster.

16. From the Service Console interface, verify that the **State** of the component and the storage system are **Normal** (green).

17. After the component replacement, initiate **Check Health** on the storage system.

   a. From the Service Console interface, select **Systems**.
   
   b. Select **Actions > Check health**.

18. If significant time is left in the maintenance window, end the **Maintenance Mode**.

   a. From the Service Console interface, select **Systems**.
   
   b. Select **Actions > Set maintenance mode**.
   
   c. To end the maintenance window associated with the replacement, click **X**.

      The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

19. Follow the return instructions provided with the replacement component.

### Drive replacement

#### Replacing a drive—SP 4.x

This procedure is for the replacement of a drive using HPE 3PAR Service Processor (SP) 4.x.
CAUTION:

• The replacement drive must match the failed drive exactly in terms of drive type, capacity, and speed.

• To avoid damage to hardware and the loss of data, never remove a drive without first confirming that the drive status/activity LED is solid amber and the UID/service LED is solid blue.

• If you require more than 10 minutes to replace a drive, install a slot-filler blank in the drive bay to prevent overheating while you are working.

• If the storage system is enabled with HPE 3PAR Data Encryption feature, only use Federal Information Processing Standard (FIPS) capable drives. Using a non-self-encrypting drive might cause errors during the replacement process.

• To avoid potential damage to equipment and loss of data, handle drives carefully following industry-standard practices and ESD precautions. Internal storage media can be damaged when drives are shaken, dropped, or roughly placed on a work surface.

• Before installing drives into enclosures, make sure that the enclosures are free of obstructions (such as loose screws, hardware, or debris). Inspect the drives before installing them in the enclosure to make sure that they are not damaged.

IMPORTANT:

• This replacement procedure applies only to a drive that has failed. If a drive replacement is needed for a drive that has not failed, contact your authorized service provider.

• If more than one drive is degraded or failed, contact your authorized service provider to determine if the repair can be done in a safe manner, preventing downtime or data loss.

IMPORTANT: When replacing a drive that is Failed, Maintenance Mode is not required. By not setting Maintenance Mode, alerts for other issues that might arise will continue to be sent to HPE.

Prerequisites

Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.

Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.

2. Connect to the HPE 3PAR Service Processor.

   Browse to either the IP address or hostname: https://<sp_ip_address> or https://<hostname>.

3. Log in to the HPE 3PAR Service Processor (SP).

   With the 3parcust account credentials, the Service Processor Onsite Customer Care (SPOCC) interface displays.

4. Initiate Check Health on the storage system.
a. From the SPOCC interface main menu, click **Support** in the left navigation pane.

b. From the **Service Processor - Support** page, under **StoreServs**, click **Health Check** in the **Action** column.

   A pop-up window displays a status message while the health check runs.

   When running the **Health Check** using Internet Explorer, the screen might remain blank while information is gathered. This process could take a few minutes before displaying results. Wait for the process to complete and do not attempt to cancel or close the browser.

c. To review the report, click either **Details** or **View Summary**.

   △ **CAUTION**: If health issues are identified during the **Check Health** scan, resolve these issues before continuing. Refer to the details in the **Check Health** results and contact Hewlett Packard Enterprise Support if necessary.

5. Locate information about the failed drive.
   
   The alert notification specifies which drive is in a **Failed** state. Notice that the health of the storage system will be in a **Degraded** state due to the failed drive.

6. Locate the drive enclosure (cage) that contains the failed drive.
   
   From the enclosure front, locate the enclosure that has a solid amber drive status LED on the left ear cap (bezel).

7. Remove the bezel from the enclosure front.
   
   a. Unlock the bezel if necessary.
   
   b. Press the release tab.
   
   c. Rotate the bezel away from the enclosure left side.
   
   d. Pull the bezel out from the enclosure right side.

8. Locate the failed drive by the LEDs.

   △ **CAUTION**: To avoid damaging the hardware or losing data, always confirm that the drive is ready for removal by its solid amber fault LED.

   ▶ **IMPORTANT**: If you do not see a solid amber fault LED on the drive, it could be the data has not been vacated yet. When the drive has failed and been spun down, the fault LED becomes lit solid amber and only then can you proceed with removal. This process may take several hours.

**Removal**

▶ **IMPORTANT**: Do not remove the failed drive until you have the replacement drive ready. To prevent overheating, do not leave the drive bay unpopulated for more than 10 minutes.

9. Remove the drive.
a. To release the handle into the open position, pinch the latch handle to release the handle into the open position (1).

b. Extend the latch handle (2).

c. Slide the drive out of the bay (3) and place on an ESD safe mat.

Figure 11: Removing an SFF drive

Figure 12: Removing an LFF drive

Replacement

10. Install the drive.

   a. On the drive, press the release button to open the handle.

   b. With the latch handle of the drive fully extended, align and slide the drive into the bay until the handle begins to engage (1).

   c. To seat the drive into the drive bay, close the handle (2).
Verification

11. Observe the newly installed drive and confirm that the fault LED is off and the status LED is solid green.

   The change in the LEDs may take several minutes as the drive is prepared for use by the system.

12. Verify the state of the replacement drive.

   From the SSMC interface, the drive ID that you just replaced will be removed from the list, and the replacement drive will be assigned a new drive ID and be in a healthy state.

13. From the SPOCC interface, verify that the State for the component and the storage system are Normal (green).

14. After the component replacement, initiate Check Health on the storage system.

   a. From the SPOCC interface main menu, click Support in the left navigation pane.

   b. From the Service Processor - Support page, under StoreServs, click Health Check in the Action column.

15. Install the bezel on the enclosure front.

   a. Insert the bezel into the enclosure right side.

   b. Press in the release tab.
c. Insert the bezel into the enclosure left side.

d. Lock the bezel (optional).

16. Follow the return instructions provided with the replacement component.

Replacing a drive—SP 5.x

This procedure is for the replacement of a drive using HPE 3PAR Service Processor (SP) 5.x.

⚠️ CAUTION:

- The replacement drive must match the failed drive exactly in terms of drive type, capacity, and speed.
- To avoid damage to hardware and the loss of data, never remove a drive without first confirming that the drive status/activity LED is solid amber and the UID/service LED is solid blue.
- If you require more than 10 minutes to replace a drive, install a slot-filler blank in the drive bay to prevent overheating while you are working.
- If the storage system is enabled with HPE 3PAR Data Encryption feature, only use Federal Information Processing Standard (FIPS) capable drives. Using a non-self-encrypting drive might cause errors during the replacement process.
- To avoid potential damage to equipment and loss of data, handle drives carefully following industry-standard practices and ESD precautions. Internal storage media can be damaged when drives are shaken, dropped, or roughly placed on a work surface.
- Before installing drives into enclosures, make sure that the enclosures are free of obstructions (such as loose screws, hardware, or debris). Inspect the drives before installing them in the enclosure to make sure that they are not damaged.

⚠️ IMPORTANT:

- This replacement procedure applies only to a drive that has failed. If a drive replacement is needed for a drive that has not failed, contact your authorized service provider.
- If more than one drive is degraded or failed, contact your authorized service provider to determine if the repair can be done in a safe manner, preventing downtime or data loss.

⚠️ IMPORTANT: When replacing a drive that is Failed, Maintenance Mode is not required. By not setting Maintenance Mode, alerts for other issues that might arise will continue to be sent to HPE.

Prerequisites

Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.

Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.
2. Connect to the service processor in the Service Console interface:
Browse to the IP address: https://<sp_ip_address>:8443

3. Log in to the HPE 3PAR SP and enter the admin account credentials.

4. Initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

   A check of the storage system runs to ensure that there are no additional issues.

   △ CAUTION: If health issues are identified during the Check Health, resolve these issues before continuing. Refer to the details in the Check Health results and review the documentation.

5. Locate information about the failed drive.
   a. From the Service Console interface Systems page, click the link labeled Failed from the Health pane to see the Overview page for the component. Notice that there is an alert banner at the top of the page that provides additional information.

   NOTE: On the Health pane of the Systems page, the State is Degraded and indicates the state of the storage system and not the state of an individual component.

   b. On the Physical Drives link in the Health pane, confirm that the drive State shows Failed and Vacated.

   c. In the Health pane, select the link next to the Failed drive, and then click the Overview drop-down menu and select Schematic.

   d. On the Schematic page, hover over the failed drive and note the positioning information within the storage system.

   △ CAUTION: If the drive is still in a Degraded state instead of a Failed state, do not attempt to remove the drive from the drive enclosure. A drive in a Degraded state is still vacating the data. If you remove a drive in a Degraded state, a loss of data may occur. Wait to remove the drive once it enters a Failed state, which indicates that the data has been vacated and the drive is safe to replace. This process may take several hours.

6. Locate the drive enclosure (cage) that contains the failed drive.
   From the enclosure front, locate the enclosure that has a solid amber drive status LED on the left ear cap (bezel).

7. Remove the bezel from the enclosure front.
   a. Unlock the bezel if necessary.
   b. Press the release tab.
   c. Rotate the bezel away from the enclosure left side.
   d. Pull the bezel out from the enclosure right side.

8. Locate the failed drive by the LEDs.
**CAUTION:** To avoid damaging the hardware or losing data, always confirm that the drive is ready for removal by its solid amber fault LED.

**IMPORTANT:** If you do not see a solid amber fault LED on the drive, it could be the data has not been vacated yet. When the drive has failed and been spun down, the fault LED becomes lit solid amber and only then can you proceed with removal. This process may take several hours.

### Removal

**IMPORTANT:** Do not remove the failed drive until you have the replacement drive ready. To prevent overheating, do not leave the drive bay unpopulated for more than 10 minutes.

9. Remove the drive.

   a. To release the handle into the open position, pinch the latch handle to release the handle into the open position (1).

   b. Extend the latch handle (2).

   c. Slide the drive out of the bay (3) and place on an ESD safe mat.

   ![Figure 15: Removing an SFF drive](image1)

   ![Figure 16: Removing an LFF drive](image2)

### Replacement

10. Install the drive.
a. On the drive, press the release button to open the handle.

b. With the latch handle of the drive fully extended, align and slide the drive into the bay until the handle begins to engage (1).

c. To seat the drive into the drive bay, close the handle (2).

Figure 17: Installing an SFF drive

Figure 18: Installing an LFF drive

Verification

11. Observe the newly installed drive and confirm that the fault LED is off and the status LED is solid green.

The change in the LEDs may take several minutes as the drive is prepared for use by the system.

12. Verify the state of the replacement drive.

From the Service Console interface, the drive ID that you just replaced will be removed from the list, and the replacement drive will be assigned a new drive ID and be in a healthy state. The Schematic view automatically refreshes.

13. From the Service Console interface, verify that the State of the component and the storage system are Normal (green).

14. After the component replacement, initiate Check Health on the storage system.

   a. From the Service Console interface, select Systems.

   b. Select Actions > Check health.
15. Install the bezel on the enclosure front.
   a. Insert the bezel into the enclosure right side.
   b. Press in the release tab.
   c. Insert the bezel into the enclosure left side.
   d. Lock the bezel (optional).

16. Follow the return instructions provided with the replacement component.

Power cooling module or battery replacement

Replace the alternating-current power cooling module battery in a controller node enclosure—SP 5.x

This procedure is for the replacement of a battery in an alternating-current power cooling module (AC PCM) of the controller node enclosure using HPE 3PAR Service Processor (SP) 5.x. The battery can be replaced without replacing the entire PCM.

**IMPORTANT:**
- If both batteries in the power cooling modules in the same controller node enclosure have failed, only replace one power cooling module battery at a time.
- Only one power cooling module can be serviced at a time. If another power cooling module is to be serviced, verify that the first serviced power cooling module is healthy and functioning, and then restart this servicing procedure from the beginning for the next power cooling module to be serviced.
- To prevent overheating, the replacement of the power cooling module requires a maximum service time of six minutes.
- Ensure that cables are clear of the power cooling module when installing.

**IMPORTANT:** Because each battery is a backup for both controller nodes in the controller node enclosure, controller nodes 0 and 1 both report a problem with a single battery. The Qty appears as 2 in output because two controller nodes are reporting the problem. Battery 0 for controller node 0 is in the left PCM, and battery 0 for controller node 1 is in the right side PCM (when looking at the controller node enclosure from the rear).

Prerequisites

**Only for the controller node enclosure**, verify that at least one PCM Battery in each controller node enclosure is functional before removing a PCM.

Procedure

Preparation
1. Unpack the component and place on an ESD safe mat.
2. Connect to the service processor in the Service Console interface:
   Browse to the IP address: `https://<sp_ip_address>:8443`
3. Log in to the HPE 3PAR SP and enter the `admin` account credentials.

4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Set maintenance mode** and then follow the instructions.

   🌶️ **TIP:** When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.

   To edit the maintenance window, select **Actions > Set maintenance mode** and then click the Edit icon next to the maintenance window.

5. Initiate **Check Health** on the storage system.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Check health**.

   A check of the storage system runs to ensure that there are no additional issues.

   🚨 **CAUTION:** If health issues are identified during the **Check Health**, resolve these issues before continuing. Refer to the details in the **Check Health** results and review the documentation.

6. Review the information in the alert notification.
   If notifications are enabled, information about the failed component is provided in the notification.

7. Locate the failed battery in an AC PCM by checking the LED status.

   Confirm on the AC PCM that the battery fail LED is solid amber.

8. Verify that at least one battery in an AC PCM in each controller node enclosure is functional.

9. Turn off power to the AC PCM and disconnect the power cable.
   a. Move the power switch to the off position.
   b. Loosen the cord clamp, release the cable tie tab, and slide the cord clamp off the cable tie.
   c. Disconnect the power cable, keeping the cord clamp on the power cable.
   d. Secure the power cable and cable clamp.

Removal

10. Remove the AC PCM.
   a. With thumb and forefinger, grasp and squeeze the PCM latch to release the handle (1).
   b. Rotate the PCM release handle (2).
   c. Slide the PCM out of the enclosure (3).
   d. Place the PCM on the ESD mat with the battery compartment facing up.
11. Remove the battery from the AC PCM.
   
a. At the back of the PCM, lift the battery release handle (1).
b. Remove the battery from the battery compartment (2).
c. Place on the ESD safe mat.

12. Install the battery for the AC PCM.
   
a. With the battery handle in the upright position, insert the replacement battery into the PCM (1).
b. Push down the handle to install (2).
   
   When the battery is correctly seated, the battery and handle are aligned with the surface of the PCM.
13. Install the AC PCM.
   a. On the ESD mat, extend the PCM handle to the open position, and then carry it to the enclosure.
   b. Slide the PCM into the enclosure and then push until the insertion mechanism starts to engage (the handle starts to rotate).
      Ensure that no cables get caught in the PCM insertion mechanism.
   c. Close the handle until the latch clicks to fully seat the PCM in the enclosure.
   d. Once inserted, pull back lightly on the PCM to ensure that it is properly engaged.

14. Connect the power cable and turn on the power to the AC PCM.
   a. Reconnect the power cable.
   b. Slide the cable clamp onto the cable tie.
   c. Tighten the clamp.
   d. Move the power switch to the on position.

Verification
15. Verify that the replacement battery in the AC PCM has been successfully installed.
   Confirm the battery good LED is solid green and the PCM OK LED is solid green.

16. From the Service Console interface, verify that the State of the component and the storage system are Normal (green).

17. After the component replacement, initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

18. If significant time is left in the maintenance window, end the Maintenance Mode.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode.
   c. To end the maintenance window associated with the replacement, click X.
      The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

19. Follow the return instructions provided with the replacement component.

Replacing an alternating-current power cooling module in a controller node enclosure—SP 5.x

This procedure is for the replacement of an alternating-current power cooling module (AC PCM) in a controller node enclosure using HPE 3PAR Service Processor (SP) 5.x.

**IMPORTANT:**
- Only one power cooling module can be serviced at a time. If another power cooling module is to be serviced, verify that the first serviced power cooling module is healthy and functioning, and then restart this servicing procedure from the beginning for the next power cooling module to be serviced.
- To prevent overheating, the replacement of the power cooling module requires a maximum service time of six minutes.
- Ensure that cables are clear of the power cooling module when installing.

**IMPORTANT:** Because each battery is a backup for both controller nodes in the controller node enclosure, controller nodes 0 and 1 both report a problem with a single battery. The Qty appears as 2 in output because two controller nodes are reporting the problem. Battery 0 for controller node 0 is in the left PCM, and battery 0 for controller node 1 is in the right side PCM (when looking at the controller node enclosure from the rear).

**Prerequisites**

Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.
Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.
2. Connect to the service processor in the Service Console interface:
   Browse to the IP address: https://<sp_ip_address>:8443
3. Log in to the HPE 3PAR SP and enter the admin account credentials.
4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode and then follow the instructions.

   ☀ TIP: When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.
   To edit the maintenance window, select Actions > Set maintenance mode and then click the Edit icon next to the maintenance window.

5. Initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

   A check of the storage system runs to ensure that there are no additional issues.

   △ CAUTION: If health issues are identified during the Check Health, resolve these issues before continuing. Refer to the details in the Check Health results and review the documentation.

6. Review the information in the alert notification.
   If notifications are enabled, information about the failed component is provided in the notification.

7. Locate the failed AC PCM by checking the LED status.
   Confirm on the failed PCM that the AC input fail LED and DC output fail LEDs are solid amber.

8. Turn off power to the AC PCM and disconnect the power cable.
   a. Move the power switch to the off position.
   b. Loosen the cord clamp, release the cable tie tab, and slide the cord clamp off the cable tie.
   c. Disconnect the power cable, keeping the cord clamp on the power cable.
   d. Secure the power cable and cable clamp.

Removal

9. Remove the AC PCM.
   a. With thumb and forefinger, grasp and squeeze the PCM latch to release the handle (1).
   b. Rotate the PCM release handle (2).
c. Slide the PCM out of the enclosure (3).

d. Place the PCM on the ESD mat with the battery compartment facing up.

![Figure 23: Removing the AC power cooling module](image)

10. Remove the battery from the AC PCM.

   a. At the back of the PCM, lift the battery release handle (1).
   
   b. Remove the battery from the battery compartment (2).
   
   c. Place on the ESD safe mat.

![Figure 24: Removing the battery, AC power cooling module, controller node enclosure](image)

Replacement

11. Install the battery for the AC PCM.

   a. With the battery handle in the upright position, insert the replacement battery into the PCM (1).
   
   b. Push down the handle to install (2).

   When the battery is correctly seated, the battery and handle are aligned with the surface of the PCM.
Figure 25: Installing the battery, AC power cooling module, controller node enclosure

12. Install the AC PCM.
   a. On the ESD mat, extend the PCM handle to the open position, and then carry it to the enclosure.
   b. Slide the PCM into the enclosure and then push until the insertion mechanism starts to engage (the handle starts to rotate).
      Ensure that no cables get caught in the PCM insertion mechanism.
   c. Close the handle until the latch clicks to fully seat the PCM in the enclosure.
   d. Once inserted, pull back lightly on the PCM to ensure that it is properly engaged.

Figure 26: Installing the AC power cooling module

13. Connect the power cable and turn on the power to the AC PCM.
   a. Reconnect the power cable.
   b. Slide the cable clamp onto the cable tie.
   c. Tighten the clamp.
   d. Move the power switch to the on position.

Verification
14. Verify that the replacement AC PCM has been successfully installed.
   Confirm that the PCM OK LED is solid green and the battery good LED is solid green.

15. From the Service Console interface, verify that the State of the component and the storage system are Normal (green).

16. After the component replacement, initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

17. If significant time is left in the maintenance window, end the Maintenance Mode.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode.
   c. To end the maintenance window associated with the replacement, click X.
   
   The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

18. Follow the return instructions provided with the replacement component.

**Replacing an alternating-current power cooling module in a drive enclosure — SP 5.x**

This procedure is for the replacement of an alternating-current power cooling module (AC PCM) in a drive enclosure using HPE 3PAR Service Processor (SP) 5.x.

**IMPORTANT:**
- Only one power cooling module can be serviced at a time. If another power cooling module is to be serviced, verify that the first serviced power cooling module is healthy and functioning, and then restart this servicing procedure from the beginning for the next power cooling module to be serviced.
- To prevent overheating, the replacement of the power cooling module requires a maximum service time of six minutes.
- Ensure that cables are clear of the power cooling module when installing.

**Prerequisites**

Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.

**Procedure**

**Preparation**

1. Unpack the component and place on an ESD safe mat.
2. Connect to the service processor in the Service Console interface:
   
   Browse to the IP address: \texttt{https://<sp_ip_address>:8443}
3. Log in to the HPE 3PAR SP and enter the \texttt{admin} account credentials.
4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode and then follow the instructions.

   **TIP:** When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.
   To edit the maintenance window, select Actions > Set maintenance mode and then click the Edit icon next to the maintenance window.

5. Initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

   A check of the storage system runs to ensure that there are no additional issues.

   **CAUTION:** If health issues are identified during the Check Health, resolve these issues before continuing. Refer to the details in the Check Health results and review the documentation.

6. Review the information in the alert notification.
   If notifications are enabled, information about the failed component is provided in the notification.

7. Initiate the Locate action on the drive enclosure (cage) that contains the failed component.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

   A check of the storage system runs to ensure that there are no additional issues.

   **CAUTION:** If health issues are identified during the Check Health, resolve these issues before continuing. Refer to the details in the Check Health results and review the documentation.

6. Review the information in the alert notification.
   If notifications are enabled, information about the failed component is provided in the notification.

7. Initiate the Locate action on the drive enclosure (cage) that contains the failed component.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

   A check of the storage system runs to ensure that there are no additional issues.

   **CAUTION:** If health issues are identified during the Check Health, resolve these issues before continuing. Refer to the details in the Check Health results and review the documentation.

8. Locate the failed PCM by checking the LED status.
   Confirm on the failed PCM that the AC input fail LED, fan fail LED, and DC output fail LED are solid amber.

**Removal**

9. Turn off power to the AC PCM and disconnect the power cable.
   a. Move the power switch to the off position.
   b. Loosen the cord clamp, release the cable tie tab, and slide the cord clamp off the cable tie.
   c. Disconnect the power cable, keeping the cord clamp on the power cable.
   d. Secure the power cable and cable clamp.

10. Remove the AC PCM.
   a. With thumb and forefinger, grasp and squeeze the PCM latch to release the handle (1).
   b. Rotate the PCM release handle (2).
   c. Slide the PCM out of the enclosure (3).
   d. Place the PCM on the ESD mat with the battery compartment facing up.
Replacement

11. Install the AC PCM.

   a. On the ESD mat, extend the PCM handle to the open position, and then carry it to the enclosure.
   b. Slide the PCM into the enclosure and then push until the insertion mechanism starts to engage (the handle starts to rotate).
      Ensure that no cables get caught in the PCM insertion mechanism.
   c. Close the handle until the latch clicks to fully seat the PCM in the enclosure.
   d. Once inserted, pull back lightly on the PCM to ensure that it is properly engaged.

12. Connect the power cable and turn on the power to the AC PCM.

   a. Reconnect the power cable.
   b. Slide the cable clamp onto the cable tie.
c. Tighten the clamp.
d. Move the power switch to the on position.

**Verification**

13. Verify that the AC PCM has been successfully installed by the LEDs. Confirm that the PCM OK LED is solid green.

14. Stop the **Locate** action on the drive enclosure.
   At the right side of the **Schematic** view of the drive enclosure, click the UID icon.

15. After the component replacement, initiate **Check Health** on the storage system.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Check health**.

16. If significant time is left in the maintenance window, end the **Maintenance Mode**.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Set maintenance mode**.
   c. To end the maintenance window associated with the replacement, click **X**.
      The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

17. Follow the return instructions provided with the replacement component.

**Replacing a direct-current power cooling module battery in a controller node enclosure—SP 5.x**

This procedure is for the replacement of a battery in an -48V direct-current (DC) power cooling module (PCM) in the controller node enclosure using HPE 3PAR Service Processor (SP) 5.x. The battery can be replaced without replacing the entire PCM.

⚠️ **WARNING:** Since there is a risk of injury from electric shock or high energy levels, only a certified electrician who knows about the procedures, precautions, and hazards associated with direct-current (DC) power should perform the power wiring, cabling, routine maintenance, and service of a storage system installed in a direct-current power environment. Hewlett Packard Enterprise and partner service personnel are not authorized to perform DC power wiring or cabling.

⚠️ **CAUTION:** Connecting to a direct-current power source outside the designated -48V DC nominal range (-36V DC to -72V DC) may damage the direct-current power cooling module.

⚠️ **IMPORTANT:** The direct-current components are qualified and supported only with a direct-current HPE 3PAR StoreServ 8000 Storage system running HPE 3PAR OS 3.3.1 and later versions.

⚠️ **IMPORTANT:** The storage system ordered for installation in a direct-current (DC) power environment requires the installation of DC-specific components. Use of components with alternating-current (AC) power in the DC storage system is prohibited.
IMPORTANT:

• If both batteries in the power cooling modules in the same controller node enclosure have failed, only replace one power cooling module battery at a time.

• Only one power cooling module can be serviced at a time. If another power cooling module is to be serviced, verify that the first serviced power cooling module is healthy and functioning, and then restart this servicing procedure from the beginning for the next power cooling module to be serviced.

• To prevent overheating, the replacement of the power cooling module requires a maximum service time of six minutes.

• Ensure that cables are clear of the power cooling module when installing.

IMPORTANT:

• The same HPE 3PAR -48VDC 764W Power Cooling Module is used in both the controller node enclosures and the drive enclosures.

• The HPE 3PAR -48VDC 764W Power Cooling Module is shipped without a battery.

• Before installation of the -48VDC 764W PCMs in the controller node enclosure, batteries are required to be installed in the -48VDC 764W PCM. Remove the batteries from the AC PCMs and install the batteries in the -48VDC 764W PCMs.

IMPORTANT: Because each battery is a backup for both controller nodes in the controller node enclosure, controller nodes 0 and 1 both report a problem with a single battery. The Qty appears as 2 in output because two controller nodes are reporting the problem. Battery 0 for controller node 0 is in the left PCM, and battery 0 for controller node 1 is in the right side PCM (when looking at the controller node enclosure from the rear).

NOTE:

• The power switch on the HPE 3PAR -48VDC 764W Power Cooling Module is inverted 180° from the orientation of the power switch on the alternating-current (AC) power cooling module.

• Labels on the HPE 3PAR -48VDC 764W Power Cooling Module show the model as -48VDC INPUT 764W PCM.

Prerequisites

• Arrange to have a certified electrician available during the installation to complete the power cabling connections of the -48V direct-current (DC) power cooling module (PCM).

• Only for the controller node enclosure, verify that at least one PCM Battery in each controller node enclosure is functional before removing a PCM.

Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.

2. Connect to the service processor in the Service Console interface:
Browse to the IP address: `https://<sp_ip_address>:8443`

3. Log in to the HPE 3PAR SP and enter the admin account credentials.

4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode and then follow the instructions.

   ⚠️ **TIP:** When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.

   To edit the maintenance window, select Actions > Set maintenance mode and then click the Edit icon next to the maintenance window.

5. Initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

   A check of the storage system runs to ensure that there are no additional issues.

   ⚠️ **CAUTION:** If health issues are identified during the Check Health, resolve these issues before continuing. Refer to the details in the Check Health results and review the documentation.

6. Review the information in the alert notification.

   If notifications are enabled, information about the failed component is provided in the notification.

7. Locate the DC PCM with the failed battery.

8. Confirm on the DC PCM that the battery fail LED is solid amber.

9. Turn off the power switch on the DC PCM.

   Some LEDs might remain illuminated after the PCM is powered off because PCMs use a common power bus.

10. **Only to be completed by a certified electrician provided by the customer:** Disengage power to the -48V DC PCM from the fuse/distribution panel and remove the power cable from the PCM.

    The electrician must remove the power cable connections from the positive terminal (+), negative terminal (−), and ground terminal (◎). When the plastic cap over the terminal connections is removed, it reveals the symbols for the terminals.

**Removal**

11. Remove the DC PCM.

   a. With thumb and forefinger, grasp and squeeze the PCM latch to release the handle.

   b. Rotate the PCM release handle and slide the PCM out of the enclosure, and then place the PCM on the ESD mat with the battery compartment facing up.
12. Remove the battery from the DC PCM.
   
   a. At the back of the PCM, lift the battery release handle.
   b. Remove the battery from the battery compartment and place on the ESD safe mat.

13. Install the battery in the DC PCM.
   
   a. With the battery handle in the upright position, insert the battery into the -48V DC PCM.
   b. Push down the handle to install.

   When the battery is correctly seated, the battery and handle are aligned with the surface of the -48V DC PCM.
14. Install the DC PCM.
   
   a. On the ESD mat, rotate the -48V DC PCM release handle to the open position and then carry it to the enclosure.
   
   b. Slide the -48V DC PCM into the enclosure, and then push until the insertion mechanism starts to engage (the handle starts to rotate).

   **IMPORTANT:** Ensure that no cables get caught in the PCM insertion mechanism.

   c. Close the handle until the latch clicks to fully seat the -48V DC PCM in the enclosure.
   
   d. Once inserted, pull back lightly on the PCM to ensure that it is properly engaged.

15. Only to be completed by a certified electrician provided by the customer: Install the power cable on the -48V DC PCMs and re-engage power from the fuse/distribution panel.
⚠️ **WARNING:** Before powering up the storage system, a certified electrician must attach all the power cabling to all the PCMs.

The power cable is connected to the -48V DC PCM with connections to the positive terminal (+), negative terminal (−), and ground terminal ( Ground ).

**Verification**

16. Verify that the replacement DC PCM has been successfully installed.
   Turn on the PCM and check that the power LED is on.

17. After the component replacement, initiate **Check Health** on the storage system.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Check health**.

18. If significant time is left in the maintenance window, end the **Maintenance Mode**.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Set maintenance mode**.
   c. To end the maintenance window associated with the replacement, click **X**.
      The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

19. Follow the return instructions provided with the replacement component.

**Replacing the direct-current power cooling module in a controller node enclosure—SP 5.x**

This procedure is for the replacement of an -48V direct-current (DC) power cooling module (PCM) in a controller node enclosure using HPE 3PAR Service Processor (SP) 5.x.

⚠️ **WARNING:** Since there is a risk of injury from electric shock or high energy levels, only a certified electrician who knows about the procedures, precautions, and hazards associated with direct-current (DC) power should perform the power wiring, cabling, routine maintenance, and service of a storage system installed in a direct-current power environment. Hewlett Packard Enterprise and partner service personnel are not authorized to perform DC power wiring or cabling.

⚠️ **CAUTION:** Connecting to a direct-current power source outside the designated -48V DC nominal range (-36V DC to -72V DC) may damage the direct-current power cooling module.

⚠️ **IMPORTANT:** The direct-current components are qualified and supported only with a direct-current HPE 3PAR StoreServ 8000 Storage system running HPE 3PAR OS 3.3.1 and later versions.

⚠️ **IMPORTANT:** The storage system ordered for installation in a direct-current (DC) power environment requires the installation of DC-specific components. Use of components with alternating-current (AC) power in the DC storage system is prohibited.
**IMPORTANT:**

- Only one power cooling module can be serviced at a time. If another power cooling module is to be serviced, verify that the first serviced power cooling module is healthy and functioning, and then restart this servicing procedure from the beginning for the next power cooling module to be serviced.

- To prevent overheating, the replacement of the power cooling module requires a maximum service time of six minutes.

- Ensure that cables are clear of the power cooling module when installing.

**IMPORTANT:**

- The same HPE 3PAR -48VDC 764W Power Cooling Module is used in both the controller node enclosures and the drive enclosures.

- The HPE 3PAR -48VDC 764W Power Cooling Module is shipped without a battery.

- **Before installation of the -48VDC 764W PCMs in the controller node enclosure**, batteries are required to be installed in the -48VDC 764W PCM. Remove the batteries from the AC PCMs and install the batteries in the -48VDC 764W PCMs.

**IMPORTANT:** Because each battery is a backup for both controller nodes in the controller node enclosure, controller nodes 0 and 1 both report a problem with a single battery. The Qty appears as 2 in output because two controller nodes are reporting the problem. Battery 0 for controller node 0 is in the left PCM, and battery 0 for controller node 1 is in the right side PCM (when looking at the controller node enclosure from the rear).

**NOTE:**

- The power switch on the HPE 3PAR -48VDC 764W Power Cooling Module is inverted 180° from the orientation of the power switch on the alternating-current (AC) power cooling module.

- Labels on the HPE 3PAR -48VDC 764W Power Cooling Module show the model as -48VDC INPUT 764W PCM.

**Prerequisites**

- Arrange to have a certified electrician available during the installation to complete the power cabling connections of the -48V direct-current (DC) power cooling module (PCM).

- **Only for the controller node enclosure**, verify that at least one PCM Battery in each controller node enclosure is functional before removing a PCM.

**Procedure**

**Preparation**

1. Unpack the component and place on an ESD safe mat.

2. Connect to the service processor in the Service Console interface:
   
   Browse to the IP address: `https://<sp_ip_address>:8443`

3. Log in to the HPE 3PAR SP and enter the `admin` account credentials.
4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Set maintenance mode** and then follow the instructions.

   **TIP:** When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.
   
   To edit the maintenance window, select **Actions > Set maintenance mode** and then click the Edit icon next to the maintenance window.

5. Initiate **Check Health** on the storage system.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Check health**.

   A check of the storage system runs to ensure that there are no additional issues.

   **CAUTION:** If health issues are identified during the **Check Health**, resolve these issues before continuing. Refer to the details in the **Check Health** results and review the documentation.

6. Review the information in the alert notification.
   If notifications are enabled, information about the failed component is provided in the notification.

7. Locate the failed PCM.

8. Turn off the power switch on the DC PCM.
   Some LEDs might remain illuminated after the PCM is powered off because PCMs use a common power bus.

9. **Only to be completed by a certified electrician provided by the customer:** Disengage power to the -48V DC PCM from the fuse/distribution panel and remove the power cable from the PCM.
   The electrician must remove the power cable connections from the positive terminal (⁺), negative terminal (⁻), and ground terminal (⁻). When the plastic cap over the terminal connections is removed, it reveals the symbols for the terminals.

   **Removal**

10. Remove the DC PCM.
    a. With thumb and forefinger, grasp and squeeze the PCM latch to release the handle.
    b. Rotate the PCM release handle and slide the PCM out of the enclosure, and then place the PCM on the ESD mat with the battery compartment facing up.
11. Remove the battery from the DC PCM.
   
a. At the back of the PCM, lift the battery release handle.
   
b. Remove the battery from the battery compartment and place on the ESD safe mat.

12. Install the battery in the DC PCM.
   
a. With the battery handle in the upright position, insert the battery into the -48V DC PCM.
   
b. Push down the handle to install.
      
      When the battery is correctly seated, the battery and handle are aligned with the surface of the -48V DC PCM.
13. Install the DC PCM.

a. On the ESD mat, rotate the -48V DC PCM release handle to the open position and then carry it to the enclosure.

b. Slide the -48V DC PCM into the enclosure, and then push until the insertion mechanism starts to engage (the handle starts to rotate).

1 IMPORTANT: Ensure that no cables get caught in the PCM insertion mechanism.

c. Close the handle until the latch clicks to fully seat the -48V DC PCM in the enclosure.

d. Once inserted, pull back lightly on the PCM to ensure that it is properly engaged.

14. Only to be completed by a certified electrician provided by the customer: Install the power cable on the -48V DC PCMs and re-engage power from the fuse/distribution panel.
Before powering up the storage system, a certified electrician must attach all the power cabling to all the PCMs.

The power cable is connected to the -48V DC PCM with connections to the positive terminal (+), negative terminal (−), and ground terminal (接地).

Verification

15. Turn on the PCM and check that the power LED is on. The battery good LED must also be solid green.

16. After the component replacement, initiate **Check Health** on the storage system.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Check health**.

17. If significant time is left in the maintenance window, end the **Maintenance Mode**.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Set maintenance mode**.
   c. To end the maintenance window associated with the replacement, click **X**.

   The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

18. Follow the return instructions provided with the replacement component.

Replacing a direct-current power cooling module in a drive enclosure—SP 5.x

This procedure is for the replacement of an -48V direct-current (DC) power cooling module (PCM) in a drive enclosure using HPE 3PAR Service Processor (SP) 5.x.

**WARNING:** Since there is a risk of injury from electric shock or high energy levels, only a certified electrician who knows about the procedures, precautions, and hazards associated with direct-current (DC) power should perform the power wiring, cabling, routine maintenance, and service of a storage system installed in a direct-current power environment. Hewlett Packard Enterprise and partner service personnel are not authorized to perform DC power wiring or cabling.

**CAUTION:** Connecting to a direct-current power source outside the designated -48V DC nominal range (-36V DC to -72V DC) may damage the direct-current power cooling module.

**IMPORTANT:** The direct-current components are qualified and supported only with a direct-current HPE 3PAR StoreServ 8000 Storage system running HPE 3PAR OS 3.3.1 and later versions.

**IMPORTANT:** The storage system ordered for installation in a direct-current (DC) power environment requires the installation of DC-specific components. Use of components with alternating-current (AC) power in the DC storage system is prohibited.
IMPORTANT:

- Only one power cooling module can be serviced at a time. If another power cooling module is to be serviced, verify that the first serviced power cooling module is healthy and functioning, and then restart this servicing procedure from the beginning for the next power cooling module to be serviced.

- To prevent overheating, the replacement of the power cooling module requires a maximum service time of six minutes.

- Ensure that cables are clear of the power cooling module when installing.

IMPORTANT:

- The same HPE 3PAR -48VDC 764W Power Cooling Module is used in both the controller node enclosures and the drive enclosures.

- Though the HPE 3PAR -48VDC 764W Power Cooling Module has a compartment for a replaceable battery, this compartment remains empty when the direct-current power cooling module is installed in a drive enclosure.

NOTE:

- The power switch on the HPE 3PAR -48VDC 764W Power Cooling Module is inverted 180° from the orientation of the power switch on the alternating-current (AC) power cooling module.

- Labels on the HPE 3PAR -48VDC 764W Power Cooling Module show the model as -48VDC INPUT 764W PCM.

Prerequisites

Arrange to have a certified electrician available during the installation. A certified electrician must complete the power cabling connections for the direct-current power cooling module.

Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.

2. Connect to the service processor in the Service Console interface:
   - Browse to the IP address: https://<sp_ip_address>:8443

3. Log in to the HPE 3PAR SP and enter the **admin** account credentials.

4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Set maintenance mode** and then follow the instructions.

TIP: When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.

To edit the maintenance window, select **Actions > Set maintenance mode** and then click the Edit icon next to the maintenance window.
5. Initiate **Check Health** on the storage system.
   
a. From the Service Console interface, select **Systems**.

b. Select **Actions > Check health**.

   A check of the storage system runs to ensure that there are no additional issues.

   △ **CAUTION:** If health issues are identified during the **Check Health**, resolve these issues before continuing. Refer to the details in the **Check Health** results and review the documentation.

6. Review the information in the alert notification.

   If notifications are enabled, information about the failed component is provided in the notification.

7. Initiate the **Locate** action on the drive enclosure (cage) that contains the failed component.

   At the right side of the **Schematic** view of the drive enclosure, click the UID icon to illuminate the blue UID LED on the drive enclosure.

   For many of the components, the **Schematic** view can be used to illuminate the blue UID LED on the component. Once the component is located, the UID LED can be turned off using the same method.

8. Locate the failed PCM.

9. Turn off the power switch on the DC PCM.

   Some LEDs might remain illuminated after the PCM is powered off because PCMs use a common power bus.

10. **Only to be completed by a certified electrician provided by the customer:** Disengage power to the -48V DC PCM from the fuse/distribution panel and remove the power cable from the PCM.

    The electrician must remove the power cable connections from the positive terminal (⁺), negative terminal (⁻), and ground terminal (⊕). When the plastic cap over the terminal connections is removed, it reveals the symbols for the terminals.

**Removal**

11. Remove the DC PCM.

   a. With thumb and forefinger, grasp and squeeze the PCM latch to release the handle.

   b. Rotate the PCM release handle and slide the PCM out of the enclosure, and then place the PCM on the ESD mat with the battery compartment facing up.
Replacement

12. Install the DC PCM.
   a. On the ESD mat, rotate the -48V DC PCM release handle to the open position and then carry it to the enclosure.
   b. Slide the -48V DC PCM into the enclosure, and then push until the insertion mechanism starts to engage (the handle starts to rotate).
   
   [IMPORTANT] Ensure that no cables get caught in the PCM insertion mechanism.
   
   c. Close the handle until the latch clicks to fully seat the -48V DC PCM in the enclosure.
   d. Once inserted, pull back lightly on the PCM to ensure that it is properly engaged.
13. **Only to be completed by a certified electrician provided by the customer:** Install the power cable on the -48V DC PCMs and re-engage power from the fuse/distribution panel.

⚠️ **WARNING:** Before powering up the storage system, a certified electrician must attach all the power cabling to all the PCMs.

The power cable is connected to the -48V DC PCM with connections to the positive terminal (обра), negative terminal (хв), and ground terminal (земо).

**Verification**

14. Verify that the replacement DC PCM has been successfully installed.
   Turn on the PCM and check that the power LED is on.

15. Stop the Locate action on the drive enclosure.
   At the right side of the Schematic view of the drive enclosure, click the UID icon.

16. After the component replacement, initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

17. If significant time is left in the maintenance window, end the Maintenance Mode.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode.
   c. To end the maintenance window associated with the replacement, click X.
   The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

18. Follow the return instructions provided with the replacement component.

**SFP transceiver replacement**

**Replacing an SFP transceiver—SP 4.x**

This procedure is for the replacement of a small form-factor pluggable (SFP) transceiver using HPE 3PAR Service Processor (SP) 4.x. An SFP transceiver is installed in each onboard Fibre Channel (FC) port and in the ports of host adapters.

⚠️ **WARNING:** When the storage system is on, do not stare at the FC fibers because doing so could damage your eyes.

⚠️ **CAUTION:** To prevent damage when handling the SFP transceiver, do not touch the gold contact leads.

⚠️ **IMPORTANT:** All SFP ports must contain an SFP transceiver and cable or a dust cover.
Prerequisites
Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.

Procedure

Preparation
1. Unpack the component and place on an ESD safe mat.
2. Connect to the HPE 3PAR Service Processor.
   Browse to either the IP address or hostname: https://<sp_ip_address> or https://<hostname>.
3. Log in to the HPE 3PAR Service Processor (SP).
   With the 3parcust account credentials, the Service Processor Onsite Customer Care (SPOCC) interface displays.
4. Initiate a maintenance window to stop the system from sending alerts to Hewlett Packard Enterprise.
   a. From the SPOCC interface main menu, select SPMAINT in the left navigation pane.
   b. From the SPMAint interface main menu under Service Processor - SP Maintenance, select StoreServ Configuration Management.
   c. Under Service Processor - StoreServ Configuration, select Modify under Action.
   d. Under Service Processor - StoreServ Info, select On for the Maintenance Mode setting.
5. Initiate Check Health on the storage system.
   a. From the SPOCC interface main menu, click Support in the left navigation pane.
   b. From the Service Processor - Support page, under StoreServs, click Health Check in the Action column.
      A pop-up window displays a status message while the health check runs.
      When running the Health Check using Internet Explorer, the screen might remain blank while information is gathered. This process could take a few minutes before displaying results. Wait for the process to complete and do not attempt to cancel or close the browser.
   c. To review the report, click either Details or View Summary.

⚠️ CAUTION: If health issues are identified during the Check Health scan, resolve these issues before continuing. Refer to the details in the Check Health results and contact Hewlett Packard Enterprise Support if necessary.

6. Review the information in the email alert notification.
   If the email notifications are enabled, information about the failed port due to the failed SFP transceiver is provided in an email alert notification. The port position in the storage system is provided as Node:Slot:Port (N:S:P).
7. Review the information in the HPE 3PAR StoreServ Management Console (SSMC) interface alert notification.
On the **Ports** screen, an alert notification banner appears that contains the information for the failed port due to the failed SFP transceiver. From the SSMC main menu, select **Storage Systems > Systems**, select the storage system from the list, select **Configuration** view from the detail pane, and click the total ports link from the **Ports** panel. In the alert notification banner, the port position is provided as Node:Slot:Port (N:S:P).

**NOTE:** The health and details listed in the SSMC for the failed port might still show as healthy. If this occurs, rely on the information in the alert notification about the failed port. Confirm that you have located the failed port by checking the status of its LEDs: the Port Speed LED is off and the Link Status LED is flashing green.

8. Locate the failed SFP transceiver.

   To locate the port containing the failed SFP transceiver, use the Node:Slot:Port position. The port has a flashing green Link Status LED and the Port Speed LED is off.

**Removal**

9. Label the cable connected to the failed SFP transceiver with the port location, and then disconnect the cable.

10. Remove the SFP transceiver.

    **CAUTION:** To prevent damage, do not touch the gold contact leads on the SFP transceiver.

    a. On the SFP transceiver, pivot open the retaining clip.

    b. Slide the SFP transceiver out of the port slot.

**Replacement**

11. Install the SFP transceiver.

    **CAUTION:** To prevent damage, do not touch the gold contact leads on the SFP transceiver.

    **IMPORTANT:** If a cable will not be connected to the SFP transceiver, install a dust cover in the SFP transceiver.

    a. On the SFP transceiver, pivot the retaining clip closed.

    b. Slide the SFP transceiver into the port slot until fully inserted.

12. Reconnect the cable in the same location recorded on the label.

**Verification**

13. Verify that the replacement SFP transceiver has been successfully installed.

   On the port with the replacement SFP transceiver, verify that the Link Status LED is solid green and the Port Speed LED is flashing amber.

14. From the SPOCC interface, verify that the **State** for the component and the storage system are **Normal** (green).

15. After the component replacement, initiate **Check Health** on the storage system.
a. From the SPOCC interface main menu, click Support in the left navigation pane.
b. From the Service Processor - Support page, under StoreServs, click Health Check in the Action column.

16. If significant time is left in the maintenance window, end the Maintenance Mode.

a. From the SPOCC interface main menu, select SPMAINT in the left navigation pane.
b. From the SPMaint interface main menu under Service Processor - SP Maintenance, select StoreServ Configuration Management.
c. Under Service Processor - StoreServ Configuration, select Modify under Action.
d. Under Service Processor - StoreServ Info, select Off for the Maintenance Mode setting.

17. Follow the return instructions provided with the replacement component.

Replacing an SFP transceiver—SP 5.x

This procedure is for the replacement of a small form-factor pluggable (SFP) transceiver using HPE 3PAR Service Processor (SP) 5.x. An SFP transceiver is installed in each onboard Fibre Channel (FC) port and in the ports of host adapters.

⚠️ WARNING: When the storage system is on, do not stare at the FC fibers because doing so could damage your eyes.

⚠️ CAUTION: To prevent damage when handling the SFP transceiver, do not touch the gold contact leads.

⚠️ IMPORTANT: All SFP ports must contain an SFP transceiver and cable or a dust cover.

Prerequisites

Order a replacement component by contacting your Hewlett Packard Enterprise authorized service provider.

Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.
2. Connect to the service processor in the Service Console interface:
   Browse to the IP address: https://<sp_ip_address>:8443
3. Log in to the HPE 3PAR SP and enter the admin account credentials.
4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode and then follow the instructions.
5. Initiate **Check Health** on the storage system.
   a. From the Service Console interface, select **Systems**.
   b. Select **Actions > Check health**.

   A check of the storage system runs to ensure that there are no additional issues.

   **CAUTION:** If health issues are identified during the **Check Health**, resolve these issues before continuing. Refer to the details in the **Check Health** results and review the documentation.

6. Review the information in the email alert notification.

   If the email notifications are enabled, information about the failed port due to the failed SFP transceiver is provided in an email alert notification. The port position in the storage system is provided as Node:Slot:Port (N:S:P).

7. Review the information in the HPE 3PAR Service Console (SC) alert notification.

   An alert notification banner appears that contains the information for the failed port due to the failed SFP. In the alert notification banner, the port position is provided as Node:Slot:Port (N:S:P). To expand the box, click the banner, which shows additional information about the nature of the alert. Click the details link to be taken to the **Activity** view for the appropriate component. You can also view a graphical representation of the components from the **Schematic** view.

8. Locate the failed SFP transceiver.

   To locate the port containing the failed SFP transceiver, use the Node:Slot:Port position. The port has a flashing green Link Status LED and the Port Speed LED is off.

**Removal**

9. Label the cable connected to the failed SFP transceiver with the port location, and then disconnect the cable.

10. Remove the SFP transceiver.

   **CAUTION:** To prevent damage, do not touch the gold contact leads on the SFP transceiver.

   a. On the SFP transceiver, pivot open the retaining clip.
   b. Slide the SFP transceiver out of the port slot.

**Replacement**

11. Install the SFP transceiver.

   **CAUTION:** To prevent damage, do not touch the gold contact leads on the SFP transceiver.
IMPORTANT: If a cable will not be connected to the SFP transceiver, install a dust cover in the SFP transceiver.

- a. On the SFP transceiver, pivot the retaining clip closed.
- b. Slide the SFP transceiver into the port slot until fully inserted.

12. Reconnect the cable in the same location recorded on the label.

Verification

13. Verify that the replacement SFP transceiver has been successfully installed.

   On the port with the replacement SFP transceiver, verify that the Link Status LED is solid green and the Port Speed LED is flashing amber.

14. From the Service Console interface, verify that the State of the component and the storage system are Normal (green).

15. After the component replacement, initiate Check Health on the storage system.

   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

16. If significant time is left in the maintenance window, end the Maintenance Mode.

   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode.
   c. To end the maintenance window associated with the replacement, click X.

      The flow of support information and local notifications of system alerts will be sent to Hewlett Packard Enterprise again.

17. Follow the return instructions provided with the replacement component.

Switch replacement

The Brocade 6510 Switch is a direct-current component supported for the HPE 3PAR StoreServ 8000 Storage system.

WARNING: Since there is a risk of injury from electric shock or high energy levels, only a certified electrician who knows about the procedures, precautions, and hazards associated with direct-current (DC) power should perform the power wiring, cabling, routine maintenance, and service of a storage system installed in a direct-current power environment. Hewlett Packard Enterprise and partner service personnel are not authorized to perform DC power wiring or cabling.

IMPORTANT: The storage system ordered for installation in a direct-current (DC) power environment requires the installation of DC-specific components. Use of components with alternating-current (AC) power in the DC storage system is prohibited.

IMPORTANT: The direct-current components are qualified and supported only with a direct-current HPE 3PAR StoreServ 8000 Storage system running HPE 3PAR OS 3.3.1 and later versions.
When support is needed for the direct-current Brocade 6510 Switch, locate the contact information at the Broadcom website:

www.broadcom.com/

For more information about the Brocade 6510 Switch, see the product page:

www.broadcom.com/products/fibre-channel-networking/switches/6510-switch
Upgrade

Customer self upgrade

**IMPORTANT:** Some Hewlett Packard Enterprise components are not designed for a customer self upgrade (CSU). To satisfy the customer warranty, Hewlett Packard Enterprise requires that an authorized service provider replace such components.

Drive additions

Guidelines for the drive installation

**IMPORTANT:** The guidelines for how the drives are installed, allocated, and balanced are critical to the performance and reliability of your storage system.

- An encrypted storage system, for example any storage system that has the HPE 3PAR Data Encryption license activated or intended to be activated, must have only self-encrypted drives installed.
- A nonencrypted storage system can have a mix of encrypted and nonencrypted drives.
- A pair or pairs identical drives must be installed together and must be of the same capacity, speed, and type. Never install an uneven number of drives of one type within a single enclosure.
- Different drive types can be loaded next to each other in the same enclosure, but load all the drives of one drive type before loading drives of a different drive type.
- For each drive type installed in the array, the following are the minimum recommended initial quantities:
  - For SSD and SAS performance HDDs, the recommended initial quantity is eight drives per pair of controller nodes. The required minimum is six drives per pair of controller nodes.
  - For Nearline HDDs, the recommended initial quantity is 12 drives per pair of controller nodes and is the same for required minimum.
- **NOTE:** Eight drives support RAID 1 and RAID 5. For RAID 6, choose 12 drives.
- RAID 6 is recommended for all drive types, SSDs, and HDDs (both Fast Class and Nearline).
- The minimum number of SSDs for Adaptive Flash Cache (AFC) is two.
- Minimum upgrade quantity is four drives per pair of controller nodes or two drives per enclosure, whichever is larger. The best practice is to run Autonomic Rebalance (also known as tunesys) after adding the drives.
- All controller node enclosures must contain either zero or an even number of the same type of drives (FC, NL, SSD).
- All drive enclosures must contain an even number of drives, with a minimum of two.
• Try to distribute an equal number of drives to all enclosures compatible with the drive type being added. If an equal distribution is not possible, get as close as possible while still following the guidelines for the drives.

• With a four-node configuration, the best practice is to attach the same number and type of drives to each pair of controller nodes.

Small form factor (SFF) configuration

• SFF drives may be loaded into the "Storage Base enclosures", the "Upgrade Node Pair enclosure", and the "2U SAS drive enclosure".

• SFF drives must be loaded in pairs of identical drives, beginning with the leftmost slot, slot 0, and filling to the right, leaving no empty slots between drives.

Large form factor (LFF) configuration

• LFF drives may be loaded into the 4U SAS drive enclosure.

• LFF drives must be loaded in pairs of identical drives starting at the bottom of a column, leaving no empty slots between drives in the column.

• Intermixing SSDs and spinning media in an LFF drive enclosure is allowed as long as each drive type is installed in even pairs in the same column.

• It is permitted to have empty columns between columns containing drives. Different columns do not have to contain the same number of drives.

• An all LFF drive configuration is permitted, leaving the Storage Base enclosure empty.

SFF drive loading and examples

SFF drives are loaded starting at bay 0, left to right, leaving no empty slots between drives. The drive bays are numbered 0 through 23.

Figure 39: Drives bay numbering, SFF drives, SFF enclosure front view

Figure 40: Loading order, SFF drives, SFF enclosure front view
This example demonstrates an SFF enclosure loaded correctly with these drives: two pairs of FC, three pairs of NL, and two pairs of SSD.

Figure 41: Example of a correct SFF drive allocation in one SFF enclosure

This example demonstrates two SFF enclosures loaded correctly with these drives: three pairs of FC (six drives), five pairs of NL (10 drives), and two pairs of SSD (four drives).

Figure 42: Example of a correct SFF drive allocation in two SFF enclosures

⚠️ CAUTION: This example demonstrates an unbalanced allocation due to the NL drives not being installed in even pairs. Avoid having an odd number of drives allocated in the drive enclosures.

Figure 43: Example of an unbalanced SFF drive allocation in two SFF enclosures
LFF drive loading and examples

**IMPORTANT:** Notice that the numbering for the order and direction that drives are installed in the LFF enclosure do not follow the same number order used to identify drives from the storage system management software. Drives are installed in vertical columns instead of by sequential numbering.

LFF drives are loaded starting at bay 0, bottom to top in the leftmost column, then bottom to top in the next column, and so on, leaving no empty slots between drives. Note bay numbering does not follow how the bays are loaded. The bays are numbered left to right, and then the next row up, left to right, and so on, from 0 to 23. The first four LFF drives are loaded into bays 0, 4, 8, and 12.

**Figure 44: Drives bay numbering, LFF drives, LFF enclosure front view**

**Figure 45: Loading order, LFF drives, LFF enclosure front view**

This example demonstrates an LFF enclosure loaded correctly with these drives: three pairs of NL (six drives) and one pair of SSD (two drives).

**Figure 46: Example of a correct LFF drive allocation in one LFF enclosure**
CAUTION: This example demonstrates an unbalanced allocation due to the NL drives being installed across all four columns.

Instead, the correct way to load the drives is loading in the first column before moving to the next column to the right.

Figure 47: Example of an unbalanced LFF drive allocation in one LFF enclosure

Guidelines for a drive addition

This information is for the drives added to an HPE 3PAR StoreServ 8000 Storage system.

• Keep existing drives in the enclosures in their drive-bay slots.
• Add drives following the guidelines for installing, allocating, and balancing.
• Add drives in the next available slots of the enclosure.
• For an upgrade of only SFF drives, install the drives by splitting the drives evenly across all the SFF drive enclosures. If an equal distribution is not possible, get as close as possible while still following the guidelines for the drives.
• For an upgrade of only LFF drives, install the drives by splitting the drives evenly across all the LFF drive enclosures. If an equal distribution is not possible, get as close as possible while still following the guidelines for the drives.
• For an upgrade with a mix of SFF and LFF drives, install the drives by splitting the SFF drives across all the SFF drive enclosures and the LFF drives across all the LFF drive enclosures with as much of an equal distribution as possible between the enclosures. If an equal distribution is not possible, get as close as possible while still following the guidelines for the drives.

Adding drives—SP 4.x

This procedure is for the addition of drives using HPE 3PAR Service Processor (SP) 4.x.
CAUTION:

- To ensure proper thermal control, slot-filler blanks are provided with the enclosures and must be inserted in all unused drive bays in the enclosure. Operate the enclosure only when all drive bays are populated with either a drive or a blank.
- If the storage system is enabled with the Data-at-Rest (DAR) encryption feature, only use Federal Information Processing Standard (FIPS) capable encrypted drives.
- Before installing drives into enclosures, make sure that the enclosures are free of obstructions (such as loose screws, hardware, or debris). Inspect the drives before installing them in the enclosure to make sure that they are not damaged.
- To avoid errors when powering on the storage system, all enclosures must have at least one pair of identical drives installed by following the guidelines for installing, allocating, and balancing drives.

Prerequisites

Determine an installation plan for allocating and loading the drives based on the provided guidelines, number of drives, and types of drives.

Procedure

Preparation

1. Unpack the component and place on an ESD safe mat.
2. Connect to the HPE 3PAR Service Processor.
   Browse to either the IP address or hostname: \https://\sp_ip_address\ or \https://\<hostname>.
3. Log in to the HPE 3PAR Service Processor (SP).
   With the 3parcust account credentials, the Service Processor Onsite Customer Care (SPOCC) interface displays.
4. Initiate Check Health on the storage system.
   a. From the SPOCC interface main menu, click Support in the left navigation pane.
   b. From the Service Processor - Support page, under StoreServes, click Health Check in the Action column.
      A pop-up window displays a status message while the health check runs.
      When running the Health Check using Internet Explorer, the screen might remain blank while information is gathered. This process could take a few minutes before displaying results. Wait for the process to complete and do not attempt to cancel or close the browser.
   c. To review the report, click either Details or View Summary.

   CAUTION: If health issues are identified during the Check Health scan, resolve these issues before continuing. Refer to the details in the Check Health results and contact Hewlett Packard Enterprise Support if necessary.

5. Obtain the current drive count.
   From the SSMC interface, select Storage Systems > Drive Enclosures > Physical Drives.
6. Remove the bezel from the enclosure front.
   a. Unlock the bezel if necessary.
   b. Press the release tab.
   c. Rotate the bezel away from the enclosure left side.
   d. Pull the bezel out from the enclosure right side.

Installation

7. Remove the slot-filler blanks from where you will be installing the pairs of drives.

   IMPORTANT: For proper airflow and cooling, a slot-filler blank must remain installed in all unused drive bays.

8. Install the pair or pairs of drives.
   a. On the drive, press the release button to open the handle.
   b. With the latch handle of the drive fully extended, align and slide the drive into the bay until the handle begins to engage (1).
   c. To seat the drive into the drive bay, close the handle (2).

![Figure 48: Installing an SFF drive](image)

![Figure 49: Installing an LFF drive](image)

Verification
9. Verify that the drives have been admitted and integrated into the storage system. Confirm on the drives that the status LED is solid green.

Within six minutes (depending on the storage system load and the size of the upgrade), the drives will be admitted, integrated, assigned an ID number, and the storage system starts to initialize the chunklets to ready for use. Chunklet initialization can take several hours to complete and the output of the available capacity is displayed.

10. After the component replacement, initiate **Check Health** on the storage system.
   a. From the SPOCC interface main menu, click **Support** in the left navigation pane.
   b. From the **Service Processor - Support** page, under **StoreServs**, click **Health Check** in the **Action** column.

11. Install the bezel on the enclosure front.
   a. Insert the bezel into the enclosure right side.
   b. Press in the release tab.
   c. Insert the bezel into the enclosure left side.
   d. Lock the bezel (optional).

### Adding drives—SP 5.x

This procedure is for the addition of drives using HPE 3PAR Service Processor (SP) 5.x.

⚠️ **CAUTION:**

- To ensure proper thermal control, slot-filler blanks are provided with the enclosures and must be inserted in all unused drive bays in the enclosure. Operate the enclosure only when all drive bays are populated with either a drive or a blank.
- If the storage system is enabled with the Data-at-Rest (DAR) encryption feature, only use Federal Information Processing Standard (FIPS) capable encrypted drives.
- Before installing drives into enclosures, make sure that the enclosures are free of obstructions (such as loose screws, hardware, or debris). Inspect the drives before installing them in the enclosure to make sure that they are not damaged.
- To avoid errors when powering on the storage system, all enclosures must have at least one pair of identical drives installed by following the guidelines for installing, allocating, and balancing drives.

**Prerequisites**

Determine an installation plan for allocating and loading the drives based on the provided guidelines, number of drives, and types of drives.

**Procedure**

**Preparation**

1. Unpack the component and place on an ESD safe mat.
2. Connect to the service processor in the Service Console interface:
Browse to the IP address: https://<sp_ip_address>:8443

3. Log in to the HPE 3PAR SP and enter the admin account credentials.

4. Initiate a maintenance window to stop the flow of alerts to Hewlett Packard Enterprise.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Set maintenance mode and then follow the instructions.

   TIP: When you put the storage system in maintenance mode or edit the maintenance mode, specify the duration in hours and a reason.
   To edit the maintenance window, select Actions > Set maintenance mode and then click the Edit icon next to the maintenance window.

5. Initiate Check Health on the storage system.
   a. From the Service Console interface, select Systems.
   b. Select Actions > Check health.

   A check of the storage system runs to ensure that there are no additional issues.

   CAUTION: If health issues are identified during the Check Health, resolve these issues before continuing. Refer to the details in the Check Health results and review the documentation.

6. Obtain the current drive count.
   From the Service Console interface, select Storage Systems > Physical Drives. At the top, you can see the total number of drives. Scroll down to the bottom of the list to see all the drives installed in your system.
   To see a graphical representation of the current drives, select Storage Systems > Drive Enclosure, and then select Schematic from the View drop-down menu.

7. Remove the bezel from the enclosure front.
   a. Unlock the bezel if necessary.
   b. Press the release tab.
   c. Rotate the bezel away from the enclosure left side.
   d. Pull the bezel out from the enclosure right side.

   Installation

8. Remove the slot-filler blanks from where you will be installing the pairs of drives.

   IMPORTANT: For proper airflow and cooling, a slot-filler blank must remain installed in all unused drive bays.

9. Install the pair or pairs of drives.
a. On the drive, press the release button to open the handle.

b. With the latch handle of the drive fully extended, align and slide the drive into the bay until the handle begins to engage (1).

c. To seat the drive into the drive bay, close the handle (2).

Figure 50: Installing an SFF drive

Figure 51: Installing an LFF drive

Verification

10. From the Service Console interface, verify the installation of the additional drives. The display refreshes periodically, and you will see the newly inserted drives, which are automatically admitted into the storage system.

**IMPORTANT:** The storage system can be used normally, but newly added drive capacity must be initialized before it can be allocated.

Within six minutes (depending on the storage system load and the size of the upgrade), the drives will be assigned an ID number, and the storage system starts to initialize the chunklets to ready for use. Chunklet initialization can take several hours to complete and the output of the available capacity is displayed. Once the drives are admitted, notice at the top of the list that your drive count has increased appropriately. Scroll down to the bottom of the list to see all the drives installed in your system.

11. Initiate **Check Health** on the storage system.
a. From the Service Console interface, select **Systems**.

b. Select **Actions > Check health**.

A check of the storage system runs to ensure that there are no additional issues.

⚠️ **CAUTION:** If health issues are identified during the **Check Health**, resolve these issues before continuing. Refer to the details in the **Check Health** results and review the documentation.

12. Install the bezel on the enclosure front.

   a. Insert the bezel into the enclosure right side.
   
   b. Press in the release tab.
   
   c. Insert the bezel into the enclosure left side.
   
   d. Lock the bezel (optional).
More information

About the software on a virtual service processor or physical service processor

The service processor (SP) is available as either a physical SP or a virtual SP. The HPE 3PAR Service Processor software is designed to provide remote error detection and reporting and to support diagnostic and maintenance activities involving the storage systems. The service processor is composed of a Linux OS and the HPE 3PAR Service Processor software, and it exists as a single undivided entity.

- **Physical service processor:** The physical SP is a hardware device mounted in the system rack. If the customer chooses a physical SP, each storage system installed at the operating site includes a physical SP installed in the same rack as the controller nodes. A physical SP uses two physical network connections:
  - The Management (MGMT) port requires a connection from the customer network to communicate with the storage system.
  - The Service port is for maintenance purposes only and is not connected to the customer network.

- **Virtual service processor:** The virtual SP software is provided in an Open Virtual Format (OVF) for VMware vSphere hypervisor and self-extractable Virtual Hard Disk (VHD) package for Microsoft Hyper-V.

HPE 3PAR Service Processor documentation

For more information about the HPE 3PAR SP, see the HPE 3PAR Service Processor Software User Guide available at the Hewlett Packard Enterprise Information Library Storage website:

www.hpe.com/info/storage/docs

Connection methods for the HPE 3PAR Service Processor

Use one of the following methods to establish a connection to the HPE 3PAR Service Processor (SP).

- **Web browser connection**—Use a standard web browser and browse to the SP.
  - With SP 4.x: https://<hostname> or https://<sp_ip_address>
  - With SP 5.x: https://<sp_ip_address>:8443

- **Secure Shell (SSH) connection**—Use a terminal emulator application to establish a Secure Shell (SSH) session connection from a host, laptop, or other computer connected on the same network, and then connect to the HPE 3PAR Service Processor (SP) IP address or hostname.

- **Laptop connection**—Connect the laptop to the physical SP with an Ethernet connection (LAN).

**IMPORTANT:** If firewall permissive mode for the service processor (SP) is disabled, you must add firewall rules to allow access to port 8443 or add the hosts to the firewall. By default, permissive mode is enabled for the firewall. To add rules using the Service Console (SC) interface (SP 5.x) or the Service Processor Onsite Customer Care (SPOCC) interface (SP 4.x), you must first enable permissive mode through the Text-Based User interface (SP 5.x) or SPMaint interface (SP 4.x). After adding the rules, you can then use the interface to disable permissive mode again.
Connecting to HPE 3PAR Service Processor 5.x from a web browser

Procedure
1. Browse to the HPE 3PAR Service Processor (SP) IP address https://<sp_ip_address>:8443.
2. Enter the account credentials and click Login.

Connecting to the HPE 3PAR Service Processor 4.x from a web browser

Procedure
1. Browse to the HPE 3PAR Service Processor (SP) 4.x IP address or hostname https://<sp_ip_address> and press Enter.
2. Enter the account credentials and click OK.

Connecting to the Linux console of the HPE 3PAR Service Processor through a Secure Shell session

Procedure
1. Initiate a Secure Shell (SSH) session from a host, laptop, or other computer connected on the same network, and then connect to the HPE 3PAR Service Processor (SP) IP address or hostname.
2. Log in to the HPE 3PAR SP software.

Connecting to the Linux console of the HPE 3PAR Service Processor through a VMware vSphere Client

Procedure
1. From a VMware vSphere client, connect to the Linux console of the HPE 3PAR Service Processor (SP).
2. Log in to the HPE 3PAR SP software.

Connecting a service laptop to the physical HPE 3PAR Service Processor through the service port

Procedure
1. Connect an Ethernet cable between the service port on the physical service processor and an Ethernet port on a service laptop.
2. Temporarily configure the LAN connection of the laptop as follows:
   a. IP Address: 10.255.155.49
   b. Subnet mask: 255.255.255.248
3. Log in to the HPE 3PAR Service Processor software. In a browser window, enter: https://10.255.155.54:8443/.
Interfaces for the HPE 3PAR Service Processor software

Interfaces with HPE 3PAR Service Processor software 5.x

**IMPORTANT:** HPE 3PAR SP 5.x requires HPE 3PAR OS 3.3.1 and later versions.

- **Service Console (SC) interface:** The Service Console interface is accessed when you log in to the HPE 3PAR SP. The interface collects data from the managed HPE 3PAR StoreServ Storage system in predefined intervals as well as an on-demand basis. The data is sent to HPE 3PAR Remote Support, if configured. The Service Console interface also enables service functions to be performed by a company administrator, Hewlett Packard Enterprise Support, or an authorized service provider. The Service Console interface replaces the Service Processor Onsite Customer Care (SPOCC) interface and the Service Console interface functionality is similar to SPOCC interface.

- **Text-based User Interface (TUI):** The TUI is a utility on an SP running SP 5.x software. The TUI enables limited configuration and management of the HPE 3PAR SP and access to the HPE 3PAR CLI for the attached storage system. The intent of the TUI is not to duplicate the functionality of the Service Console interface, but to allow a way to fix problems that may prevent you from using the Service Console interface. The TUI appears the first time you log in to the Linux console through a terminal emulator using Secure Shell (SSH). Prior to the HPE 3PAR SP initialization, you can log in to the TUI with the `admin` user name and no password. To access the TUI after the HPE 3PAR SP has been initialized, log in to the console with the `admin`, `hpepartner`, or `hpesupport` accounts and credentials set during the initialization.

Interfaces with HPE 3PAR Service Processor software 4.x

**IMPORTANT:** HPE 3PAR SP 4.x requires HPE 3PAR OS 3.2.2.

- **Service Processor Onsite Customer Care (SPOCC):** The SPOCC interface is accessed when you log in to the HPE 3PAR SP and is a web-based GUI (GUI) that is available for support of the HPE 3PAR StoreServ Storage system and its HPE 3PAR SP. The SPOCC interface is the web-based alternative to accessing most of the features and functionality that are available through the SPMaint.

- **SPMaint interface:** The SPMaint interface is for the support (configuration and maintenance) of both the storage system and its HPE 3PAR SP. Use SPMaint as a backup method for accessing the HPE 3PAR SP. The SPOCC is the preferred access method. An SPMaint session can be started either from the menu option in SPOCC, through a connection to the HPE 3PAR SP through a Secure Shell (SSH), or logging in to the Linux console; however, only one SPMaint session is allowed at a time.

**CAUTION:** Many of the features and functions that are available through SPMaint can adversely affect a running system. To prevent potential damage to the system and irrecoverable loss of data, do not attempt the procedures described in this manual until you have taken all necessary safeguards.

- **CPMAINT interface:** The CPMAINT terminal user interface is the primary user interface for the support of the HPE 3PAR Secure Service Agent as well as a management interface for the HPE 3PAR Policy Server and Collector Server.
Accessing the SP 5.x Service Console interface

Procedure

1. From a web browser, enter the HPE 3PAR Service Processor (SP) 5.x IP address https://<sp_ip_address>:8443.
2. Enter the account credentials and then click Login to gain access to the Service Console (SC) interface.

Accessing the SP 5.x Text-Based User Interface

Procedure

1. Connect to the HPE 3PAR Service Processor (SP) 5.x Linux console.
2. Log in to gain access to the Text-Based User Interface (TUI).

Accessing the Service Processor Onsite Customer Care interface—SP 4.x

Procedure

1. Browse to the HPE 3PAR Service Processor (SP) 4.x IP address or host name https://<sp_ip_address> and then press Enter.
2. Enter the account credentials and then click OK.
3. Log in to gain access to the Service Processor Onsite Customer Care (SPOCC) interface.

Accessing the SP 4.x SPMaint interface directly

Procedure

1. Connect to the HPE 3PAR Service Processor (SP) 4.x Linux console.
2. Log in to gain access to the HPE 3PAR SPMaint main menu, HPE 3PAR Service Processor Menu.

Accessing the CLI session from the Service Console interface, HPE 3PAR Service Processor 5.x

The Service Console (SC) interface of the HPE 3PAR Service Processor (SP) 5.x provides a CLI session only for issuing noninteractive HPE 3PAR CLI commands.

Procedure

1. From a web browser, enter the HPE 3PAR Service Processor (SP) 5.x IP address https://<sp_ip_address>:8443.
2. Enter the account credentials and then click Login to gain access to the Service Console (SC) interface.
3. Access the CLI interface.
a. From the Service Console interface, select Systems.
b. On the Actions menu, select Start CLI session.

Accessing the interactive CLI interface from the Text-Based User Interface, HPE 3PAR Service Processor 5.x

The Text-based User Interface (TUI) of the HPE 3PAR Service Processor (SP) 5.x provides an interactive CLI interface for issuing HPE 3PAR CLI commands.

Procedure

1. Connect to the HPE 3PAR SP 5.x Linux console.
2. Log in to gain access to the Text-Based User Interface (TUI).

   IMPORTANT: When logging in using the admin or hpepartner accounts, a customer-supplied user ID and password must be obtained for the storage system. The hpesupport account requires a strong password to gain access to the SP, but no user ID or password is needed to access the storage system from the SP.

3. Access the interactive CLI interface from the TUI main menu.
   a. Enter the number for Interactive CLI / Maintenance Mode.
   b. Enter the number for Open interactive CLI.

Accessing the CLI session from the Service Processor Onsite Customer Care interface, HPE 3PAR Service Processor 4.x

The Service Processor Onsite Customer Care (SPOCC) interface of the HPE 3PAR Service Processor (SP) 4.x provides a CLI session only for issuing noninteractive HPE 3PAR CLI commands.

Procedure

1. Browse to the HPE 3PAR Service Processor (SP) 4.x IP address or hostname https://<sp_ip_address>, and then press Enter.
2. Enter the account credentials, and then click Ok.
3. Access the CLI interface.
   a. From the left side of the Service Processor Onsite Customer Care (SPOCC) interface home page, click Support.
   b. From the Service Processor - Support page, under Service Processor, click SPMAINT on the Web in the Action column.
   c. From the 3PAR Service Processor Menu, enter the menu option for Execute a CLI command, and then select the storage system.
Accessing the interactive CLI interface from the SPMaint interface, HPE 3PAR Service Processor 4.x

The SPMaint interface of the HPE 3PAR Service Processor (SP) 4.x provides an HPE 3PAR interactive CLI interface for issuing HPE 3PAR CLI commands.

Procedure

1. Connect to the HPE 3PAR SP 4.x Linux console.
2. Log in to gain access to the SPMaint interface.
3. Access the interactive CLI interface.

From the SPMaint main menu, enter the menu option for CLI for a StoreServ.

Network and firewall support access

Before performing the service processor (SP) connection setup, ensure that there are no customer firewall restrictions to the existing HP servers and the new HPE servers on port 443. Firewall and proxy server configuration must be updated to enable outbound connections from the service processor to the existing HP servers and the new HPE servers.

For a list of HP and HPE server host names and IP addresses, see Firewall and proxy server configuration on page 73.

Firewall and proxy server configuration

Firewall and proxy server configuration must be updated on the customer network to enable outbound connections from the service processor to the existing HP servers and the new HPE servers.

HP and HPE server host names and IP addresses

- HPE Remote Support Connectivity Collector Servers:
  - https://storage-support.glb.itcs.hpe.com (16.248.72.63)
  - https://storage-support2.itcs.hpe.com (16.250.72.82)

- HPE Remote Support Connectivity Global Access Servers:
  - https://c4t18808.itcs.hpe.com (16.249.3.18)
  - https://c4t18809.itcs.hpe.com (16.249.3.14)
  - https://c9t18806.itcs.hpe.com (16.251.3.82)
  - https://c9t18807.itcs.hpe.com (16.251.4.224)

- HP Remote Support Connectivity Global Access Servers:
  - https://g4t2481g.houston.hp.com (15.201.200.205)
  - https://g4t2482g.houston.hp.com (15.201.200.206)
  - https://g9t1615g.houston.hp.com (15.240.0.73)
  - https://g9t1616g.houston hp.com (15.240.0.74)

- HPE RDA Midway Servers:
• **HPE InfoSight Servers:**
  - https://sfrm-production-llb-austin1.itcs.hpe.com (16.252.64.51)
  - https://infosight1.itcs.hpe.com (16.248.65.16)

• For communication between the service processor and the HPE 3PAR StoreServ Storage system, the customer network must allow access to the following ports on the storage system.
  - Port 22 (SSH)
  - Port 5781 (Event Monitor)
  - Port 5783 (CLI)

• For communication between the browser and the service processor, the customer network must enable access to port 8443 on the SP.

• For communication between the vCenter instance and the service processor, the customer network must enable access to port 443 (default port) on the SP and vCenter server.

### About the HPE 3PAR StoreServ Management Console

The HPE 3PAR StoreServ Management Console (SSMC) provides browser-based consoles (interfaces) for monitoring an HPE 3PAR StoreServ Storage system. The HPE 3PAR SSMC procedures in this guide assume that the storage system to be serviced has already been added to the HPE 3PAR SSMC and is available for management through logging in to the HPE 3PAR SSMC Main Console. If that is not the case, you must first add the storage system to the HPE 3PAR SSMC by logging in to the HPE 3PAR SSMC Administrator Console.
HPE 3PAR SSMC guidelines

- The HPE 3PAR SSMC must **not** be installed on the HPE 3PAR Service Processor (SP) or a storage system running a virtual SP, and instead the HPE 3PAR SSMC must be installed on a separate customer system running Linux or Windows OSs.
- The HPE 3PAR SSMC must be run locally from the storage system on which it is installed.

HPE 3PAR SSMC documentation

The following documents are available at the Hewlett Packard Enterprise Information Library Storage website:

[www.hpe.com/info/storage/docs](http://www.hpe.com/info/storage/docs)

- The *HPE 3PAR StoreServ Management Console Release Notes* provide OS-dependent details.
- The *HPE 3PAR StoreServ Management Console Administrator Guide* provides information on planning, installing, and configuring HPE 3PAR SSMC server instances.
- The *HPE 3PAR StoreServ Management Console User Guide* and the *HPE 3PAR StoreServ Management Console Online Help* provide information for managing a storage system after installing an HPE 3PAR SSMC server instance.

HPE 3PAR StoreServ Management Console connection

To establish a connection to the HPE 3PAR StoreServ Management Console (SSMC), use a standard web browser and browse to the address `https://<localhost>:8443`.

HPE 3PAR StoreServ Management Console interfaces

Interfaces for the HPE 3PAR StoreServ Management Console (SSMC):

- **Main Console** (SSMC console)—Manage a storage system.
- **Administrator Console** (Admin console)—Add, edit, connect, disconnect, and remove a storage system; accept certificates, and view connected and disconnected systems.

About the HPE InfoSight platform

**Overview**

HPE InfoSight is a cloud-based predictive analytics platform that can be used with your HPE 3PAR StoreServ Storage system for planning, managing, monitoring, and troubleshooting.

The HPE InfoSight web portal is available at [infosight.hpe.com](http://infosight.hpe.com).

**IMPORTANT:** HPE InfoSight replaces HPE StoreFront Remote (SFRM).

The SFRM functionality has been embedded in HPE InfoSight.

**Registration of a storage system with InfoSight**

The registration process validates ownership of the HPE 3PAR StoreServ Storage system and makes the system data available to those who are authorized.

Systems that are registered with HPE InfoSight must be added to a system group, and then users in the organization can be added to the system group. Typically, a single system group is all that is necessary to manage multiple systems through the process of assigning users and setting their roles and permissions for the system group.
Registration token for a system group

Each system group has a unique HPE InfoSight registration token provided from the **Register Systems** page. This token is used to register the HPE 3PAR StoreServ Storage system to a specific system group by adding the token to the software for the HPE 3PAR StoreServ Storage system.

Accessing the HPE InfoSight platform and registering the storage system: Process overview

For accessing the HPE InfoSight cloud-based predictive analytics platform and registering the HPE 3PAR StoreServ Storage system, complete the following process:

**Procedure**

1. Go to the `infosight.hpe.com` web portal and log in with an HPE Passport account.

   Hewlett Packard Enterprise recommends using the Google Chrome browser to access the HPE InfoSight web portal.

   • If you created an HPE Passport account to access HPE StoreFront Remote (SFRM), this account is supported with HPE InfoSight.

   • If you must create an account, complete [Creating an account to access the HPE InfoSight web portal](#) on page 76.

2. Complete [Registering the storage system with the HPE InfoSight web portal using the HPE 3PAR StoreServ Management Console](#) on page 76

Creating an account to access the HPE InfoSight web portal

This procedure is for creating an HPE Passport account to access the HPE InfoSight web portal.

**IMPORTANT:** To gain access to the HPE InfoSight web portal, Hewlett Packard Enterprise recommends the Google Chrome browser.

**Procedure**

1. Connect to the HPE InfoSight web portal: `infosight.hpe.com`

2. To create an HPE Passport account, click **Create Account**.

3. To complete the process, follow the online instructions.

Registering the storage system with the HPE InfoSight web portal using the HPE 3PAR StoreServ Management Console

This procedure is for registering an HPE 3PAR StoreServ Storage system with HPE InfoSight using the HPE 3PAR StoreServ Management Console (SSMC).

**IMPORTANT:** To gain access to the HPE InfoSight web portal, Hewlett Packard Enterprise recommends the Google Chrome browser.

**TIP:** For additional information about the features of the HPE InfoSight web portal, located the question mark (?) icons throughout the portal to access context-specific help content.

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76 More information
Prerequisites
From the HPE 3PAR Service Processor (SP) software in the Support settings, verify that the Send support data to HPE option (call-home feature) is enabled.

For more information about the HPE 3PAR Service Processor software settings, see the HPE 3PAR Service Processor Software 5.0.x User Guide available at the Hewlett Packard Enterprise Information Library website:
www.hpe.com/info/storage/docs

Procedure
1. Connect to the HPE InfoSight web portal: infosight.hpe.com
2. Log in using the credentials for your HPE Passport account.
3. Select Register Systems from the settings menu (gear icon).
4. From the Register Systems page, select a previously created system group or create a system group, and then click I Accept to agree you are registering one or more systems that you own or administer.
   To create a system group, select the Create New Group option from the drop-down menu.
5. Copy the generated registration token to your clipboard by clicking the clipboard button located to the left of the field containing the token.
   This token is text beginning with StoreFrontRemoteAccess and will be pasted into a Token field in the Main Console interface.
6. From the server on which the HPE 3PAR SSMC software is installed, access the Main Console:
   a. Browse to https://<IP address or FQDN>:8443.
      TIP: The default port number is 8443. Another port might have been assigned during installation of the software.
      The login screen opens.
   b. Enter a user name and password, make sure the check box for Administrator Console is clear, and then click Login.
      The Dashboard screen is displayed.
7. From the Main Console interface dashboard, complete the following steps:
   a. From the main menu under Storage Systems, click Systems.
   b. Select the storage system from the list pane view.
   c. From the detail pane view for that system, hover over the General detail area, and then click the edit icon (edit) that appears near the panel name.
   d. Scroll down to the Descriptors section, and then paste the token in the Comments field.

With this token added, the next time the storage system calls home, StoreFront Remote will see the storage system and associate it with the corresponding group. This process can take 24–48 hours.
Removing a storage system from the HPE InfoSight platform

This procedure is for removing an HPE 3PAR StoreServ Storage system from the HPE InfoSight platform. A storage system may need to be removed from a System Group or from all System Groups in HPE InfoSight. Typically a storage system is removed from a System Group using the method of removing the HPE InfoSight registration token from the storage system software. However, this method is inconvenient if the storage system is decommissioned or inaccessible. An alternative method is to blacklist the device using the HPE InfoSight web portal, which removes the storage system from a selected System Group.

Procedure

1. Connect to the HPE InfoSight web portal: [Infosight.hpe.com](https://infosight.hpe.com)
   
   Only an owner of the system can view and edit the blacklist.

   
   Adding a storage system to the blacklist can take up to 48 hours.

Accounts and credentials for service

**IMPORTANT:** There are separate accounts for access to the storage system or the service processor. The account options and type of password vary based on the version of the software installed for the storage system and the version of the software installed on the service processor.

- **Beginning with HPE 3PAR SP 5.x for the service processor,** time-based or encryption-based passwords are implemented for the support accounts used with the SP.
- **Beginning with HPE 3PAR OS 3.2.2 for the storage system,** time-based or encryption-based passwords are implemented for the support accounts used with the storage system.

**Time-based password (strong password)**

With the time-based password option, the Hewlett Packard Enterprise support person or authorized service provider can acquire the account password when needed without the involvement of the administrator. The time-based password is generated using strong cryptographic algorithms and large key sizes; it is valid for 60 minutes and automatically regenerated at the start of each hour.

During the service, upgrade, or diagnostic procedure, the account password remains active until you log out of the account, even if you exceed 60 minutes. During the procedure, if it is necessary to log out and then log back in to the account (for example, closing the session or rebooting a controller node), do one of the following:

- If within the same hour, use the same password.
- If a new hour has started, obtain a newly generated password.

**Encryption-based password (strong password)**

With the encryption-based (ciphertext) password option, the administrator initiates the generation or regeneration of account ciphertext that is copied and provided to the authorized service provider. The authorized service provider decrypts the ciphertext to obtain the account password that they will use for the service, upgrade, or diagnostic procedure. The password does not expire. After the service, upgrade, or diagnostic procedure is completed, the administrator may regenerate a new ciphertext to make the
current password invalid. Only the administrator initiates the generation or regeneration of the account ciphertext for a new password.

HPE 3PAR Service Processor accounts for service

For access to the HPE 3PAR Service Processor (SP) interfaces, there are the following account options for the administrator or for Hewlett Packard Enterprise support personnel and authorized service providers. Based on the account, there are differences in the access it provides to the HPE 3PAR SP interfaces, the type of password options, and the permissions associated with the account.

Interfaces for HPE 3PAR SP 5.x
- HPE 3PAR Service Console (SC) interface
- HPE 3PAR Text-based User Interface (TUI)

Interfaces for HPE 3PAR SP 4.x
- HPE 3PAR Service Processor Onsite Customer Care (SPOCC) interface
- HPE 3PAR SPMaint utility (SPMaint)
- HPE 3PAR CPMaint utility (CPMaint)

Table 1: Accounts for HPE 3PAR SP 5.x

<table>
<thead>
<tr>
<th>Account</th>
<th>Password options</th>
<th>Interface access</th>
<th>Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>Static password</td>
<td>• SC through a web browser&lt;br&gt;• TUI through a physical or virtual console&lt;br&gt;• TUI through SSH</td>
<td>• Only the administrator&lt;br&gt;• Default account&lt;br&gt;• Can create new local SP users</td>
</tr>
<tr>
<td>hpepartner</td>
<td>Static password&lt;br&gt;Administrator sets/changes</td>
<td>• SC through a web browser&lt;br&gt;• TUI through a physical or virtual console&lt;br&gt;• TUI through SSH</td>
<td>• Only authorized service providers&lt;br&gt;• Service and diagnostic functions</td>
</tr>
</tbody>
</table>

Table Continued
<table>
<thead>
<tr>
<th>Account</th>
<th>Password options</th>
<th>Interface access</th>
<th>Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>hpesupport</td>
<td>Time-based or encryption-based password</td>
<td>- SC through a web browser</td>
<td>- Only Hewlett Packard Enterprise support</td>
</tr>
<tr>
<td></td>
<td>• Administrator sets the password option through the SC or TUI</td>
<td>- TUI and Linux Shell through a physical or virtual console</td>
<td>- service and diagnostic functions</td>
</tr>
<tr>
<td></td>
<td>• For encryption-based password, administrator regenerates ciphertext (blob) through the SC or TUI</td>
<td>- TUI and Linux Shell through SSH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Authorized service provider obtains the ciphertext (blob) from the administrator and retrieves the password through the StoreFront Remote</td>
<td></td>
<td></td>
</tr>
<tr>
<td>root</td>
<td>Time-based or encryption-based password</td>
<td>SP Linux shell</td>
<td>- Only Hewlett Packard Enterprise support and authorized service providers</td>
</tr>
<tr>
<td></td>
<td>• Administrator sets the password option through the SC or TUI</td>
<td></td>
<td>- Service and diagnostic functions</td>
</tr>
<tr>
<td></td>
<td>• For encryption-based password, administrator regenerates ciphertext (blob) through the SC or TUI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Authorized service provider obtains the ciphertext (blob) from the administrator and retrieves the password through the StoreFront Remote</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 2: Accounts for HPE 3PAR SP 4.x

<table>
<thead>
<tr>
<th>Account</th>
<th>Password options</th>
<th>Interface access</th>
<th>Permissions</th>
</tr>
</thead>
</table>
| 3parcust | Static password | • SPOCC through a web browser  
                  • SPMaint through a physical or virtual console  
                  • SPMaint through SSH | • Only the administrator  
                  • Default account  
                  • Can create new local SP users |
| cpmaint | Static password | • SP Linux shell  
                  • CPMaint | • Only the administrator  
                  • Administrative Secure Service Agent (SSA) functions |
| spvar | Static password | • SPOCC through a web browser  
                  • SPMaint through a physical or virtual console  
                  • SPMaint through SSH | • Only Hewlett Packard Enterprise personnel and authorized service providers  
                  • Service and diagnostic functions |
| spdood | Static password | • SPOCC through a web browser  
                  • SPMaint through a physical or virtual console  
                  • SPMaint through SSH | • Only Hewlett Packard Enterprise support  
                  • Service and diagnostic functions |
| root | Static password | SP Linux shell | • Only Hewlett Packard Enterprise support and authorized service providers  
                  • Service and diagnostic functions |

### Setting time-based or encryption-based password option from the Service Console interface of the HPE 3PAR Service Processor 5.x

**Procedure**

1. Connect and log in to the HPE 3PAR Service Processor (SP) 5.x.
2. From the Service Console interface main menu, select **Service Processor**, and then select **Actions > HPE Support password**
3. Select **Time based password** or **Encryption based password**.
4. Click **Apply**.
Generating the encryption-based ciphertext from the Service Console interface of the HPE 3PAR Service Processor 5.x

In advance or at the time of a support session, the administrator can generate the ciphertext (blob) and provide it to Hewlett Packard Enterprise support to be deciphered. Before or upon arriving at the site, the approved service provider can obtain the password from Hewlett Packard Enterprise support over the phone, text message, or email.

**Procedure**

1. Connect and log in to the HPE 3PAR Service Processor (SP) 5.x.
2. From the Service Console interface main menu, select **Service Processor**, and then select **Actions** > **HPE Support password**.
3. Select **Encryption based password**.
4. Click **Apply**.

The ciphertext is displayed.

5. Copy and paste that ciphertext into an email, text message, or into an encrypted zip file and send to Hewlett Packard Enterprise support.

The ciphertext is safe to email, because the random credential contained in the ciphertext is first encrypted and then wrapped using a public key. Only Hewlett Packard Enterprise can unwrap the encrypted credential using the corresponding private key.

Setting time-based or encryption-based password option from the Text-Based User Interface of the HPE 3PAR Service Processor 5.x

**Procedure**

1. Connect and log in to the HPE 3PAR Service Processor (SP) 5.x.
2. From the Text-Based User Interface (TUI) main menu, enter the menu option for **Secure Password Management**.

The current mode is displayed after **Current password mode**: as either **TIME** or **ENCRYPT**.

3. Enter the menu option for **Change password mode to <TIME or ENCRYPT>**.
Generating the encryption-based ciphertext from the Text-Based User Interface of the HPE 3PAR Service Processor 5.x

Procedure

1. Connect and log in to the HPE 3PAR Service Processor (SP) 5.x.
2. From the Text-Based User Interface (TUI) main menu, enter 5 for `Secure Password Management`.
   
   The current mode is displayed as:
   
   **Current password mode:** ENCRYPT

3. Enter either 2 for `Display password blob for root` or enter 3 for `Display password blob for hpesupport`.
   
   The ciphertext (blob) is displayed.

4. Copy the entire ciphertext and paste it into an email to Hewlett Packard Enterprise support or to the approved service provider. The ciphertext is safe to email, because the random credential contained in the ciphertext is first encrypted and then wrapped using a public key. Only Hewlett Packard Enterprise can unwrap the encrypted credential using the corresponding private key.

   **When copying the ciphertext, copy the text starting with:**
   
   - - - Begin tpd blob - -
   
   **and all the text ending with:**
   
   - - - End tpd blob - -

HPE 3PAR StoreServ Storage system accounts for service

For access to the HPE 3PAR StoreServ Storage system interfaces, there are the following account options for the administrator or for Hewlett Packard Enterprise support personnel and authorized service...
providers. Based on the account, there are differences in the access it provides to the storage system interfaces, the type of password options, and the permissions associated with the account.

Table 3: HPE 3PAR StoreServ Storage system accounts with HPE 3PAR OS 3.3.1 and 3.2.2

<table>
<thead>
<tr>
<th>Account</th>
<th>PW options</th>
<th>Interface access</th>
<th>Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>3paradm</td>
<td>Static password</td>
<td>• Main console</td>
<td>• Only the administrator</td>
</tr>
<tr>
<td></td>
<td>Administrator sets/changes through the Administrator console</td>
<td>• Administrator console</td>
<td>• Create new CLI user accounts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interactive CLI</td>
<td>• Service and diagnostic functions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Super rights</td>
</tr>
<tr>
<td>console</td>
<td>Time-based or encrypted-based password</td>
<td>• Main console</td>
<td>• Only Hewlett Packard Enterprise support and authorized service providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Administrator console</td>
<td>• Service and diagnostic functions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>root</td>
<td>Time-based or encrypted-based password</td>
<td>Linux Shell on the storage system</td>
<td>• Only Hewlett Packard Enterprise support and authorized service providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Service and diagnostic functions</td>
</tr>
</tbody>
</table>

Setting time-based or encryption-based password option for a storage system account

Procedure

1. Connect and log in to the HPE 3PAR Service Processor (SP) and access the interactive CLI interface.
2. Query the current mode by using the HPE 3PAR CLI `controlrecoveryauth status` command.
3. To change the mode, use the `controlrecoveryauth setmethod <totp|ciphertext>` command, where `<totp|ciphertext>` is either `totp` or `ciphertext`. 
Generating the encryption-based ciphertext for a storage system account

In advance or at the time of a support session, the administrator can generate the ciphertext (blob) and provide it to Hewlett Packard Enterprise support to be deciphered. Before or upon arriving at the site, the approved service provider can obtain the password from Hewlett Packard Enterprise support over the phone, text message, or email.

Procedure

1. Connect and log in to the HPE 3PAR Service Processor (SP) and access the interactive CLI interface.

2. To generate a ciphertext, initiate the HPE 3PAR CLI `controlrecoveryauth ciphertext <user>` command, where `<user>` is either `root` or `console`.

3. Copy and paste that ciphertext into an email, text message, or into an encrypted zip file and send to Hewlett Packard Enterprise support.

   The ciphertext is safe to email, because the random credential contained in the ciphertext is first encrypted and then wrapped using a public key. Only Hewlett Packard Enterprise support can unwrap the encrypted credential using the corresponding private key.

Regenerating the encryption-based ciphertext for a storage system account

Procedure

1. Connect and log in to the HPE 3PAR Service Processor (SP) and access the interactive CLI interface.

2. To regenerate a ciphertext, initiate the HPE 3PAR CLI `controlrecoveryauth rollcred <user>` command, where `<user>` is either `root` or `console`.

3. Copy and paste that ciphertext into an email to Hewlett Packard Enterprise support or to the approved service provider.

   The ciphertext is safe to email, because the random credential contained in the ciphertext is first encrypted and then wrapped using a public key. Only Hewlett Packard Enterprise can unwrap the encrypted credential using the corresponding private key.

Alert notifications for the storage system—SP 5.x

When a component is in a degraded or failed state, notification of the issue is provided in the following ways:

- Email notification from service processor (SP) if enabled

  During the service processor setup, the Send email notification of system alerts option was either enabled or disabled. If enabled, the service processor can send email notifications of alerts from systems to contacts. The Contacts page allows you to manage system support contacts (for Hewlett Packard Enterprise to contact about issues with the system) and local notification contacts (to receive email notifications). The Service Console also allows for the creation of local notification rules for suppression and disclosure of specific alerts for contacts. The email might include a Corrective Action for the failure and the spare part number for the failed part. The spare part number is used to order a replacement part.

- Alert banner or a health alert on the dashboard of the HPE 3PAR StoreServ Management Console (SSMC)

- Alert banner or a health alert in the Service Console interface for the HPE 3PAR Service Processor

- LED on the component indicating a fault
Browser warning when connecting to the service processor

Symptom
When connecting to your service processor (SP) IP address, you might receive a warning from your browser that there is a problem with the security certificate or that the connection is not private.

Solution 1

Cause
Warning message in Internet Explorer browser.

Action
Click **Continue to this website (not recommended)**.

![Warning message in Internet Explorer browser](image)

Solution 2

Cause
Warning message in Google Chrome browser.

Action
1. Click the **Advanced** link.
2. Click Proceed to <sp_ip_address> (unsafe).

Solution 3

 Cause
Warning message in Mozilla Firefox browser.

 Action
1. Click Advanced.
2. Click **Add Exception**.

3. (Optional) To remove the warning for this site in the future, select **Permanently store this exception** in the **Add Security Exception** dialog.
4. In the Add Security Exception dialog, click Confirm Security Exception.

Component information

- The illustrations of components are examples only and might not accurately represent the configuration of your HPE 3PAR StoreServ Storage system.

- Due to the large number of prospective configurations, component placement and internal cabling have been standardized to simplify installation and maintenance. The components are placed in the rack and then numbered according to their order and location in the rack.

Adapters information (optional component)

The types of host PCIe adapters available are dependent on the model and configuration of the HPE 3PAR StoreServ 8000 Storage system. The host PCIe adapters are optional for the HPE 3PAR StoreServ 8000 Storage system.

**IMPORTANT:** Only an Hewlett Packard Enterprise authorized service provider is permitted to install the adapters.

Four-Port 16 Gb FC Host PCIe Adapter information

This information applies only to the HPE 3PAR Four-Port 16Gb FC Host Bus Adapter for the HPE 3PAR StoreServ 8000 Storage systems.

Use 16 Gb SFP+ transceiver connectors with the ports.
Table 4: HPE 3PAR Four-Port 16Gb FC Host Bus Adapter ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N:2:1</td>
</tr>
<tr>
<td>2</td>
<td>N:2:2</td>
</tr>
<tr>
<td>3</td>
<td>N:2:3</td>
</tr>
<tr>
<td>4</td>
<td>N:2:4</td>
</tr>
</tbody>
</table>

Two-Port 10 Gb iSCSI/FCoE CNA Host PCIe Adapter information

This information applies only to the HPE 3PAR Two-Port 10Gb iSCSI/FCoE Converged Network Adapter for the HPE 3PAR StoreServ 8000 Storage systems.

**IMPORTANT:** For the HPE 3PAR Two-Port 10Gb iSCSI/FCoE Converged Network Adapter, some of the adapters have the faceplate labeling reversed, with the port on the left identified as port 2, when oriented as in the following illustration. This illustration shows the corrected label with port 1 on the left.

Use SFP+ transceiver connectors with the ports.

Table 5: HPE 3PAR Two-Port 10Gb iSCSI/FCoE Converged Network Adapter ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N:2:1</td>
</tr>
<tr>
<td>2</td>
<td>N:2:2</td>
</tr>
</tbody>
</table>
Two-Port 10 GbE NIC Host PCIe Adapter information

This information applies only to the HPE 3PAR Two-Port 10Gb Ethernet NIC Adapter for the HPE 3PAR StoreServ 8000 Storage systems.

IMPORTANT: For the HPE 3PAR Two-Port 10Gb Ethernet NIC Adapter, some of the adapters have the faceplate labeling reversed, with the port on the left identified as port 2, when oriented as in the following illustration. This illustration shows the corrected label with port 1 on the left.

Use SFP+ transceiver connectors with the ports.

![Figure 54: HPE 3PAR Two-Port 10Gb Ethernet NIC Adapter ports](image)

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N:2:1</td>
</tr>
<tr>
<td>2</td>
<td>N:2:2</td>
</tr>
</tbody>
</table>

Four-Port 1 GbE NIC Host PCIe Adapter information

This information applies only to the HPE 3PAR Four-Port 1Gb Ethernet NIC Adapter for the HPE 3PAR StoreServ 8000 Storage systems.

IMPORTANT: For the HPE 3PAR Four-Port 1Gb Ethernet NIC Adapter, some of the adapters have the faceplate labeling incorrect, indicating that the ports are numbered 0 through 3. The following illustration shows the corrected label, indicating that the ports are numbered 1 through 4.

For HPE 3PAR File Persona configuration of the NIC Ethernet ports, see the HPE 3PAR File Persona User Guide available at the Hewlett Packard Enterprise Information Library website: [www.hpe.com/info/storage/docs](http://www.hpe.com/info/storage/docs)

Use RJ45 connectors with the ports.

![Figure 55: HPE 3PAR Four-Port 1Gb Ethernet NIC Adapter ports](image)
Table 7: HPE 3PAR Four-Port 1Gb Ethernet NIC Adapter ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N:2:1</td>
</tr>
<tr>
<td>2</td>
<td>N:2:2</td>
</tr>
<tr>
<td>3</td>
<td>N:2:3</td>
</tr>
<tr>
<td>4</td>
<td>N:2:4</td>
</tr>
</tbody>
</table>

Four-port 16 Gb FC/10 Gb Ethernet Combo Adapter information

This information applies only to the HPE 3PAR Four-Port 16Gb FC/10Gb Ethernet Combo Adapter for the HPE 3PAR StoreServ 8000 Storage systems.

IMPORTANT: There is no FCoE support for the four-port combo adapter.

Use 16 Gb SFP+ transceiver connectors with the ports.

Table 8: HPE 3PAR Four-Port 16Gb FC/10Gb Ethernet Combo Adapter ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Fibre Channel)</td>
<td>N:2:1</td>
</tr>
<tr>
<td>2 (Fibre Channel)</td>
<td>N:2:2</td>
</tr>
<tr>
<td>3 (Ethernet)</td>
<td>N:2:3</td>
</tr>
<tr>
<td>4 (Ethernet)</td>
<td>N:2:4</td>
</tr>
</tbody>
</table>

Four-port 10 Gb iSCSI/10 Gb Ethernet Combo Adapter information

This information applies only to the HPE 3PAR Four-Port 10Gb iSCSI/10Gb Ethernet Combo Adapter for the HPE 3PAR StoreServ 8000 Storage systems.

IMPORTANT: There is no FCoE support for the four-port combo adapter.

Use SFP+ transceiver connectors with the ports.

Table 9: HPE 3PAR Four-Port 10Gb iSCSI/10Gb Ethernet Combo Adapter ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (iSCSI)</td>
<td>N:2:1</td>
</tr>
<tr>
<td>2 (iSCSI)</td>
<td>N:2:2</td>
</tr>
<tr>
<td>3 (Ethernet)</td>
<td>N:2:3</td>
</tr>
<tr>
<td>4 (Ethernet)</td>
<td>N:2:4</td>
</tr>
</tbody>
</table>
Two-port 32Gb FC HBA information

This information applies only to the HPE 3PAR Two-Port 32Gb FC Host Bus Adapter for the HPE 3PAR StoreServ 8000 Storage systems.

Use 32Gb SFP28 transceiver connectors with the ports.

Figure 56: HPE 3PAR Two-Port 32Gb FC Host Bus Adapter ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N:2:1</td>
</tr>
<tr>
<td>2</td>
<td>N:2:2</td>
</tr>
</tbody>
</table>

Breaker panel information

Direct-current E-T-A Breaker Panel and Grounding Bar information

The direct-current (DC) E-T-A Breaker Panel is supported for the HPE 3PAR StoreServ 8000 Storage system when installing the system in a direct-current power environment.

For installation in the DC HPE 3PAR StoreServ 8000 Storage system, two DC Breaker Panels and two Grounding Bars are installed as a set. This provides a total of 32 outputs (or 16 redundant outputs).

- The DC Breaker Panel is the DC equivalent to the AC Power Distribution Unit (PDU).
- The Grounding Bar is installed on the Breaker Panel and is the central ground to which all components and the rack itself will be grounded. The grounding bars are then connected to the facility ground (as opposed to connecting the grounding bar to the rack and grounding the rack to the facility).

Controller node information

This information applies only to the controller nodes for the HPE 3PAR StoreServ 8000 Storage system.

**IMPORTANT:** The controller nodes in the controller node enclosure are inverted 180° from each other, as well as the ports.

Figure 57: Controller node numbering, two-node controller node enclosure rear view
Figure 58: Controller node numbering, four-node controller node enclosure rear view

Controller node ports

Figure 59: Controller node ports, controller node enclosure rear view

Table 10: Controller node ports, controller node enclosure rear view

<table>
<thead>
<tr>
<th>Port type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   PCIe host adapter slot</td>
<td>PCIe slot used for optional host adapters (FC/CNA/NIC).</td>
</tr>
<tr>
<td>2   Fibre Channel ports</td>
<td>Two 16 Gb FC onboard ports (FC-1, FC-2) used for the host server connection.</td>
</tr>
<tr>
<td>3   Ethernet port (MGMT)</td>
<td>MGMT: 1 Gb Ethernet onboard port used to connect to the network.</td>
</tr>
<tr>
<td>4   Ethernet port (RC-1)</td>
<td>RC-1: 1 Gb Ethernet onboard port used for an HPE 3PAR Remote Copy or HPE 3PAR File Persona connection.</td>
</tr>
<tr>
<td>5   SAS ports</td>
<td>Two 12 Gb SAS onboard ports (DP-1, DP-2) used for the expansion drive enclosure connection.</td>
</tr>
<tr>
<td>Port type</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6 Cluster Interconnect Link</td>
<td>Cluster Interconnect Link ports (Intr0, Intr1) used only with 4-node storage systems for the controller nodes 0 and 1 to controller nodes 2 and 3 connection.</td>
</tr>
<tr>
<td>7 Console port</td>
<td>Console port (MFG) is a serial connection for service procedures.</td>
</tr>
</tbody>
</table>

**Ethernet onboard ports**

The controller node has two Ethernet onboard (built-in) ports:

- **MGMT**—Onboard port for the network connection

  - **RC-1**—Onboard port for an HPE 3PAR Remote Copy or HPE 3PAR File Persona connection

**Figure 60: Ethernet onboard ports, controller node enclosure rear view**

**FC onboard ports**

The controller node has two Fibre Channel (FC) onboard ports and each port includes two LEDs. The arrow head-shaped LEDs point to the port they are associated with.

**Figure 61: FC onboard ports, controller node enclosure rear view**
Table 11: FC onboard ports numbering

<table>
<thead>
<tr>
<th>Port</th>
<th>Node:Slot:Port (N:S:P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC-1</td>
<td>N:0:1</td>
</tr>
<tr>
<td>FC-2</td>
<td>N:0:2</td>
</tr>
</tbody>
</table>

SAS onboard ports

The controller node has two SAS onboard ports (DP-1 and DP-2) and each includes two LEDs.

![SAS onboard ports](image)

Figure 62: SAS onboard ports (DP-1 and DP-2), controller node enclosure rear view

Cluster Interconnect Link onboard ports

The controller node has two Cluster Interconnect Link onboard ports and each includes two LEDs.

NOTE:

- 4-node storage system—Cluster Interconnect Link onboard ports are used to connect nodes together.
- 2-node storage system—Cluster Interconnect Link onboard ports are not used and LEDs will be off.

![Cluster Interconnect Link onboard](image)

Figure 63: Cluster Interconnect Link onboard, controller node enclosure rear view

Console onboard port

The controller node has one Console onboard port (MFG) that is a serial connection.
Drive information

This information applies only to the drives for the HPE 3PAR StoreServ 8000 Storage system. The drives are installed in the drive bays at the front of either the controller node enclosures or expansion drive enclosures.

Drive types:
For the all-flash-array (AFA) model of the storage system, only SSDs are supported.

- HPE 3PAR SSD
- HPE 3PAR SAS HDD
- HPE 3PAR Near line (NL) SAS HDD
- HPE 3PAR FIPS Encrypted SSD/HDD

Drive sizes:
The drives come in two physical sizes installed in carriers (magazines).

- SFF 6.4 cm (2.5 in) drives
- LFF 8.9 cm (3.5 in) drives

Maximum drives supported:

- 24 SFF drives per SFF enclosure
- 24 LFF drives per LFF enclosure

Enclosures information

Controller node enclosure and drive enclosures information front view

The fronts of the controller node enclosure and expansion drive enclosures contain the drive bays for installing the drives. Each drive bay is assigned a number for locating drives in the HPE 3PAR StoreServ 8000 Storage system.
Table 12: SFF and LFF enclosures front view

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Left bezel ear cap</td>
<td>Location of the system LEDs and a lower-panel latch that opens to gain access to a captive screw for securing the enclosure to a rack</td>
</tr>
<tr>
<td>2 SFF drive</td>
<td>SFF 6.4 cm (2.5 in) drives</td>
</tr>
<tr>
<td>3 LFF drive</td>
<td>LFF 8.9 cm (3.5 in) drives</td>
</tr>
<tr>
<td>4 Right bezel ear cap</td>
<td>Lower-panel latch that opens to gain access to a captive screw for securing the enclosure to a rack and the model information for the storage system</td>
</tr>
</tbody>
</table>

Controller node enclosure:
There is one type of controller node enclosure:
SFF 6.4 cm (2.5 in), 2U, controller node enclosure: Provides 24 SFF drive bays arranged in a single row

Drive enclosure:
There are two types of expansion drive enclosures:

- SFF 6.4 cm (2.5 in), 2U, SAS expansion drive enclosure: Provides 24 SFF drive bays arranged in a single row
- LFF 8.9 cm (3.5 in), 4U, SAS expansion drive enclosure: Provides 24 LFF drive bays, arranged in four columns of six slots each.

Controller node enclosure information rear view

This information applies only to the controller node enclosure for the HPE 3PAR StoreServ 8000 Storage system.
### Table 13: Controller node enclosure rear view

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Power connection 0</td>
<td>This power connection requires a power cable to be attached between the power supply and an independent electrical source. This electrical source must support the entire power load of the enclosure and have its own circuit breaker.</td>
</tr>
<tr>
<td>2  Power cooling module 0</td>
<td>The power cooling module (PCM) is an integrated power supply and cooling fan and also contains a replaceable battery. The PCM battery is shipped fully charged, but the batteries might lose some charge and show a degraded status immediately when power is applied. One PCM can supply enough power for the controller node enclosure. Connect each PCM to draw power from different mains to allow for continued operation if one main fails.</td>
</tr>
<tr>
<td>3  Controller node 0</td>
<td>The Controller Node caches and manages data from the storage system and provides hosts with a coherent, virtualized view of the storage system.</td>
</tr>
<tr>
<td>4  Controller node 1</td>
<td>The Controller Node caches and manage data from the storage system and provides hosts with a coherent, virtualized view of the storage system.</td>
</tr>
<tr>
<td>5  Power cooling module 1</td>
<td>The power cooling module (PCM) is an integrated power supply and cooling fan and also contains a replaceable battery. The PCM battery is shipped fully charged, but the batteries might lose some charge and show a degraded status immediately when power is applied. One PCM can supply enough power for the controller node enclosure. Connect each PCM to draw power from different mains to allow for continued operation if one main fails.</td>
</tr>
<tr>
<td>6  Power connection 1</td>
<td>This power connection requires a power cable to be attached between the power supply and an independent electrical source. This electrical source must support the entire power load of the enclosure and have its own circuit breaker.</td>
</tr>
<tr>
<td>7  Serial number</td>
<td>The 10-character serial number for the storage system is required for the software setup. The serial number is on the controller node enclosure next to the rightmost power cooling module (PCM 1) power switch.</td>
</tr>
</tbody>
</table>

---

**Drive enclosure information rear view**

This information applies only to the drive enclosure for the HPE 3PAR StoreServ 8000 Storage system.
Figure 70: SFF and LFF expansion drive enclosures rear view

Table 14: SFF and LFF expansion drive enclosures rear view

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Power connection</td>
<td>This power connection requires a power cable to be attached between the power supply and an independent electrical source capable of supporting the entire power load of the enclosure and controlled by its own circuit breaker.</td>
</tr>
<tr>
<td><strong>2</strong> Power cooling module 0</td>
<td>The power cooling module (PCM) is an integrated power supply and cooling fan. One PCM can supply enough power for the enclosure. Each PCM must draw power from different mains. If one main fails, operation of the other PCM continues.</td>
</tr>
<tr>
<td><strong>3</strong> I/O module 0</td>
<td>The I/O modules connect the controller nodes to the drive enclosures using mini-SAS cables, enabling the transfer of data between the controller nodes, drives, PCMs, and enclosures. I/O module 0 has a red label.</td>
</tr>
<tr>
<td><strong>4</strong> SAS ports</td>
<td>The SAS ports connect the I/O modules to the controller nodes using mini-SAS cables.</td>
</tr>
<tr>
<td><strong>5</strong> I/O module 1</td>
<td>The I/O modules connect the controller nodes to the drive enclosures using mini-SAS cables, enabling the transfer of data between the controller nodes, drives, PCMs, and enclosures. I/O module 1 has a green label.</td>
</tr>
</tbody>
</table>

*Table Continued*
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Power cooling module 1</td>
</tr>
<tr>
<td></td>
<td>The power cooling module (PCM) is an integrated power supply and cooling fan. One PCM can supply enough power for the enclosure. Each PCM must draw power from different mains. If one main fails, operation of the other PCM continues.</td>
</tr>
<tr>
<td>7</td>
<td>Power connection 1</td>
</tr>
<tr>
<td></td>
<td>This power connection requires a power cable to be attached between the power supply and an independent electrical source capable of supporting the entire power load of the enclosure and controlled by its own circuit breaker.</td>
</tr>
</tbody>
</table>

### I/O module information

This information applies only to the I/O module for the HPE 3PAR StoreServ 8000 Storage system.

**IMPORTANT:** Notice that the I/O modules are installed differently between the SFF drive enclosure and the LFF drive enclosure.

- In the SFF drive enclosure, the I/O modules in the enclosure are inverted 180° from each other, as well as the SAS ports.
- In the LFF drive enclosure, the I/O modules in the enclosure are installed in the same direction, as well as the SAS ports.

![Figure 71: I/O module numbering, SFF drive enclosure rear view](image)

**Figure 71: I/O module numbering, SFF drive enclosure rear view**

![Figure 72: I/O module numbering, LFF drive enclosure rear view](image)

**Figure 72: I/O module numbering, LFF drive enclosure rear view**

### SAS ports

The I/O module has two SAS ports (DP-1 and DP-2) and each includes two LEDs.
The HPE 3PAR StoreServ 8000 Storage system supports the following power cooling modules based on whether the system is installed in either an alternating-current or direct-current power environment:

- Alternating-current HPE 3PAR 764W power cooling module for use with the controller node enclosure
- Alternating-current HPE 3PAR 580W power cooling module for use with the expansion drive enclosures.
- Direct-current HPE 3PAR -48VDC 764W Power Cooling Module for use with both the controller node enclosure and expansion drive enclosures.

**Power cooling module information, alternating-current, controller node enclosure**

The alternating-current (AC) HPE 3PAR 764W power cooling module (PCM) is a component for the HPE 3PAR StoreServ 8000 Storage controller node enclosures when installing the system in an alternating-current power environment. The 764 W PCM is an integrated power supply and cooling fan that includes a replaceable battery.

**NOTE:** Labels on the PCM for the controller node enclosure show the model as 760W PCM Gold Series.
The alternating-current (AC) HPE 3PAR 580W power cooling module is a component for the HPE 3PAR StoreServ 8000 Storage drive enclosure when installing the system in an alternating-current power environment. The 580 W PCM is an integrated power supply and cooling fan.

NOTE: Labels on the PCM for the drive enclosure show the model as 580W PCM Gold Series.
Power cooling module information, direct-current system

The direct-current (DC) HPE 3PAR -48VDC 764W Power Cooling Module (PCM) is used with an HPE 3PAR StoreServ 8000 Storage system in both the controller node enclosures and expansion drive enclosures when installing the system in a direct-current power environment. The -48V DC PCM is an integrated power supply and cooling fan that has a compartment for adding a replaceable battery when it is installed in a controller node enclosure.

NOTE:

- The power switch on the HPE 3PAR -48VDC 764W Power Cooling Module is inverted 180° from the orientation of the power switch on the alternating-current (AC) power cooling module.
- Labels on the HPE 3PAR -48VDC 764W Power Cooling Module show the model as -48VDC INPUT 764W PCM.
Power distribution unit information

For a storage system that is factory integrated in an HPE rack, there are four power distribution units (PDUs) mounted at the bottom of the rack.

For more information, see the HPE 3PAR StoreServ 8000 Storage Site Planning Manual available at the Hewlett Packard Enterprise Information Library website:

www.hpe.com/info/storage/docs

Service processor information

The physical service processor (SP) is an optional component for the storage system that can be used instead of a virtual service processor. The storage system supports the following physical service processors based on whether the system is installed in either an alternating-current or direct-current power environment:

- Alternating-current HPE ProLiant DL120 Gen9 Server
- Alternating-current HPE ProLiant DL360 Gen10 Server
- Direct-current HPE ProLiant DL360 Gen10 Server

Physical service processor information, HPE ProLiant DL120 Gen9 Server

The physical service processor can be used instead of using a virtual service processor.
**Figure 83: Physical service processor ports, HPE ProLiant DL120 Gen9 Server**

1. Management (MGMT) port; NIC 1
2. Service port; NIC 2

**Figure 84: HPE ProLiant DL120 Gen9 Server details**

**NOTE:** For the HPE ProLiant DL120 Gen9 Server, the NIC port 2 is configured for shared mode to either be configured for use as the Service port or configured for use as an iLO (virtual serial) port.

1. Slot 3 PCIe3 x8 (8, 4, 1); If the GPU riser cage is installed, Slot 3 supports PCIe x16 (16, 8, 4, 1).
2. Slot 2 PCIe3 x8 (8, 4, 1)
3. Slot 3 PCIe3 x16 (16, 8, 4, 1)
4. Non-hot-plug power supply
5. Power supply blank (bay 2 of optional redundant power supply module)
6. Hot-plug power supply (bay 1 of optional redundant power supply module)
7. NIC 2; iLO (virtual serial) port; Service port (Eth1)
8. NIC 1; Management port (Eth0)
9. Video port
10. USB 3.0 port

Physical service processor information, HPE ProLiant DL360 Gen10 Server

The physical service processor) can be used instead of using a virtual service processor.

![Physical service processor ports, HPE ProLiant DL360 Gen10 Server](image)

Figure 85: Physical service processor ports, HPE ProLiant DL360 Gen10 Server

1. Management (MGMT) port; NIC 1
2. Service port; NIC 2

![HPE ProLiant DL360 Gen10 Server details](image)

Figure 86: HPE ProLiant DL360 Gen10 Server details

For the HPE ProLiant DL360 Gen10 Server, the Service port, iLO Management port, and Serial port are dedicated ports.

**NOTE:** The ports are different than the HPE ProLiant DL120 Gen9 Server.

1. Slot 1 PCIe3
2. Slot 2 PCIe3
3. Slot 3 PCIe3 (optional - requires second processor)
4. Power supply 2 (PS2)
5. Power supply 1 (PS1)
6. Video port
7. NIC 4
8. NIC 3
9. NIC 2; Service port (Eth1)
10. NIC 1; Management port (Eth0)
11. iLO Management port
12. Serial port
13. USB 3.0 ports
14. FlexibleLOM (optional)

Switch information

Direct-current switch information

The direct-current (DC) Brocade 6510 Switch is supported for the HPE 3PAR StoreServ 8000 Storage system when installing the system in a direct-current power environment.

For more information about the Brocade 6510 Switch, see the product page:
www.broadcom.com/products/fibre-channel-networking-switches/6510-switch

Component LEDs

**IMPORTANT:** The HPE 3PAR StoreServ Storage system components have LEDs to indicate whether the hardware is functioning properly and to help identify errors. The LEDs help diagnose basic hardware problems.

Adapter LEDs

Four-Port 16 Gb FC Host PCIe Adapter LEDs

This information applies only to the HPE 3PAR Four-Port 16Gb FC Host Bus Adapter for the HPE 3PAR StoreServ 8000 Storage system.

![Figure 87: HPE 3PAR Four-Port 16Gb FC Host Bus Adapter LEDs](image)

Table 15: HPE 3PAR Four-Port 16Gb FC Host Bus Adapter LEDs

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Port Speed</td>
<td>3 Fast amber flashes</td>
<td>Connected at 8 Gb/s</td>
</tr>
<tr>
<td></td>
<td>4 Fast amber flashes</td>
<td>Connected at 16 Gb/s</td>
</tr>
</tbody>
</table>

Table Continued
### Two-Port 10 Gb iSCSI/FCoE CNA Host PCIe Adapter LEDs

This information applies only to the HPE 3PAR Two-Port 10Gb iSCSI/FCoE Converged Network Adapter for the HPE 3PAR StoreServ 8000 Storage system.

![Illustration of LED positions](image)

#### Table 16: HPE 3PAR Two-Port 10Gb iSCSI/FCoE Converged Network Adapter LEDs

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Link status</td>
<td>Green solid</td>
<td>Normal/Connected – link up</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Link down or not connected</td>
</tr>
</tbody>
</table>

#### Two-Port 10 GbE NIC Host PCIe Adapter LEDs

This information applies only to the HPE 3PAR Two-Port 10Gb Ethernet NIC Adapter for the HPE 3PAR StoreServ 8000 Storage system.

![Illustration of LED positions](image)

#### Important:
For the HPE 3PAR Two-Port 10Gb Ethernet NIC Adapter, some of the adapters have the faceplate labeling reversed, with the port on the left identified as port 2, when oriented as in the following illustration. This illustration shows the corrected label with port 1 on the left.
**Table 17: HPE 3PAR Two-Port 10Gb Ethernet NIC Adapter LEDs**

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Amb=10 G</td>
<td>Amber solid</td>
<td>Link speed 10 Gb/s</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Link speed 1 Gb/s</td>
</tr>
<tr>
<td>2 ACT/Port</td>
<td>Green solid</td>
<td>Link up</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Link activity</td>
</tr>
</tbody>
</table>

**Four-Port 1 GbE NIC Host PCIe Adapter LEDs**

This information applies only to the HPE 3PAR Four-Port 1Gb Ethernet NIC Adapter for the HPE 3PAR StoreServ 8000 Storage system.

**IMPORTANT:** For the HPE 3PAR Four-Port 1Gb Ethernet NIC Adapter, some of the adapters have the faceplate labeling incorrect, indicating that the ports are numbered 0 through 3. The following illustration shows the corrected label, indicating that the ports are numbered 1 through 4.

**Table 18: HPE 3PAR Four-Port 1Gb Ethernet NIC Adapter LEDs**

<table>
<thead>
<tr>
<th>LED status</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Green solid</td>
<td>Link speed 1 Gb/s</td>
</tr>
<tr>
<td></td>
<td>Off</td>
</tr>
<tr>
<td>2 Green solid</td>
<td>Link up</td>
</tr>
</tbody>
</table>
LED status | Port state
---|---
Green flashing | Link activity
Off | Link down

Four-Port 16 Gb FC/10 GbE NIC Host PCIe Combo Adapter LEDs
This information applies only to the HPE 3PAR Four-Port 16Gb FC/10Gb Ethernet Combo Adapter for the HPE 3PAR StoreServ 8000 Storage system.

Table 19: 16 Gb FC port LEDs
<table>
<thead>
<tr>
<th>Green LED</th>
<th>Amber LED</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>No Link</td>
</tr>
<tr>
<td>Off</td>
<td>Amber solid</td>
<td>Post failure</td>
</tr>
<tr>
<td>Green solid</td>
<td>Off</td>
<td>Failure in common code module</td>
</tr>
<tr>
<td>Green solid</td>
<td>Amber solid</td>
<td>Failure in common code module</td>
</tr>
<tr>
<td>Green solid</td>
<td>1 fast amber flashes</td>
<td>Link up and activity at 2 Gb/s</td>
</tr>
<tr>
<td></td>
<td>2 fast amber flashes</td>
<td>Link up and activity 4 Gb/s</td>
</tr>
<tr>
<td></td>
<td>3 fast amber flashes</td>
<td>Link up and activity 8 Gb/s</td>
</tr>
<tr>
<td></td>
<td>4 fast amber flashes</td>
<td>Link up and activity 16 Gb/s</td>
</tr>
</tbody>
</table>

Table 20: 10 GbE NIC port LEDs
<table>
<thead>
<tr>
<th>Green LED</th>
<th>Amber LED</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>No link</td>
</tr>
<tr>
<td>Off</td>
<td>Amber solid</td>
<td>Link at the highest speed, 10 GbE</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Amber solid</td>
<td>Link at the highest speed and activity</td>
</tr>
<tr>
<td>Green solid</td>
<td>Off</td>
<td>Link at the highest speed, 1 GbE</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Off</td>
<td>Link at lowest speed and activity</td>
</tr>
</tbody>
</table>

Four-port 10 Gb iSCSI/10 Gb Ethernet Combo Adapter LEDs
This information applies only to the HPE 3PAR Four-Port 10Gb iSCSI/10Gb Ethernet Combo Adapter for the HPE 3PAR StoreServ 8000 Storage system.
Table 21: 10 Gb iSCSI port LEDs

<table>
<thead>
<tr>
<th>Green LED</th>
<th>Amber LED</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>No link</td>
</tr>
<tr>
<td>Off</td>
<td>Amber solid</td>
<td>Boot failure</td>
</tr>
<tr>
<td>Green solid</td>
<td>Amber solid</td>
<td>Link up at 10 Gb/s, without traffic</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Amber solid</td>
<td>Link up at 10 Gb/s, with traffic</td>
</tr>
</tbody>
</table>

Table 22: 10 GbE NIC port LEDs

<table>
<thead>
<tr>
<th>Green LED</th>
<th>Amber LED</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>No link</td>
</tr>
<tr>
<td>Off</td>
<td>Amber solid</td>
<td>Link at the highest speed, 10 GbE</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Amber solid</td>
<td>Link at the highest speed and activity</td>
</tr>
<tr>
<td>Green solid</td>
<td>Off</td>
<td>Link at the highest speed, 1 GbE</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Off</td>
<td>Link at lowest speed and activity</td>
</tr>
</tbody>
</table>

Two-Port 32 Gb FC HBA LEDs

This information applies only to the HPE 3PAR Two-Port 32Gb FC Host Bus Adapter for the HPE 3PAR StoreServ 8000 Storage system.

Figure 91: HPE 3PAR Two-Port 32Gb FC Host Bus Adapter ports

Table 23: HPE 3PAR Two-Port 32Gb FC Host Bus Adapter LEDs

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>Port state</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Link/Status</td>
<td>Green solid</td>
<td>Normal/connected; link up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green flashing</td>
<td>Link down or not connected</td>
</tr>
<tr>
<td>2</td>
<td>Port/Speed</td>
<td>Amber flashing</td>
<td>Connected at high speed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Not connected - port failed or power not applied</td>
</tr>
</tbody>
</table>
Controller node LEDs

This information applies only to the controller nodes for the HPE 3PAR StoreServ 8000 Storage system.

**IMPORTANT:** The controller nodes in the controller node enclosure are inverted 180° from each other, as well as the ports.

---

**Table 24: Controller node LEDs, controller node enclosure rear view**

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Green solid</td>
<td>Not a cluster member</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green rapid flashing</td>
<td>• Booting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shutdown (halted)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green slow flashing</td>
<td>Cluster member and flashes slowly in synchronization with the other controller nodes in the cluster</td>
<td></td>
</tr>
<tr>
<td>UID</td>
<td>Blue solid</td>
<td>Shutdown (halted); not a cluster member; can be removed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blue flashing</td>
<td>Locate active; do not remove component</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Locate not active</td>
<td></td>
</tr>
<tr>
<td>Fault</td>
<td>Amber solid</td>
<td>Fault</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amber flashing</td>
<td>In the cluster, one of the other controller nodes is shut down (halted).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No fault</td>
<td></td>
</tr>
</tbody>
</table>

**Ethernet onboard ports LEDs, controller node enclosure rear view**

The controller node has two Ethernet onboard (built-in) ports:

- **MGMT**—Onboard port for the network connection
- **RC-1**—Onboard port for an HPE 3PAR Remote Copy or HPE 3PAR File Persona connection
Figure 93: Ethernet onboard ports, controller node enclosure rear view

Figure 94: Ethernet onboard ports LEDs, controller node enclosure rear view

Table 25: Ethernet onboard ports LEDs, controller node enclosure rear view

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Link up speed</td>
<td>Green solid</td>
<td>1 Gb Link</td>
</tr>
<tr>
<td></td>
<td>Amber solid</td>
<td>100 Mb Link</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No link established or 10 Mb Link</td>
</tr>
<tr>
<td>2 Activity</td>
<td>Green solid</td>
<td>No link activity</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Link activity</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No link established</td>
</tr>
</tbody>
</table>

FC onboard ports LEDs, controller node enclosure rear view

The controller node has two Fibre Channel (FC) onboard ports and each port includes two LEDs. The arrow head-shaped LEDs point to the port they are associated with.

NOTE: Incorrectly configured cables result in illuminated amber LEDs on the ports.
Table 26: FC onboard ports LEDs, controller node enclosure rear view

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ports</td>
<td>Off</td>
<td>Wake up failure (dead device) or power not applied</td>
</tr>
<tr>
<td>1 Port speed</td>
<td>Off</td>
<td>Not connected</td>
</tr>
<tr>
<td></td>
<td>3 Fast amber flashes</td>
<td>Connected at 8 Gb/s</td>
</tr>
<tr>
<td></td>
<td>4 Fast amber flashes</td>
<td>Connected at 16 Gb/s</td>
</tr>
<tr>
<td>2 Link status</td>
<td>On</td>
<td>Normal/Connected—link up</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Link down or not connected</td>
</tr>
</tbody>
</table>

SAS onboard ports LEDs

**IMPORTANT:** For the SAS DP2 port without an SAS cable attached, the amber LED is illuminated and the green LED is off. This behavior is expected for the DP2 port. For the SAS DP-1 port without an SAS cable attached, both amber and green LEDs are off.

The controller node has two SAS onboard ports (DP-1 and DP-2) and each includes two LEDs.
Figure 97: SAS onboard ports (DP-1 and DP-2), controller node enclosure rear view

Figure 98: SAS onboard ports LEDs, controller node rear view

Table 27: SAS onboard ports LEDs, controller node rear view

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Activity</td>
<td>Green solid</td>
<td>No link activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green flashing</td>
<td>Link activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No link established</td>
</tr>
<tr>
<td>Fault</td>
<td></td>
<td>Amber solid</td>
<td>• Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Only for DP-2: no SAS cable connected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber flashing</td>
<td>Locate active</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Normal operation</td>
</tr>
</tbody>
</table>

**Cluster Interconnect Link onboard ports LEDs**

The controller node has two cluster interconnect link onboard ports and each includes two LEDs.
Figure 99: Cluster Interconnect Link onboard port, controller node enclosure rear view

Figure 100: Cluster Interconnect Link onboard port LEDs, controller node enclosure rear view

Table 28: Cluster Interconnect Link onboard port LEDs, controller node enclosure rear view

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Fault</td>
<td>Amber solid</td>
<td>Fault—No link established or the cable incorrectly configured</td>
</tr>
<tr>
<td></td>
<td>Amber flashing</td>
<td>- Interconnect link cabling error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Controller node in wrong slot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Serial number mismatch between controller nodes</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No fault</td>
</tr>
<tr>
<td>2 Status</td>
<td>Green solid</td>
<td>Link established</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No link established</td>
</tr>
</tbody>
</table>

**Drive LEDs**

This information applies only to the drives for the HPE 3PAR StoreServ 8000 Storage system.
### Table 29: SFF drive LEDs

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Fault</td>
<td>Amber solid</td>
<td>Fault; ready for replacement</td>
</tr>
<tr>
<td></td>
<td>Amber flashing</td>
<td>Locate active; amber LED flashes on all drives in <strong>OK</strong> state</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTE:</strong> On failed drives, the Fault amber LED does not flash.</td>
</tr>
<tr>
<td>2 Status</td>
<td>Green solid</td>
<td>Normal operation; drive in an <strong>OK</strong> state; admitted by the HPE 3PAR OS</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Drive activity</td>
</tr>
</tbody>
</table>

**Figure 101: SFF drive LEDs**
Figure 102: LFF drive LEDs

Table 30: LFF drive LEDs

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Fault</td>
<td>Amber solid</td>
<td>Fault; ready for replacement</td>
</tr>
<tr>
<td></td>
<td>Amber flashing</td>
<td>Locate active; amber LED flashes on all drives in <strong>OK</strong> state</td>
</tr>
</tbody>
</table>

**NOTE:** On failed drives, the Fault amber LED does not flash.

<table>
<thead>
<tr>
<th>2 Status</th>
<th>Green solid</th>
<th>Normal operation; drive in an <strong>OK</strong> state; admitted by the HPE 3PAR OS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Green flashing</td>
<td>Drive activity</td>
</tr>
</tbody>
</table>

**I/O module LEDs**

This information applies only to the I/O modules for the HPE 3PAR StoreServ 8000 Storage system.
**IMPORTANT:** Notice that the I/O modules are installed differently between the SFF drive enclosure and the LFF drive enclosure.

- In the SFF drive enclosure, the I/O modules in the enclosure are inverted 180° from each other, as well as the SAS ports.
- In the LFF drive enclosure, the I/O modules in the enclosure are installed in the same direction, as well as the SAS ports.

---

**Figure 103: I/O module LEDs, SFF drive enclosure rear view**

**Table 31: I/O module LEDs, SFF drive enclosure rear view**

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Power LED" /></td>
<td>Power</td>
<td>Green solid</td>
<td>Power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No power</td>
</tr>
<tr>
<td><img src="image" alt="UID LED" /></td>
<td>UID/Service</td>
<td>Blue flashing</td>
<td>Locate active</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Locate not active</td>
</tr>
<tr>
<td><img src="image" alt="Fault LED" /></td>
<td>Fault</td>
<td>Amber solid</td>
<td>Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No fault</td>
</tr>
</tbody>
</table>
Figure 104: SAS ports LEDs, I/O module

Table 32: SAS ports LEDs, I/O module

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td></td>
<td>Green solid</td>
<td>Links up, but no activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No cable, bad cable, not ready or no power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green flashing</td>
<td>Activity</td>
</tr>
<tr>
<td>Fault</td>
<td></td>
<td>Amber solid</td>
<td>Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No fault</td>
</tr>
</tbody>
</table>

Power cooling module LEDs

Power cooling module LEDs, alternating-current, controller node enclosure

This information applies only to the HPE 3PAR 764W power cooling module for the HPE 3PAR StoreServ 8000 Storage system.

NOTE: Labels on the PCM for the controller node enclosure show the model as 760W PCM Gold Series.
Table 33: 764W PCM LEDs, alternating-current, controller node enclosure rear view

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>🌓</td>
<td>AC input fail</td>
<td>Amber solid</td>
<td>No AC power or PCM fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber flashing</td>
<td>• Firmware Download</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Locate active</td>
</tr>
<tr>
<td>🌙</td>
<td>PCM OK</td>
<td>Green solid</td>
<td>AC present and PCM On / OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green flashing</td>
<td>Standby mode</td>
</tr>
<tr>
<td>⚛</td>
<td>Fan fail</td>
<td>Amber solid</td>
<td>PCM fail or PCM fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber flashing</td>
<td>Firmware download</td>
</tr>
<tr>
<td>⚔</td>
<td>DC output fail</td>
<td>Amber solid</td>
<td>• No AC power</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Out of tolerance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber flashing</td>
<td>Firmware download</td>
</tr>
<tr>
<td>⚔</td>
<td>Battery fail</td>
<td>Amber solid</td>
<td>Hard fault (not recoverable)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber flashing</td>
<td>Soft fault (recoverable)</td>
</tr>
<tr>
<td>📲</td>
<td>Battery good</td>
<td>Green solid</td>
<td>Present and charged</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green flashing</td>
<td>Charging or disarmed</td>
</tr>
</tbody>
</table>

Power cooling module LEDs, alternating-current, drive enclosure

This information applies only to the HPE 3PAR 580W power cooling module for the HPE 3PAR StoreServ 8000 Storage system.

**NOTE:** Labels on the PCM for the drive enclosure show the model as 580W PCM Gold Series.

Figure 106: 580W PCM LEDs, alternating-current, drive enclosure rear view
### Table 34: 580W PCM LEDs, drive enclosure rear view

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="" /></td>
<td>AC input fail</td>
<td>Amber solid</td>
<td>No AC power or PCM fault</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td></td>
<td>Amber flashing</td>
<td>• Partner PCM Faulty/Off or Firmware Download</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td></td>
<td></td>
<td>• Locate active</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td>PCM OK</td>
<td>Green solid</td>
<td>AC Present and PCM On / OK</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td></td>
<td>Green flashing</td>
<td>Standby mode</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td>Fan fail</td>
<td>Amber solid</td>
<td>PCM fail or PCM fault</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td></td>
<td>Amber flashing</td>
<td>Firmware download</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td>DC output fail</td>
<td>Amber solid</td>
<td>• No AC power</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td></td>
<td></td>
<td>• Fault</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td></td>
<td></td>
<td>• Out of tolerance</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td></td>
<td>Amber flashing</td>
<td>Firmware download</td>
</tr>
</tbody>
</table>

### Power cooling module LEDs, direct-current system

This information applies only to the HPE 3PAR -48VDC 764W Power Cooling Module for the HPE 3PAR StoreServ 8000 Storage system.

**NOTE:**

- The power switch on the HPE 3PAR -48VDC 764W Power Cooling Module is inverted 180° from the orientation of the power switch on the alternating-current (AC) power cooling module.
- Labels on the HPE 3PAR -48VDC 764W Power Cooling Module show the model as -48VDC INPUT 764W PCM.

---

![Figure 107: -48VDC 764W PCM LEDs](image)
Table 35: -48VDC 764W PCM LEDs

<table>
<thead>
<tr>
<th>DC input fail</th>
<th>Power</th>
<th>Fan fail</th>
<th>DC output fail</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>No DC power on any PCM</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>No DC power on this PCM only</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>DC present; PCM OK</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>PCM fan speed is outside acceptable limits</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>PCM fan has failed</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>PCM fault (over temp, over voltage, over current)</td>
</tr>
<tr>
<td>Off</td>
<td>Flashing</td>
<td>Off</td>
<td>Off</td>
<td>Standby mode</td>
</tr>
<tr>
<td>Flashing</td>
<td>Off</td>
<td>Flashing</td>
<td>Flashing</td>
<td>PCM firmware download</td>
</tr>
</tbody>
</table>

Table 36: -48VDC 764W PCM LEDs

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>🍃</td>
<td>Battery fail</td>
<td>Amber solid</td>
<td>Hard fault (not recoverable)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber flashing</td>
<td>Soft fault (recoverable)</td>
</tr>
<tr>
<td>🍃</td>
<td>Battery good</td>
<td>Green solid</td>
<td>Present and charged</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green flashing</td>
<td>Charging or disarmed</td>
</tr>
</tbody>
</table>

Service processor LEDs
Figure 108: Physical service processor LEDs, HPE ProLiant DL120 Gen9 Server rear view

Table 37: Physical service processor LEDs, HPE ProLiant DL120 Gen9 Server rear view

<table>
<thead>
<tr>
<th>LED/Port function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 UID/Service</td>
<td>Blue solid</td>
<td>Activated</td>
</tr>
<tr>
<td></td>
<td>Blue flashing</td>
<td>Service processor managed remotely</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Deactivated</td>
</tr>
<tr>
<td>2 NIC link</td>
<td>Green solid</td>
<td>Network link</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No network link</td>
</tr>
<tr>
<td>3 NIC activity</td>
<td>Green solid</td>
<td>Network link</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Network activity</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No network activity</td>
</tr>
<tr>
<td>4 Power supply</td>
<td>Green solid</td>
<td>Normal</td>
</tr>
</tbody>
</table>
|                   | Off                           | The physical service processor has redundant power supplies (RPS) and the LEDs are the same on both. Off represents one or more of the following conditions:
|                   |                               | • Power unavailable                        |
|                   |                               | • Power supply failure                     |
|                   |                               | • Power supply in standby mode             |
|                   |                               | • Power supply error                       |
Figure 109: Physical service processor LEDs, HPE ProLiant DL120 Gen9 Server front view

Table 38: Physical service processor LEDs, HPE ProLiant DL120 Gen9 Server front view

<table>
<thead>
<tr>
<th>LED/Port function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Power on/Standby button</td>
<td>Green solid</td>
<td>Service processor on</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Performing power-on sequence</td>
</tr>
<tr>
<td></td>
<td>Amber solid</td>
<td>Service processor in standby, power still on</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Power cord not attached, no power supplies installed, or power failure</td>
</tr>
<tr>
<td>2 Health</td>
<td>Green solid</td>
<td>Service processor on and health normal</td>
</tr>
<tr>
<td></td>
<td>Amber flashing</td>
<td>Service processor health degraded</td>
</tr>
<tr>
<td></td>
<td>Red flashing</td>
<td>Service processor health critical</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Service processor power off</td>
</tr>
<tr>
<td>3 NIC status</td>
<td>Green solid</td>
<td>Link to network</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Network activity</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No network link/activity</td>
</tr>
<tr>
<td>4 UID/Service</td>
<td>Blue solid</td>
<td>Active</td>
</tr>
<tr>
<td></td>
<td>Blue flashing</td>
<td>Either remote management, firmware upgrade in progress, or iLO manual reboot sequence initiated</td>
</tr>
</tbody>
</table>
**Physical service processor LEDs, HPE ProLiant DL360 Gen10 Server**

![Physical service processor LEDs, HPE ProLiant DL360 Gen10 Server rear view](image)

**Table 39: Physical service processor LEDs, HPE ProLiant DL360 Gen10 Server rear view**

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> UID LED</td>
<td>Blue solid</td>
<td>Identification is activated.</td>
</tr>
<tr>
<td></td>
<td>Blue flashing</td>
<td>System is being managed remotely.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Identification is deactivated.</td>
</tr>
<tr>
<td><strong>2R</strong> iLO 5/Standard NIC activity LED</td>
<td>Green solid</td>
<td>Activity exists.</td>
</tr>
<tr>
<td></td>
<td>Green flashing</td>
<td>Activity exists.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No activity exists.</td>
</tr>
<tr>
<td><strong>2L</strong> iLO 5/Standard NIC link LED</td>
<td>Green solid</td>
<td>Link exists.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No link exists.</td>
</tr>
<tr>
<td><strong>3</strong> Power supply 2 LED</td>
<td>Green solid</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>One or more of the following conditions exists:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• AC power unavailable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Power supply failed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Power supply in standby mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Power supply exceeded current limit</td>
</tr>
<tr>
<td><strong>4</strong> Power supply 1 LED</td>
<td>Green solid</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>One or more of the following conditions exists:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• AC power unavailable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Power supply failed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Power supply in standby mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Power supply exceeded current limit</td>
</tr>
</tbody>
</table>
Table 40: Physical service processor LEDs, HPE ProLiant DL360 Gen10 Server front view

<table>
<thead>
<tr>
<th>LED function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UID button/LED*</td>
<td>Blue solid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blue flashing 1 Hz = Remote management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off = Deactivated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Hz = iLO manual reboot sequence initiated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 Hz = iLO manual reboot sequence in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>progress</td>
</tr>
<tr>
<td>2</td>
<td>Power on/Standby button</td>
<td>Green solid</td>
</tr>
<tr>
<td></td>
<td>and power LED*</td>
<td>Green flashing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber solid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Health LED*</td>
<td>Green solid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green flashing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber flashing</td>
</tr>
</tbody>
</table>

Table Continued
Table 41: System status LEDs, left bezel ear cap, SFF enclosures front view

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System power</td>
<td>Green solid</td>
<td>Power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No power</td>
</tr>
<tr>
<td></td>
<td>System standby</td>
<td>Amber solid</td>
<td>Enclosure powered by the battery</td>
</tr>
<tr>
<td>2</td>
<td>Module fault</td>
<td>Amber solid</td>
<td>Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No fault</td>
</tr>
</tbody>
</table>
Table 42: System status LEDs, left bezel ear cap, LFF enclosures front view

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
<th>Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System power</td>
<td>Green solid</td>
<td>Power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No power</td>
</tr>
<tr>
<td></td>
<td>System standby</td>
<td>Amber solid</td>
<td>Enclosure powered by the battery</td>
</tr>
<tr>
<td>2</td>
<td>Module fault</td>
<td>Amber solid</td>
<td>Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No fault</td>
</tr>
<tr>
<td>3</td>
<td>Drive status</td>
<td>Amber solid</td>
<td>Fault—An issue exists with one or more drives within the enclosure. To determine the affected drives, inspect the LEDs on each drive. This LED applies only to drives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No fault</td>
</tr>
</tbody>
</table>

Controller node rescue

Each controller node has a built-in node rescue network that connects the controller nodes in the system together in a cluster through fixed physical Ethernet connections through the backplane of the controller node enclosure (chassis). This connection in a cluster allows for a rescue to occur between an active
controller node in the cluster and the replacement or new controller node added to the storage system. This rescue is called a node-to-node rescue.

**Automatic node-to-node rescue occurs in these circumstances:**

- Installation of additional controller node pairs to upgrade the storage system
- Replacement of one or more failed node drives within a controller node

**Initiating an automatic node-to-node rescue**

An automatic node-to-node rescue process occurs for an HPE 3PAR StoreServ Storage controller node in these circumstances:

- Adding one or more controller node pairs to upgrade the storage system
- Replacing one or more failed node drives within a controller node

**IMPORTANT:** In rare instances, a replacement node drive is not recognized as being blank, which prevents the start of the automatic node-to-node rescue process. If the automatic node-to-node rescue process does not start automatically, contact your authorized service provider.

**Procedure**

1. Partially install the controller node.
   a. Pull to extend the gray rod of the controller node to the extracted position.

   ![Figure 114: Extending the controller node rod](image)

   **Figure 114: Extending the controller node rod**

   b. Confirm that the controller node is correctly oriented. In the controller node enclosure, the pair is installed with each controller node oriented 180° from each other.
c. **Partially install** the controller node into the slot. Using two hands to grasp each side of the replacement controller node, align it with the grooves in the slot, and slide it into the slot until it halts against the insertion mechanism that is inside of the slot. **Do not fully insert the controller node in the slot at this time**, because the cables must be reconnected before it is fully seated.

**Figure 116: Partially install the controller node into the slot**

2. Reconnect the cables to the controller node.

   **While the controller node is still only partially inserted in the slot**, reconnect the cables to the controller node.

3. Fully install and seat the controller node into the slot. See **Figure 117: Fully install and seat the controller node into the slot** on page 133.

   Slide in the controller node (1) while pushing in on the gray rod until it stops (2).

   If the UID LED is flashing blue after two minutes, this LED status indicates that the replacement controller node is not properly seated, so repeat this step.

   **Figure 117: Fully install and seat the controller node into the slot**
Once inserted, the replacement controller node powers up and goes through the automatic node-to-node rescue before joining the cluster. This process might take up to 10 minutes.

Customer self repair

Customer self repair (CSR) is a key component of Hewlett Packard Enterprise warranty terms. Once the failure of a hardware component has been confirmed, CSR enables Hewlett Packard Enterprise to ship replacement parts directly to you. Parts are typically shipped overnight. CSR warranty terms and conditions are included in the warranty statement for the product, which can be found in the box with the product.

For more details about CSR, contact an authorized service provider or see the Hewlett Packard Enterprise Customer Self Repair website:

www.hpe.com/info/selfrepair

**IMPORTANT:** Some components are not designed for CSR. To satisfy the customer warranty for service of non-CSR components, an authorized service provider has to service the non-CSR components.

CSR types

- **Mandatory CSR parts (warranty only)**—On-site or return-to-depot support for replacement of this part is not provided under the warranty. You can install a mandatory CSR part yourself or pay Hewlett Packard Enterprise service personnel to do the installation. A mandatory CSR part typically does not need tools to replace, consists of a single part, has minimum cabling, and is plug-and-play.

- **Optional CSR parts**—You can replace this optional CSR part yourself or have it replaced by Hewlett Packard Enterprise service personnel at no additional charge during the warranty period. Replacement may require tools, the removal of other parts, more involved cabling, and configuration and setup following replacement.

Guidelines for cabling

Guidelines for the minimum bend radius of the cable

Bend radius is defined as the minimum radius to which the cable may safely be bent during installation without the risk of permanent damage resulting in excessive attenuation or even breakage.

Use the manufacturer guidelines for the minimum bend radius of a cable. If manufacturer guidelines have not been provided, use the general guidelines provided in the following table.

**CAUTION:** Bending optical cables tightly can damage the internal fibers, causing signal loss, reduced reliability, and performance problems.

**IMPORTANT:** Minimum bend radius is not the same as minimum bend diameter.

<table>
<thead>
<tr>
<th>Table 43: General minimum bend radius by cable type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cable type</strong></td>
</tr>
<tr>
<td>Standard power cable</td>
</tr>
<tr>
<td>Active optical cable (AOC)</td>
</tr>
<tr>
<td>Fiber optical cable</td>
</tr>
</tbody>
</table>

Table Continued
Cable type & Minimum bend radius

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Minimum bend radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Cat 5/6 (Unshielded)</td>
<td>1.75 in (4.44 cm)</td>
</tr>
<tr>
<td>Network Cat 5/6 (Shielded)</td>
<td>3.5 in (8.90 cm)</td>
</tr>
<tr>
<td>Coaxial (50W)</td>
<td>1.2 in (3 cm)</td>
</tr>
<tr>
<td>Coaxial (75W)</td>
<td>1.7 in (4.31 cm)</td>
</tr>
<tr>
<td>R1 InfiniBand - at connector</td>
<td>4.6 in (11.68 cm)</td>
</tr>
<tr>
<td>R2 InfiniBand - away from connector</td>
<td>2.6 in (6.60 cm)</td>
</tr>
</tbody>
</table>

- Power cable: Minimum bend radius prevents disconnection from power socket and possible arcing under high-voltage conditions. When there is a high voltage or high current on the cable, sharp edges or turns can cause puncturing of the cable jacket or arcing to equipment at local potential.

- Copper cable: Too sharp a radius will stress the center conductor, and may cause the cable outer conductor to collapse or buckle. A sharp radius will cause impedance discontinuities at the bends resulting in reflections and leads to signal degradation and circuit problems. An excessive bending of cable can affect the geometry of the twists and increase the sensitivity to external noise and cause stress on cable terminations.

- Fiber optic: Tighter bends may cause micro-bending of individual fibers that allow light to escape the signal path, resulting in signal attenuation. More severe bends can break fiber strands completely, resulting in signal loss.

General guidelines for cabling

- If not already applied by the factory, label all cables.
- Use the shortest possible cable between devices. Shorter cables reduce the possibility of signal degradation over longer distances and are easier to route along the rear of the rack.
- Cables cannot have any obvious kinks, deformation, or damage to the connector housing or sheathing. To prevent these issues, use extra care when unpacking, unwinding, routing, and storing cables.
- To prevent mechanical damage or depositing contaminants from your hands, do not touch the ends of the cable connectors.
- Before connecting a cable to a port, lay the cable in place to verify the length of the cable.
- Some data cables are prebent. Do not unbend or manipulate the cables.
- For components that must be movable while powered on, ensure that a full range of motion (frequently called a service loop) is possible without cable interference or disconnection.
- Leave some slack in the cable (service loop). The slack provides room to remove and replace components, allows for minor, inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius. The slack can be addressed by forming loops or using a take-up spool as long as the minimum bend radius is maintained.

Guidelines for connecting, routing, and restraining cables

- When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.
- When routing cables onto a management arm, secure the cables enough to prevent interference or pinch areas during movement, yet not so tight as to cause binding.
• Restrain and support cables in a manner that eliminates stress on connectors and eliminates tight bends of the cables.

• Secure fiber and AOC cables with loose fitting Velcro straps, instead of wire or cable ties.

• For cable ties, ensure that the cables are not compressed when cinching the tie, and cut the cable ties flush with the cable tie head to prevent scratches or cuts during future service interactions.

• When the cables are restrained together, verify that storage system components and LED indicators are easily visible and accessible for operation and maintenance.

Guidelines for disconnecting cables

To prevent damage to the internal wires of the cable or the port pins, operate the release latch on the cable connector, and then grip the body of the cable connector to disconnect the cable instead of pulling on the cable.

Removing the cable restraint shipping brackets

During transport, the cable restraint shipping brackets support the connected data cables and connectors for the HPE 3PAR StoreServ 8000 Storage system. When the storage system is in a stationary position, the brackets are not required and may need to be removed to provide access to the components of the storage system. If you remove the brackets, store the brackets for later use.

Procedure

1. Remove the data cables from the hook and loop straps.

2. Loosen the captive screws.

3. Remove the brackets. Be careful not to damage the attached data cables.

Spare part number

Parts have a nine-character spare part number on their labels. For some spare parts and software versions, the part number is available from the software interface. Alternatively, Hewlett Packard Enterprise support can assist in identifying the correct spare part number.
<table>
<thead>
<tr>
<th>PN: 774040-001</th>
<th>SPARE PN: 786038-001</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT: KDBUN0A124WA10</td>
<td></td>
</tr>
</tbody>
</table>

### Figure 119: Example product label with spare part number

The spare part number can be obtained in the following ways:

- Email notification from service processor (SP) if enabled
- Contact Hewlett Packard Enterprise Support for assistance.
- HPE 3PAR Service Processor Service Console interface. Click the alert banner, and then click **Details**. From the **Activity** page, the spare part number is located under the **Component** heading.
Troubleshooting

Alerts issued by the storage system and processed by the service processor

Alerts are triggered by events that require intervention by the system administrator. To learn more about alerts, see the HPE 3PAR Alerts Reference: Customer Edition and HPE 3PAR StoreServ Storage Concepts Guide documents available at the Hewlett Packard Enterprise Information Library website or the Hewlett Packard Enterprise Support Center website:

www.hpe.com/info/storage/docs
www.hpe.com/support/hpesc

Alerts are processed by the service processor (SP). The Hewlett Packard Enterprise Support Center acts on alerts that are not customer administration alerts. Customer administration alerts are managed by customers.

Components functions

Table 44: Component functions

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>alert</td>
<td>Displays unresolved alerts</td>
</tr>
<tr>
<td>ao</td>
<td>Displays Adaptive Optimization issues</td>
</tr>
<tr>
<td>cabling</td>
<td>Displays drive enclosure (cage) cabling issues</td>
</tr>
<tr>
<td>cage</td>
<td>Displays drive enclosure (cage) issues</td>
</tr>
<tr>
<td>cert</td>
<td>Displays certificate issues</td>
</tr>
<tr>
<td>dar</td>
<td>Display data encryption issues</td>
</tr>
<tr>
<td>date</td>
<td>Displays controller nodes having different date issues</td>
</tr>
<tr>
<td>file</td>
<td>Displays file system issues</td>
</tr>
<tr>
<td>fs</td>
<td>Displays files services health</td>
</tr>
<tr>
<td>host</td>
<td>Displays host configuration and port issues</td>
</tr>
<tr>
<td>ld</td>
<td>Displays LD issues</td>
</tr>
<tr>
<td>license</td>
<td>Displays license violations</td>
</tr>
<tr>
<td>network</td>
<td>Displays Ethernet issues</td>
</tr>
</tbody>
</table>

Table Continued
<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>node</td>
<td>Displays controller node issues</td>
</tr>
<tr>
<td>pd</td>
<td>Displays PD states or condition issues</td>
</tr>
<tr>
<td>pdch</td>
<td>Displays chunklets state issues</td>
</tr>
<tr>
<td>port</td>
<td>Displays port connection issues</td>
</tr>
<tr>
<td>qos</td>
<td>Displays quality-of-service issues</td>
</tr>
<tr>
<td>rc</td>
<td>Displays Remote Copy issues</td>
</tr>
<tr>
<td>snmp</td>
<td>Displays issues with SNMP</td>
</tr>
<tr>
<td>task</td>
<td>Displays failed tasks</td>
</tr>
<tr>
<td>vlun</td>
<td>Displays VLUN issues</td>
</tr>
<tr>
<td>vv</td>
<td>Displays VV issues</td>
</tr>
</tbody>
</table>

**alert**

Displays any unresolved alerts and shows any alerts that would be seen by `showalert -n`.

**Format of possible alert exception messages**

```
Alert <component> <alert_text>
```

**alert example**

```
Component -Identifier- --------Detailed Description--------------------
Alert     hw_cage:1    Cage 1 Degraded (Loop Offline)
Alert     sw_cli       11 authentication failures in 120 secs
```

**alert suggested action**

View the full alert output using the SSMC interface or the HPE 3PAR CLI command `showalert -d`.

**ao**

- Displays Adaptive Optimization issues
- Checks that all PD classes that exist on any node-pair are found on all node pairs

**Format of possible ao exception messages**

```
AO Nodes:<nodelist> "<PDclass> PDs need to be attached to this Node pair"
```

**ao example**

```
Component ------Summary Description------ Qty
AO       Node pairs with unmatched PD types 1
```
ao suggestion action

Use the following CLI commands to view PD distribution: `showpd`, `showpd -p -devtype NL`, `showpd -p -devtype NL -nodes 0,1`, and `showcage`. In the following example, there are 72 NL PDs attached to nodes 2&3, but none attached to nodes 0&1. Contact the Hewlett Packard Enterprise Support Center to request support for moving NL PDs (and possibly cages) from nodes 2&3 to nodes 0&1 for your system.

```
cli% showpd -p -devtype NL -nodes 2,3

<table>
<thead>
<tr>
<th>Id</th>
<th>CagePos</th>
<th>Type</th>
<th>RPM</th>
<th>State</th>
<th>-----Size(MB)-------</th>
<th>-----Ports-----</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>12:0:0</td>
<td>NL</td>
<td>7</td>
<td>normal</td>
<td>1848320</td>
<td>1766400 3:0:1* 2:0:1</td>
</tr>
<tr>
<td>201</td>
<td>12:1:0</td>
<td>NL</td>
<td>7</td>
<td>normal</td>
<td>1848320</td>
<td>1766400 3:0:1 2:0:1*</td>
</tr>
<tr>
<td>202</td>
<td>12:2:0</td>
<td>NL</td>
<td>7</td>
<td>normal</td>
<td>1848320</td>
<td>1765376 3:0:1* 2:0:1</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>303</td>
<td>17:22:0</td>
<td>NL</td>
<td>7</td>
<td>normal</td>
<td>1848320</td>
<td>1765376 3:0:2 2:0:2*</td>
</tr>
</tbody>
</table>

72 total                    133079040 127172608
```

cli% showpd -p -devtype NL -nodes 0,1

cabling

Displays issues with cabling of drive enclosures (cages).

- Cages cabled correctly to controller nodes
- Cages cabled correctly to drive enclosure I/O modules and ports
- Cages with broken cables
- Cable daisy chain lengths balanced and supported length
- Cable daisy chain order
- Cages with no PDs with primary path to controller nodes

NOTE: To avoid any cabling errors, all drive enclosures must have at least one or more hard drives installed before powering on the enclosure.

Format of possible cabling exception messages

- `Cabling <cageID> "Cabled to <nodelist>, remove a cable from <nodelist>"`
- `Cabling <nodeID> "No cabling data for <nodeID>. Check status of <nodeID>"`
- `Cabling <cageID> "Cage is connected to too many node ports (<portlist>)"
- `Cabling <cageID> "Cage has multiple paths to <portlist>, correct cabling"
- `Cabling <cageID> "I/O <moduleID> missing. Check status and cabling to <cageID> I/O <moduleID>"
- `Cabling <cageID> "Cage not connected to <nodeID>, move one connection from <nodeID> to <nodeID>"
- `Cabling <cageID> "Cage connected to different ports <node&portID> and <node&portID>"
- `Cabling <cageID> "Cage connected to non-paired nodes <node&portID> and <node&portID>"
- `Cabling <cageID> "Check connections or replace cable from (<cage,module,portID>) to (<cage,module,portID>) - failed links at <speed>"
- `Cabling <node&portID> "<node&portID> has <count> cages, <node&portID> has <count> cages"
- `Cabling <cageID> "Cable in (<cage,module,portID>) should be in (<cage,module,portID>)"
- `Cabling <cageID> "No PDs installed in cage, cabling check incomplete"
- `Cabling <cageID> "<node&portID> should be cabled in the order: (<cageID>)"

Cabling example 1

```
Component -Summary Description- Qty
Cabling  Bad SAS connection      1
```
cabling suggested action 1

Use the CLI `showcage` command to verify that both cages are available through two ports, before replacing the cable specified in the error message.

```
cli% showcage cage6 cage7
```

```
Id | Name  | LoopA | Pos.A | LoopB | Pos.B | Drives | Temp | RevA | RevB | Model | FormFactor
---|-------|-------|-------|-------|-------|--------|------|------|------|-------|-----------
6  | cage6 | 0:1:1 | 1     | 1:1:1 | 0     | 10     | 28-30| 1.76 | 1.76 | DCS8  | SFF      
7  | cage7 | 0:1:1 | 0     | 1:1:1 | 1     | 10     | 27-30| 1.76 | 1.76 | DCS8  | SFF      
```

cabling example 2

```
cli% checkhealth -detail cabling
Checking cabling
Component --Summary Description--- Qty
Cabling   Wrong I/O module or port   2
--------------------------------------
1 total                      2

Component -Identifier- ---------------------Detailed Description----------------------
Cabling   cage2        Cable in (cage2, I/O 0, DP-2) should be in (cage2, I/O 0, DP-1) 1
Cabling   cage2        Cable in (cage2, I/O 0, DP-1) should be in (cage2, I/O 0, DP-2) 1

2 total
```

```
root@jnodec103288:~# showcage cage2
```

```
Id | Name  | LoopA | Pos.A | LoopB | Pos.B | Drives | Temp | RevA | RevB | Model | FormFactor
---|-------|-------|-------|-------|-------|--------|------|------|------|-------|-----------
2  | cage2 | 0:0:2 | 1     | 1:0:2 | 0     | 10     | 13-34| 402e | 402e | DCS7  | SFF      
```

cabling suggested action 2

For cables that must be moved to different ports in the same I/O Module: Use the CLI `showcage` command to verify that the cage is available through two ports, before moving one or more cables to the specified ports. For cables that must be moved between different I/O Modules and/or Drive Enclosures (cages), contact the Hewlett Packard Enterprise Support Center to request support for changing the cabling of your system. Moving cables on a running system can cause degraded PDs and LDs.

```
cli% showcage cage2
```

```
Id | Name  | LoopA | Pos.A | LoopB | Pos.B | Drives | Temp | RevA | RevB | Model | FormFactor
---|-------|-------|-------|-------|-------|--------|------|------|------|-------|-----------
2  | cage2 | 0:0:2 | 1     | 1:0:2 | 0     | 10     | 13-34| 402e | 402e | DCS7  | SFF      
```

cage

Displays drive enclosure (cage) conditions that are not optimal and reports exceptions if any of the following do not have normal states:

- Ports
- SFP signal levels (RX power low and TX failure)
- Power supplies
- Cage firmware (is not current)
- Reports if a `servicecage` operation has been started and has not ended.
- Cages are supported for hardware platform

Format of possible `cage` exception messages
Cage cage:<cageid> "Missing A loop" (or "Missing B loop")
Cage cage:<cageid>,mag:<magpos> "Magazine is <MAGSTATE>"
Cage cage:<cageid> "Power supply <X>'s fan is <FANSTATE>"
Cage cage:<cageid> "Power supply <X> is <PSSTATE>" (Degraded, Failed, Not_Present)
Cage cage:<cageid> "Cage is in "servicing" mode (Hot-Plug LED may be illuminated)"
Cage cage:<cageid> "Firmware is not current"
Cage cage:<cageid> "Cage type <Model> is not supported on this platform"
Cage cage:<cageid> "Missing both A and B loops"
Cage cage:<cageid> "Cage state information is unavailable"

**cage example 1**

<table>
<thead>
<tr>
<th>Component</th>
<th>Summary Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cage</td>
<td>Cages missing A loop</td>
<td>1</td>
</tr>
</tbody>
</table>

**cage suggested action 1**

```bash
cli% showcage -d cage1
Id Name  LoopA Pos.A LoopB Pos.B Drives Temp  RevA RevB Model FormFactor
1 cage1 0:1:1     1 1:1:1     1      8 21-23 402e 402e DCS8  SFF
```

```plaintext
----------Cage detail info for cage1----------

Position: ---

<table>
<thead>
<tr>
<th>Interface Board Info</th>
<th>Card0</th>
<th>Card1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firmware status</td>
<td>Current</td>
<td>Current</td>
</tr>
<tr>
<td>Product Rev</td>
<td>402e</td>
<td>402e</td>
</tr>
<tr>
<td>State(self,partner)</td>
<td>OK,OK</td>
<td>OK,OK</td>
</tr>
<tr>
<td>VendorId,ProductId</td>
<td>HP,DCS8</td>
<td>HP,DCS8</td>
</tr>
<tr>
<td>Master_CPU</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>SAS Addr</td>
<td>50050CC1178EA0BE 50050CC1178E6BBE</td>
<td></td>
</tr>
<tr>
<td>Link_Speed(DP1,DP2)</td>
<td>6.0Gbps,Unknown 6.0Gbps,Unknown</td>
<td></td>
</tr>
</tbody>
</table>

| PS PSState ACState DCState Fan State Fan0_Speed Fan1_Speed |
|---------------|-------------|-------------|-------------|-------------|
| ps0           | OK          | OK          | OK          | Low         | Low         |
| ps1           | Failed      | Failed      | Failed      | OK          | Low         |

----------Drive Info----------

<table>
<thead>
<tr>
<th>Drive</th>
<th>DeviceName State</th>
<th>Temp(C)</th>
<th>LoopState LoopState</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:0</td>
<td>5000c500720387e0 Normal</td>
<td>21 OK</td>
<td>OK</td>
</tr>
<tr>
<td>1:0</td>
<td>5000c50072039188 Normal</td>
<td>21 OK</td>
<td>OK</td>
</tr>
<tr>
<td>2:0</td>
<td>5000c500720387b0 Normal</td>
<td>21 OK</td>
<td>OK</td>
</tr>
<tr>
<td>3:0</td>
<td>5000c500720395b4 Normal</td>
<td>21 OK</td>
<td>OK</td>
</tr>
<tr>
<td>4:0</td>
<td>5000c50072036fbc Normal</td>
<td>21 OK</td>
<td>OK</td>
</tr>
<tr>
<td>5:0</td>
<td>5000c50072039fc0 Normal</td>
<td>21 OK</td>
<td>OK</td>
</tr>
<tr>
<td>6:0</td>
<td>5000c50072037250 Normal</td>
<td>22 OK</td>
<td>OK</td>
</tr>
<tr>
<td>7:0</td>
<td>5000c5005737cc0c Normal</td>
<td>23 OK</td>
<td>OK</td>
</tr>
</tbody>
</table>
```

Check the connection/path to the SFP in the drive enclosure (cage) and the level of signal the SFP is receiving. An RX Power reading below 100 µW signals the RX Power Low condition; typical readings are between 300 µW and 400 µW. Helpful CLI commands are `showcage -d` and `showcage -sfp -ddm`.

At least two connections are expected for drive enclosures (cages), and this exception is flagged if that is not the case.

**cage example 2**
A drive enclosure (cage) power supply or power supply fan is failed, is missing input AC power, or the switch is turned OFF. The `showcage -d <cageID>` and `showalert` commands provide more detail.

```
cli% showcage -d cage1
```

<table>
<thead>
<tr>
<th>Id</th>
<th>Name</th>
<th>LoopA</th>
<th>Pos.A</th>
<th>LoopB</th>
<th>Pos.B</th>
<th>Drives</th>
<th>Temp</th>
<th>RevA</th>
<th>RevB</th>
<th>Model</th>
<th>FormFactor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>cage1</td>
<td>0:1:1</td>
<td></td>
<td>1:1:1</td>
<td></td>
<td>1</td>
<td>8</td>
<td>21-23</td>
<td>402e</td>
<td>402e</td>
<td>DCS8</td>
</tr>
</tbody>
</table>

```
-----------Cage detail info for cage1 ---------
Position: ---
```

<table>
<thead>
<tr>
<th>Interface Board Info</th>
<th>Card0</th>
<th>Card1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firmware_status</td>
<td>Current</td>
<td>Current</td>
</tr>
<tr>
<td>Product_Rev</td>
<td>402e</td>
<td>402e</td>
</tr>
<tr>
<td>State(self,partner)</td>
<td>OK,OK</td>
<td>OK,OK</td>
</tr>
<tr>
<td>VendorId,ProductId</td>
<td>HP,DCS8</td>
<td>HP,DCS8</td>
</tr>
<tr>
<td>Master_CPU</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>SAS_Addr</td>
<td>50050CC1178EA0BE</td>
<td>50050CC1178E6BBE</td>
</tr>
<tr>
<td>Link_Speed(DP1,DP2)</td>
<td>6.0Gbps,Unknown</td>
<td>6.0Gbps,Unknown</td>
</tr>
</tbody>
</table>

```
-------------Drive Info-------------- --PortA-- --PortB--
Drive | DeviceName | State | Temp(C) | LoopState | LoopState |
0:0   | 5000c500720387e0 | Normal | 21 | OK | OK |
1:0   | 5000c50072039188 | Normal | 21 | OK | OK |
2:0   | 5000c500720387b0 | Normal | 21 | OK | OK |
3:0   | 5000c500720395b4 | Normal | 21 | OK | OK |
4:0   | 5000c50072036fbc | Normal | 21 | OK | OK |
5:0   | 5000c50072039fc0 | Normal | 21 | OK | OK |
6:0   | 5000c50072037250 | Normal | 22 | OK | OK |
7:0   | 5000c5005737cc0c | Normal | 23 | OK | OK |
```

cage suggested action 2

When a `servicecage` operation is started, it puts the targeted cage into servicing mode, and routing I/O through another path. When the service action is finished, the `servicecage endfc` command must be issued to return the drive enclosure (cage) to normal status. This `checkhealth` exception is reported if the I/O module drive enclosure (cage) is in servicing mode. If a maintenance activity is occurring on the drive enclosure (cage), this condition can be ignored.
NOTE: The primary path can be seen by an asterisk (*) in showpd's Ports columns.

cli% showcage -d cage1

Id  Name    LoopA   Pos.A   LoopB   Pos.B   Drives   Temp   RevA   RevB   Model   FormFactor
1   cage1   ---     1       1:1:1   1       8        20-23  402e   -      DCS8    SFF

--------------Cage detail info for cage1 --------------

Position: ---

Interface Board Info  Card0        Card1
Firmware_status       Current      -
Product_Rev           402e         -
State(self,partner)   OK,OK        -,-
VendorID,ProductID    HP,DCS8      -,-
Master_CPU            Yes          -
SAS_Addr              50050CC1178EA0BE -
Link_Speed(DP1,DP2)   6.0Gbps,Unknown -,-

PS   PSState  ACState  DCState  Fan State  Fan0_Speed  Fan1_Speed
ps0  OK       OK       OK       OK         Low         Low
ps1  OK       OK       OK       OK         Low         Low

---------------Drive Info------------------  ----PortA----  ----PortB----
Drive       DeviceName    State   Temp(C)    LoopState      LoopState
0:0   5000c500720387e0  Normal    20           -              OK
0:1   5000c50072039188  Normal    21           -              OK
0:2   5000c500720397b0  Normal    21           -              OK
0:3   5000c500720395b4  Normal    21           -              OK
0:4   5000c50072036fbc  Normal    21           -              OK
0:5   5000c50072039fc0  Normal    21           -              OK
0:6   5000c50072037250  Normal    21           -              OK
0:7   5000c5005737cc0c  Normal    23           -              OK

SComponent ---------Summary Description--------- Qty
Cage      Cages not on current firmware            1

Component -Identifier- ------Detailed Description------
Cage      cage:3       Firmware is not current

cage suggested action 4

Check the drive enclosure (cage) firmware revision using the commands showcage and showcage -d <cageID> . The showfirmwaredb command indicates what the current firmware level must be for the specific drive cage type.

NOTE: Use the upgradecage command to upgrade the firmware.
cert

- Displays certificate issues
- Reports SSL certificates that have expired, will expire in less than 30 days, and certificates that will not be valid until a future date

**Format of possible cert exception messages**

```
cert -- "Certificate <DNSname> for Service:<servicename> will expire in <count> days"
cert -- "Certificate <DNSname> for Service:<servicename> expired on <date&time>"
cert -- "Certificate <DNSname> for Service:<servicename> not valid until <date&time>"
```

cert **example**

```bash
cli% checkhealth -detail cert
Checking cert
Component ------Summary Description------ Qty
cert Certificates that have expired 1
```

<table>
<thead>
<tr>
<th>Component</th>
<th>Identifier</th>
<th>Detailed Description</th>
</tr>
</thead>
</table>

**cert suggested action**

Use the CLI `showcert` command to display the current SSL certificates. Use the CLI `removecert` command to remove the expired SSL certificate and the CLI `createcert` command to create an SSL certificate with a valid date range.

dar

Checks for issues with data encryption.

**Format of possible dar exception messages**

```
DAR -- "DAR Encryption status is unavailable"
DAR -- "DAR Encryption is enabled but not licensed"
DAR -- "DAR Encryption key needs backup"
DAR -- "There are <number> disks that are not Self Encrypting"
DAR -- "DAR Encryption status: <dar state>"
DAR -- "DAR EKM status is: <EKM status"
```

dar **example 1**

```
DAR -- "There are 5 disks that are not self-encrypting"
```

dar **suggested action 1**

Remove the drives that are not self-encrypting from the system because the nonencrypted drives cannot be admitted into a system that is running with data encryption. Also, if the system is not yet enabled for data encryption, the presence of these drives prevents data encryption from being enabled.

dar **example 2**

```
Dar -- "DAR Encryption key needs backup"
```

dar **suggested action 2**

Issue the `controldlencryption backup` command to generate a password-enabled backup file.

dar **example 3**
DAR -- DAR EKM status is: Error: Unable to access EKM. Configuration or connection issue.

dar suggested action 3

Use the `controlencryption status -d` and `controlencryption checkekm` CLI commands to view more status about encryption. Check network status for controller nodes with `shownet` and `shownet -d` CLI commands. For the EKM server, check the status and the network connections and status.

date

Checks the date and time on all controller nodes and reports an error if they are not the same.

Format of possible date exception messages

| Date -- "Date is not the same on all nodes"

date example

Component -Identifier- ---------------Detailed Description--------------
Date -- Date is not the same on all nodes

date suggested action

The time on the controller nodes must stay synchronized whether there is an NTP server or not. Use `showdate` to see if a controller node is out of sync. Use `shownet` and `shownet -d` to see the network and NTP information. NTP will not adjust the time for significant time differences, use the `setdate` CLI command to set the time, date, and time zone on all controller nodes.

cli% showdate
Node Date
0 2010-09-08 10:56:41 PDT (America/Los_Angeles)
1 2010-09-08 10:56:39 PDT (America/Los_Angeles)
cli% shownetshowdatesetdate -tz America/Denver setdate 05211532 showdate

file

Displays file system conditions that are not optimal:

- Checks that required system volumes are mounted.
- Checks for process, kernel, and HBA cores on controller node disk drives.
- Checks for controller node file systems that are too full.
- Checks for behavior altering files on the controller node disk drives.
- Checks if an online upgrade is in progress.

Many issues reported by the `file` component will require you to contact the Hewlett Packard Enterprise Support Center.

Format of possible file exception messages

| File <nodeID> "Filesystem <filesystem> mounted on "<mounted on>" is over <count>% full"
| File <nodeID> "Behavior altering file "<filename>" exists, created on <date&time>"
| File <nodeID> "Dump or HBA core files found"
File <nodeID> "sr_mnt is full"
File -- "sr mnt not mounted"
File -- "Admin Volume is not mounted"
File -- "An online upgrade is in progress"

**file example 1**

File node:2 Behavior altering file "manualstartup" exists created on Oct 7 14:16

**file suggested action 1**

After understanding why the files are present, the file must be removed to prevent unwanted behavior. As root on a controller node, remove the file using the UNIX `rm` command.

Known condition: some undesirable touch files are not being detected (bug 45661).

**file example 2**

Component -----------Summary Description----------- Qty
File Admin Volume is not mounted 1

**file suggested action 2**

Each controller node has a file system link so that the admin volume can be mounted if that controller node is the master controller node. This exception is reported if the link is missing or if the System Manager (sysmgr) is not running at the time. For example, `sysmgr` might have been restarted manually, due to error or during a change of master-nodes. If sysmgr was restarted, it tries to remount the admin volume every few minutes.

Every controller node must have the following file system link so that the admin volume can be mounted, if the controller node becomes the master controller node:

```
# onallnodes ls -l /dev/tpd_vvadmin
Node 0:
lrwxrwxrwx 1 root root 12 Oct 23 09:53 /dev/tpd_vvadmin -> tpddev/vvb/0
Node 1:
ls: /dev/tpd_vvadmin: No such file or directory
```

The corresponding alert when the admin volume is not properly mounted is as follows:

Message Code: 0xd0002
Severity : Minor
Type : PR transition
Message : The PR is currently getting data from the internal drive on node 1, not the admin volume. Previously recorded alerts will not be visible until the PR transitions to the admin volume.

If a link for the admin volume is not present, it can be recreated by rebooting the controller node.

**file example 3**

Component -----------Summary Description----------- Qty
File Nodes with Dump or HBA core files 1

Component ----Identifier----- ----Detailed Description------
File node:1 Dump or HBA core files found
file suggested action 3

This condition might be transient because the service processor retrieves the files and cleans up the dump directory. If the service processor (SP) is not gathering the dump files, check the condition and state of the SP.

file example 4

Component ------Summary Description-------- Qty
License An online upgrade is in progress 1

file suggested action 4

Use the CLI `upgradesys -status` command to determine the status of the online upgrade in progress. Use the CLI `upgradesys -node <nodeID>` command to reboot the next controller node shown in the status or the CLI `upgradesys -finish` command to complete the upgrade after all controller nodes have rebooted to the new version of software. Be careful with aborting or reverting an offline upgrade. Contact the Hewlett Packard Enterprise Support Center to request support for aborting or reverting the upgrade of your system.

fs

Displays file services health and checks the following file services items:

- Checks the health of file services and the failover/health of each storage pool.
- Checks the health of each virtual file system.
- Checks the health of the node IP addresses for file services.
- Checks the health of the file services gateway.

Format of possible fs exception messages

```
fs fpg "<error text>"
fs <poolname> "<poolname> is degraded: Failed over from <primaryowner> to <currentowner>"
fs <poolname> "<poolname>: <associatedMessage>. Corrective Action: <correctiveAction>
fs vfs "<error text>"
fs <server> "IP address failed to activate"
fs <server> "Missing fsip for VFS"
fs <server> "Missing cert for VFS"
fs fshareobj) "<error text>"
fs nodeip "<error text>"
fs gw "<error text>"
fs <gatewayaddr> "<gatewayaddr>: <associatedMessage>"
fs dns "<error text>"
fs <dnssuffixlist> "<dnssuffixlist>: <associatedMessage>"
```

fs example

Component --------Summary Description----------- Qty
fs File Services provisioning group issues 1

Component -Identifier- -------------------Detailed Description-------------------
fs fsp2 fsp2: FPG is not activated. Corrective Action: Activate FPG

fs Suggested action

Use the CLI `showfpg` command to determine the state of the listed FPG. Use the CLI `setfpg` and `setfpg -activate` commands to start the listed FPG or the CLI `removefpg` command to remove the
FPG if no longer wanted. For other file services issues, use the CLI `showfs`, `showvfs`, `showvfs -d` commands (and the associated set and stop commands) to investigate and solve issues.

**host**

- Displays Adaptive Optimization issues.
- Checks that all PD classes that exist on any node pair are found on all node pairs.
- Checks that FC fabric connected host ports are configured to support persistent ports.
- Checks that the FC switch ports are configured for NPIV support.
- Checks that FC fabric connected host partner ports are found on same FC SAN.
- Checks that VLUNs are visible to their configured host through more than one controller node.

**Format of possible host exception messages**

- `Host <portID> "Port failover state is <failoverstate>, port state is <state>"`
- `Host <portID> "Port not connected to fabric like <portID>"`
- `Host <portID> "Port not configured as host like <portID>"`
- `Host <portID> "Port not FC like <portID>"
- `Host <portID> "Port state is <state>, not ready like <portID>"
- `Host <portID> "Port WWN not found on FC Fabric attached to <portID>"
- `Host <portID> "Host port connected to FC Fabric switch port without NPIV support"
- `Host <portID> "Host is not seen by multiple nodes, only seen from node <nodeID>"

**host example 1**

Component --------Summary Description-------- Qty
Host      Ports not configured symmetrically   1

Component -Identifier- ------------Detailed Description------------
Host      Port:0:1:1   Port not connected to fabric like Port:1:1:1

**host action 1**

Use the CLI `showport`, `showport -par`, and `controlport` commands to configure port 1:0:1 for point mode (fabric connect) or configure port 0:1:1 to loop mode (for direct connect).

```
cli% showport -par 0:0:1 1:0:1
N:S:P CommNode ConnType CfgRate MaxRate Class2   UniqNodeWwn VCN      IntCoal  TMWO    Smart_SAN
0:1:1 host     loop     auto    8Gbps   disabled disabled    disabled disabled enabled n/a
1:0:1 host     point    auto    8Gbps   disabled disabled    disabled disabled enabled n/a
```

**host example 2**

Component ------Summary Description------- Qty
host      Hosts not seen by multiple nodes   1

Component -Identifier- ------------------Detailed Description------------------
host      testhost     Host is not seen by multiple nodes, only seen from node 3

**host action 2**

Use CLI `showvlun -v` and `showhost` commands to determine what issue is reported. If the host is defined with only connections from one controller node, use the CLI `createhost -add` command to add host connections for an additional to the host definitions. If the host is defined with ports from multiple...
controller nodes, use the CLI `showport` command to determine if a port is offline or misconfigured. A missing or rebooting controller node will cause a port to be offline.

```
cli% showvlun -v testvv
Active VLUNs
  Lun VVName HostName -Host_WWN/iSCSI_Name-  Port Type Status ID
  2 testvv testhost 10000000C9E5E0B9      3:1:1 host active  1

cli% showhost testhost
cli% createhost -add testhost 10000000C9E5E0B8
```

### ld

- Checks preserved LDs.
- Verifies that the current and created availability is the same.
- Verifies the owner and backup.
- Verifies the preserved data space (pdsld) is the same as the total data cache.
- Verifies the size and number of logging LDs.
- Displays LDs that are in a failed or a degraded state.
- Displays LDs that are mapped to volumes.
- Displays LDs that are in write-through mode.

#### Format of possible ld exception messages

<table>
<thead>
<tr>
<th>LD id:ldname</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD id:ldname</td>
<td>&quot;LD is not mapped to a volume&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;LD is in write-through mode&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;LD has &lt;X&gt; preserved RAID sets and &lt;Y&gt; preserved chunklets&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;LD has reduced availability. Current: &lt;cavail&gt;, Configured: &lt;avail&gt;&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;LD does not have a backup&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;LD does not have owner and backup&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;Logical Disk is owned by &lt;owner&gt;, but preferred owner is &lt;powner&gt;&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;Logical Disk is backed by &lt;backup&gt;, but preferred backup is &lt;pbackup&gt;&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;A logging LD is smaller than 20G in size&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;Detailed State:&lt;ldstate&gt;&quot; (degraded or failed)</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;Number of logging LD's does not match number of nodes in the cluster&quot;</td>
</tr>
<tr>
<td>LD id:ldname</td>
<td>&quot;Preserved data storage space does not equal total node's Data memory&quot;</td>
</tr>
</tbody>
</table>

#### ld example 1

| Component ------Summary Description-------- Qty |
|--------------|------------------------------------------|-----|
| LD           | LDs not mapped to a volume               | 1   |

#### ld suggested action 1

Examine the identified LDs using CLI commands such as `showld`, `showld -d`, `showldmap`, `showvvmap`, and other such commands.

LDs are mapped to VVs. However, an LD can become disassociated from a VV for two reasons: 1) if the VV is deleted without the underlying LDs being deleted too, and 2) if you use the aborted tune operation. Most often you remove the unmapped LD to return its chunklets to the free pool.
cli% showld vv.9.usr.3
Id Name      RAID -Detailed_State- Own     SizeMB UsedMB Use Lgct LgId WThru MapV
57 vv.9.usr.3  1 normal  1/0       8192          0 C,V 0 --- N N
-------------------------------------------------------------------------------------
1                      8192        0
cli% showldmap vv.9.usr.3
Ld space not used by any vv

**1d example 2**

Component --------Summary Description-------- Qty
LD    LDs in write through mode            3

Component -Identifier-- ------Detailed Description---------
LD    ld:Ten.usr.12 LD is in write-through mode

**1d suggested action 2**

Examine the identified LDs using CLI commands such as `showld, showld -d`, `showldch`, and `showpd` for any failed or missing drives. Write-through mode (WThru) indicates that host I/O operations must be written through to the drive before the host I/O command is acknowledged. This is due to a node-down condition, when controller node batteries are not working, or where drive redundancy is not optimal.

cli% showld Ten*
Id Name       RAID -Detailed_State- Own     SizeMB UsedMB Use Lgct LgId WThru MapV
91 Ten.usr.3     0 normal           1/0/3/2  13824      0 V      0  ---     N    N
92 Ten.usr.12    0 normal           2/3/0/1  28672      0 V      0  ---     Y    N
cli% showldch Ten.usr.12
cli% showpd 104

**1d example 3**

Component --------Summary Description-------- Qty
LD    LDs with reduced availability           1

Component --Identifier-- -------------Detailed Description---------------
LD    ld:R1.usr.0    LD has reduced availability. Current: ch, Configured: cage

**1d suggested action 3**

LDs are created with certain high-availability characteristics, such as `-ha -cage`. If chunklets in an LD get moved to locations where the Current Availability (CAvail) is not at least as good as the wanted level of availability (Avail), this condition is reported. Chunklets might have been manually moved with `movech` or by specifying it during a tune operation or during failure conditions such as controller node, path, or cage failures. The HA levels from highest to lowest are port, cage, mag, and ch (disk).

Examine the identified LDs using CLI commands such as `showld, showld -d`, `showldch`, and `showpd` for any failed or missing drives. In the following example, the LD must have cage-level availability, but it currently has chunklet (drive) level availability (the chunklets are on the same drive).

cli% showld -d R1.usr.0
Id Name     CPG RAID Own     SizeMB RSizeMB RowSz StepKB SetSz Refcnt Avail CAvail
32 R1.usr.0 --- 1 0/1/3/2  256     512     1    256     2      0 cage ch

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### ld example 4

Component Identifier — Detailed Description
LD -- Preserved data storage space does not equal total node's Data memory

### ld suggested action 4

Preserved data LDs (pdsld) are created during system initialization (OOTB) and after some hardware upgrades (via admithw). The total size of the pdsld must match the total size of all data-cache in the storage system (see the following example). This message appears if a node is offline because the comparison of LD size to data cache size does not match. This message can be ignored unless all nodes are online. If all nodes are online and the error condition persists, determine the cause of the failure. Use the admithw command to correct the condition.

<table>
<thead>
<tr>
<th>Node</th>
<th>Name</th>
<th>State</th>
<th>Master</th>
<th>InCluster</th>
<th>LED</th>
<th>Mem(MB)</th>
<th>Mem(MB)</th>
<th>Available(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1001335-0</td>
<td>OK</td>
<td>Yes</td>
<td>Yes</td>
<td>GreenBlnk</td>
<td>2048</td>
<td>4096</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>1001335-1</td>
<td>OK</td>
<td>No</td>
<td>Yes</td>
<td>GreenBlnk</td>
<td>2048</td>
<td>4096</td>
<td>100</td>
</tr>
</tbody>
</table>

### license

Displays license violations. Returns information if a license is temporary or if it has expired.

**Format of possible license exception messages**

License <feature_name> "License has expired"

### license example

Component Identifier — Detailed Description
License -- System Tuner License has expired

### license suggested action

If wanted, request a new or updated license from your sales engineer.

### network

Displays Ethernet issues for the administrative, file services, and Remote Copy over IP (RCIP) networks that have been logged in the previous 24-hour sampling window. Reports if the storage system has fewer than two nodes with working admin Ethernet connections.

- Checks whether the number of collisions is greater than 5% of total packets in the previous day's log.
- Check for Ethernet errors and transmit (TX) or receive (RX) errors in the previous day's log.

**Format of possible network exception messages**

Network -- "IP address change has not been completed"
Network "Node<node>:<type>" "Errors detected on network"
Network "Node<node>:<type>" "There is less than one day of network history for this node"
Network -- "No nodes have working admin network connections"
Network -- "Node <node> has no admin network link detected"
Network -- "Nodes <nodelist> have no admin network link detected"
Network -- "checkhealth was unable to determine admin link status"
network example 1

Network -- "IP address change has not been completed"

network suggested action 1

The `setnet` command was issued to change some network parameter, such as the IP address, but the action has not been completed. Use `setnet finish` to complete the change, or `setnet abort` to cancel. Use `shownet` to examine the current condition.

<table>
<thead>
<tr>
<th></th>
<th>IP Address</th>
<th>Netmask/PrefixLen</th>
<th>Nodes</th>
<th>Active Speed</th>
<th>Duplex</th>
<th>AutoNeg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>192.168.56.209</td>
<td>255.255.255.0</td>
<td>0123</td>
<td>0</td>
<td>Full</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>192.168.56.233</td>
<td>255.255.255.0</td>
<td>0123</td>
<td>0</td>
<td>Full</td>
<td>Yes</td>
</tr>
</tbody>
</table>

network example 2

Component ---Identifier----- -----Detailed Description----------
Network  Node0:Admin       Errors detected on network

network suggested action 2

Network errors have been detected on the specified node and network interface. Commands such as `shownet` and `shownet -d` are useful for troubleshooting network problems. These commands display current network counters as `checkhealth` compares error with the last logging sample.

**NOTE:** The error counters shown by `shownet` and `shownet -d` cannot be cleared except by rebooting a controller node. Because `checkhealth` is comparing network counters with a history log, `checkhealth` stops reporting the issue if there is no increase in error in the next log entry.

```
cli% shownet -d
IP Address: 192.168.56.209   Netmask 255.255.255.0
Assigned to nodes: 0123
Connected through node 0
Status: Active

Admin interface on node 0
MAC Address:     00:02:AC:25:04:03
RX Packets:                1225109  TX Packets:                   550205
RX Bytes:               1089073679  TX Bytes:                  568149943
RX Errors:                       0  TX Errors:                         0
RX Dropped:                      0  TX Dropped:                        0
RX Frame Errors:                60  TX Carrier Errors:                  0
RX Multicast:                    0  TX Compressed:                     0
RX Compressed:                   0
```

pd

Displays physical drives (PDs) with states or conditions that are not optimal:

- Checks for failed and degraded PDs
- Checks for an imbalance of PD ports, for example, if Port-A is used on more Drives than Port-B
- Checks for an Unknown sparing algorithm. For example, when it has not been set
- Checks for drives experiencing a high number of IOPS
- Reports if a servicemag operation is outstanding (servicemag status)
- Reports if there are PDs that do not have entries in the firmware DB file
- Reports PDs with slow SAS connections
- Reports minimum number of PDs in a drive enclosure (cage) and behind a node pair
- Reports PDs that are not admitted to the system

**Format of possible pd exception messages**

PD disk:<pdid> "Degraded States: <showpd -s -degraded>"
PD disk:<pdid> "Failed States: <showpd -s -failed>"
PD -- "Sparing algorithm is not set"
PD disk:<pdid> "Disk is experiencing a high level of I/O per second: <iops>"
PD File: <filename> "Folder not found on all Nodes in <folder>"
PD File: <filename> "Folder not found on some Nodes in <folder>"
PD Cage:<cageid> "There must be at least 1 PD with primary path to Node:<nodeid>"
PD Cage:<cageid> "PDs <class/rpm/cap> unbalanced. Primary path: <p_count> on Node:<nodeid>, <c_count> on Node:<nodeid>"
PD Nodes:<nodelist> "Only <count> <class/rpm/cap> PDs are attached to these nodes; the minimum is <MINDISKCNT>"
PD disk:<pdid> "PD SAS speed is <speed> instead of <speed> on both ports"
PD disk:<pdid> "PD SAS speed is <speed> instead of <speed> from port <0|1>"
PD Cage:<cageid>,mag:<magid> "Magazine has a failed servicemag operation"
PD Cage:<cageid>,mag:<magid> "Magazine is being serviced"
PD Cage:<cageid>,mag:<magid> "Magazine has an active servicemag operation in progress"

**pd example 1**

<table>
<thead>
<tr>
<th>Component</th>
<th>Summary Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>PDs that are degraded or failed</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Identifier</th>
<th>Detailed Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>disk:48</td>
<td>Detailed State: missing_B_port,loop_failure</td>
<td></td>
</tr>
<tr>
<td>PD</td>
<td>disk:49</td>
<td>Detailed State: missing_B_port,loop_failure</td>
<td></td>
</tr>
<tr>
<td>PD</td>
<td>disk:107</td>
<td>Detailed State: failed,notready,missing_A_port</td>
<td></td>
</tr>
</tbody>
</table>

**pd suggested action 1**

Both degraded and failed drives show up in this report. When an FC path to a drive Enclosure (cage) is not working, all drives in the cage have a state of Degraded due to the nonredundant condition. Use commands such as showpd, showpd -s, showcase, showcase -d.

```sh
cli% showpd -degraded -failed
Id CagePos Type Speed(K) State Total Free A B
48 3:0:0 FC 10 degraded 139520 115200 2:0:2* ----- 2
49 3:1:0 FC 10 degraded 139520 121344 2:0:2* ----- 2
...
107 4:9:3 FC 15 failed 428800 0 ----- 3:0:1*

cli% showpd -s -degraded -failed

cli% showcase -d cage3
```

**pd example 2**

```sh
cli% checkhealth -detail pd Checking pd
Component | Summary Description | Qty |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>Unbalanced PD types in cages</td>
<td>1</td>
</tr>
<tr>
<td>PD</td>
<td>PDs that a degraded</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 total</td>
</tr>
</tbody>
</table>
```
pd suggested action 2

The primary and secondary I/O paths for drives (PDs) are balanced between nodes. The primary path is indicated in the `showpd -path` output and by an asterisk in the `showpd` output. An imbalance of active ports is caused by a nonfunctioning path/loop to a drive enclosure (cage), or because an odd number of drives is installed or detected, or drives were installed in the wrong slots. To diagnose further, use CLI commands such as `showpd`, `showpd -path`, `showcage`, and `showcage -d`.

```
cli% showcage -d cage0
  Id Name  LoopA Pos.A LoopB Pos.B Drives Temp  RevA RevB Model FormFactor
  0 cage0 0:1:1     0 1:1:1     0      8 20-22 402e 402e DCN2  SFF
```

```
-----------Cage detail info for cage3 ---------
Position: ---

  Interface Board Info Card0 Card1
  Firmware_status  Current  Current
  Product_Rev  402e  402e
  State(self,partner) OK,OK OK,OK
  VendorID,ProductID HP,DCN2 HP,DCN2
  Master_CPU  Yes No
  SAS_Addr  50050CC10230567E  50050CC10230567E
  Link_Speed(DP1,Internal) 6.0Gbps,6.0Gbps 6.0Gbps,6.0Gbps

```

```
cli% showcage -d cage3
Id Name  LoopA Pos.A LoopB Pos.B Drives Temp  RevA RevB Model FormFactor
0 cage0 0:1:1     0 1:1:1     0      8 20-22 402e 402e DCN2  SFF
```

```
-----------Cage detail info for cage3 ---------
Position: ---

  Interface Board Info Card0 Card1
  Firmware_status  Current  Current
  Product_Rev  402e  402e
  State(self,partner) OK,OK OK,OK
  VendorID,ProductID HP,DCN2 HP,DCN2
  Master_CPU  Yes No
  SAS_Addr  50050CC10230567E  50050CC10230567E
  Link_Speed(DP1,Internal) 6.0Gbps,6.0Gbps 6.0Gbps,6.0Gbps

```

```
---Drive Info---
Drive DeviceName State Temp(C) LoopState LoopState
  0:0 5000c500725333e0 Normal 20 OK OK
  0:1 5000c500725333d24 Normal 21 OK OK
  0:2 5000c500725314a0 Normal 21 OK OK
  0:3 5000c50072531bf4 Normal 22 OK OK
  0:4 5000c50072531c74 Normal 22 OK OK
  0:5 5000c50072531ec8 Normal 21 OK OK
  0:6 5000c50072531384 Normal 22 OK OK
  0:7 5000c5005f4848bc Normal 22 OK OK
```

```
cli% showpd
```

pd example 3

```
Component -------------------Summary Description------------------- Qty
PD Disks experiencing a high level of I/O per second 93
```

```
Component --Identifier-- ---------Detailed Description----------
PD Disk:100 Disk is experiencing a high level of I/O per second: 789.0
```

pd suggested action 3

This check samples the I/O per second (IOPS) information in `statpd` to see if any drives are being overworked, and then it samples again after five seconds. This does not necessarily indicate a problem, but it could negatively affect system performance. The IOPS thresholds currently set for this condition are:

- NL drives < 75 IOPS
- FC 10K RPM drives < 150 IOPS
- FC 15K RPM drives < 200 IOPS
- SSD < 12000 IOPS

Operations such as `servicemag` and `tunevv` can cause this condition. If the IOPS rate is very high and/or many drives are experiencing heavy I/O, examine the system further using statistical monitoring commands/utilities such as `statpd`, the SSMC (GUI), and System Reporter. The following example reports drives whose total I/O is 150/sec or more.

```
cli% statpd -filt curs,t,iops,150
14:51:49 11/03/09 r/w I/O per second       KBytes per sec ... Idle %
ID Port Cur  Avg Max Cur  Avg Max ... Cur Avg
100 3:2:1 t 658 664 666 172563 174007 174618 ... 6 6
```

**pd example 4**

Component --Identifier-- -------Detailed Description----------
PD disk:3 Detailed State: old_firmware

**pd suggested action 4**

The identified drive lacks firmware that the storage system considers current. When a drive is replaced, the `servicemag` operation must upgrade the drive firmware. When drives are installed or added to a system, the `admithw` command can perform the firmware upgrade. Check the state of the Drive using CLI commands such as `showpd -s`, `showpd -i`, and `showfirmwaredb`.

```
cli% showpd -s 3
Id CagePos Type -State-- -Detailed_State- --SedState
3 0:3:0 FC degraded old_firmware fips_capable
```

```
cli% showpd -i 3
cli% showfirmwaredb
```

**pd example 5**

Component --Identifier-- -------Detailed Description----------
PD -- Sparing Algorithm is not set

**pd suggested action 5**

Check the system's Sparing Algorithm value using the CLI command `showsys -param`. The value is normally set during the initial installation (OOTB). If it must be set later, use the command `setsys SparingAlgorithm`; valid values are Default, Minimal, Maximal, and Custom. After setting the parameter, use the `admithw` command to programmatically create and distribute the spare chunklets.

```
cli% showsys -param
```

```
System parameters from configured settings
----Parameter-----      --Value--
RawSpaceAlertFC :            0
RawSpaceAlertNL :            0
RawSpaceAlertSSD :            0
RemoteSyslog :             0
RemoteSyslogHost :      0.0.0.0
SparingAlgorithm :   Unknown
```

**pd example 6**

Component --Identifier-- -------Detailed Description----------
PD Disk:32 ST3400755FC PD for cage type DCS2 in cage position 2:0:0 is missing from the firmware database
**pd suggested action 6**

Check the release notes for mandatory updates and patches to the HPE 3PAR OS version that is installed and install as needed to support this PD in this drive enclosure (cage).

**pdch**

- Displays chunklets state issues
- Checks LD connection paths, remote chunklets, and remote disks

**Format of possible pdch exception messages**

| pdch LD:<ldid> | "Connection path is not the same as LD ownership" |
| pdch ch:<initpdid>:<initpdpos> | "Chunklet is on a remote disk" |
| pdch LD:<ldid> | "LD has <count> remote chunklets" |

**pdch example 1**

<table>
<thead>
<tr>
<th>Component</th>
<th>Summary Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>pdch</td>
<td>LDs wwith connection path different than ownership</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Identifier</th>
<th>Detailed Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pdch</td>
<td>ld:tp-0-sd-0.1</td>
<td>Connection path is not the same as LD ownership</td>
</tr>
</tbody>
</table>

**pdch suggested action 1**

Use the CLI `showld`, `showpd`, and `shownode` commands. If the ownership issue is not created due to a node missing or failed PD, contact the Hewlett Packard Enterprise Support Center to request support for moving the LDs to the desired location for your system.

<table>
<thead>
<tr>
<th>cli% showld</th>
<th>Id</th>
<th>Name</th>
<th>RAID</th>
<th>-Detailed State-</th>
<th>Own</th>
<th>SizeMB</th>
<th>UsedMB</th>
<th>Use</th>
<th>Lgct</th>
<th>LgId</th>
<th>WThru</th>
<th>MapV</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>pdsld0.0</td>
<td>1 normal</td>
<td>1/0</td>
<td>256</td>
<td>0</td>
<td>P,F</td>
<td>0 ---</td>
<td>Y</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>pdsld0.1</td>
<td>1 normal</td>
<td>1/0</td>
<td>7680</td>
<td>0</td>
<td>P</td>
<td>0 ---</td>
<td>Y</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>pdsld0.2</td>
<td>1 normal</td>
<td>1/0</td>
<td>256</td>
<td>0</td>
<td>P</td>
<td>0 ---</td>
<td>Y</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**pdch example 2**

<table>
<thead>
<tr>
<th>Component</th>
<th>Summary Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>pdch</td>
<td>LDs with connection path different than ownership</td>
<td>23</td>
</tr>
<tr>
<td>pdch</td>
<td>LDs with chunklets on a remote disk</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Identifier</th>
<th>Detailed Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pdch</td>
<td>LD:35</td>
<td>Connection path is not the same as LD ownership</td>
</tr>
<tr>
<td>pdch</td>
<td>ld:35</td>
<td>LD has 1 remote chunklet</td>
</tr>
</tbody>
</table>

**pdch suggested action 2**

The primary I/O paths for drives are balanced between the two nodes that are physically connected to the drive cage. The node that normally has the primary path to a drive is considered the owning node. If the secondary node path has to be used for I/O to the drive, that is considered remote I/O.

These messages usually indicate a node-to-cage FC path problem because the drives (chunklets) are being accessed through their secondary path. These are usually a by-product of other conditions such as drive-cage/node-port/FC-loop problems; focus on troubleshooting those. If a node is offline due to a
service action, such as hardware or software upgrades, these exceptions can be ignored until that action has finished and the node is online.

In this example, LD 35, with a name of R1.usr.3, is owned (Own) by nodes 3/2/0/1, respectively, and the primary/secondary physical paths to the drives (chunklets) in this LD are from nodes 3 and 2, respectively. However, the FC path (Port B) from node 3 to PD 91 is failed/missing, so node 2 is performing the I/O to PD 91. When the path from node 3 to cage 3 gets fixed (N:S:P 3:0:4 in this example), this condition must disappear.

```
cli% showld Id Name     RAID -Detailed_State- Own     SizeMB UsedMB Use  Lgct LgId WThru MapV
35 R1.usr.3    1 normal           3/2/0/1    256    256 V       0  ---     N    Y

cli% showldch R1.usr.3
cli% showpd -s -failed -degraded
cli% showcase
```

Normal condition (after fixing):

```
cli% showpd 91 63
---Size(MB)--- ----Ports----
Id CagePos Type Speed(K) State       Total    Free A      B
63 2:2:3   FC         10 normal     139520  124416 2:0:3* 3:0:3
91 3:8:3   FC         10 normal     139520  124416 2:0:4  3:0:4*
```

Checks for the following port connection issues:

- Ports in unacceptable states
- Mismatches in type and mode, such as hosts connected to initiator ports, or host and Remote Copy over Fibre Channel (RCFC) ports configured on the same FC adapter
- Degraded SFPs and those with low power; perform this check only if this FC Adapter type uses SFPs
- Ports listed as hosts in "showhost" that are not ready or not configured as host
- Host ports or systems with too many initiators connected

Format of possible port exception messages

```
Port port:<nsp> "Port mode is in <mode> state"
Port port:<nsp> "is offline"
Port port:<nsp> "Mismatches mode and type"
Port port:<nsp> "Port is <state>"
Port port:<nsp> "SFP is missing"
Port port:<nsp> "SFP is <state>" (degraded or failed)
Port port:<nsp> "SFP is disabled"
Port port:<nsp> "Receiver Power Low: Check FC Cable"
Port port:<nsp> "Transmit Power Low: Check FC Cable"
Port port:<nsp> "SFP has TX fault"
Port port:<portID> "Port listed as host path but is State:<state>, Mode:<mode> and Type:<type>"
Port port:<portID> "<count> initiators attached exceeds the supported limit of <max port count>"
Port -- "Connected <protocol> host initiators of <count> exceeds the supported limit of <max system count>"
```

**port suggested actions, general**

Some specific examples follow, but in general, use the following CLI commands to check for these conditions:

For port SFP errors, use commands such as `showport`, `showport -sfp`, and `showport -sfp -ddm`.

**port example 1**
An SFP in a Node-Port is reporting a degraded condition. This is most often caused by the SFP receiver circuit detecting a low signal level (RX Power Low), and that is usually caused by a poor or contaminated FC connection, such as a cable. An alert must identify the condition, such as the following:

Port 0:1:1, SFP Degraded (Receiver Power Low: Check FC Cable)

Check SFP statistics using CLI commands, such as showport -sfp, showport -sfp -ddm.

In the following example, an RX power level of 522 microwatts (uW) for Port 0:1:1 DDM is a good reading; and 12 uW for Port 1:1:1 is a weak reading (< 15 uW). Normal RX power level readings are 300-700 uW.

In the following example, an RX power level of 522 microwatts (uW) for Port 0:1:1 DDM is a good reading; and 12 uW for Port 1:1:1 is a weak reading (< 15 uW). Normal RX power level readings are 300-700 uW.

Port suggested action 2

FC node-ports that normally contain SFPs will report an error if the SFP has been removed. The condition can be checked using the showport -sfp command. In this example, the SFP in 1:1:1 has been removed from the Adapter:
**CLI% showport -sfp**

<table>
<thead>
<tr>
<th>N:S:P</th>
<th>Mode</th>
<th>State</th>
<th>Manufacturer</th>
<th>MaxSpeed(Gbps)</th>
<th>TXDisable</th>
<th>TXFault</th>
<th>RXLoss</th>
<th>DDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:1:1</td>
<td>OK</td>
<td>ready</td>
<td>HP-F</td>
<td>8.5</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>0:1:2</td>
<td>OK</td>
<td>ready</td>
<td>HP-F</td>
<td>8.5</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>1:1:1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1:1:2</td>
<td>OK</td>
<td>ready</td>
<td>HP-F</td>
<td>8.5</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

**port example 3**

**CLI% checkhealth -detail port**

**port suggested action 3**

Check the state of the port with `showport`. If a port is offline, it was deliberately put in that state using the `controlport offline` command. Offline ports might be restored using `controlport rst`.

**cli% showport**

<table>
<thead>
<tr>
<th>N:S:P</th>
<th>Mode</th>
<th>State</th>
<th>Node_WWN</th>
<th>Port_WWN/HW_Addr</th>
<th>Type</th>
<th>Protocol</th>
<th>Label</th>
<th>FailoverState</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:0:1</td>
<td>target</td>
<td>ready</td>
<td>2FF70002AC00006E</td>
<td>20110002AC00006E</td>
<td>host</td>
<td>FC</td>
<td>-</td>
<td>1:0:1</td>
</tr>
<tr>
<td>0:0:2</td>
<td>target</td>
<td>offline</td>
<td>2FF70002AC00006E</td>
<td>20120002AC00006E</td>
<td>free</td>
<td>FC</td>
<td>-</td>
<td>1:0:2</td>
</tr>
</tbody>
</table>

---

**port example 4**

Component остоянне---Summary Description--------- Qty
Port Ports with mismatched mode and type 1

Component -Identifier- ------Detailed Description-------
Port port:2:0:3 Mismatched mode and type

**port suggested action 4**

This output indicates that the port mode, such as an initiator or target, is not correct for the connection type, such as drive, host, iSCSI, FCoE, or RCFC. Useful HPE 3PAR CLI commands are `showport`, `showport -c`, `showport -par`, `showport -rcfc`, `showcage`, and so on.

**cli% showport**

Component -Identifier- ------Detailed Description-------
Port port:0:1:1 Mismatched mode and type

---

**qos**

- Displays Quality of Service (QoS) issues
- Checks for Quality of Service rejects over the previous 24 hours

**Format of possible qos exception messages**

QOS <vvsetname> "VVSet has logged <count> rejects in 24 hours"
**qos example**

<table>
<thead>
<tr>
<th>Component</th>
<th>Summary Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoS</td>
<td>VVSets with non-zero reject counts</td>
<td>1</td>
</tr>
</tbody>
</table>

**qos suggested action**

Use the CLI `showqos` command to determine if the QoS rules fit the needs of the host and application access. If the QoS rules for this `vvset` must be adjusted or removed, use the CLI `setqos` command to set new limits, to remove, or disable the QoS rules for this `vvset`. If the QoS rules appear correct, use the CLI `statvv` command to determine if there are other VVs that are causing QoS to reject I/O requests for this `vvset`. Either change the QoS rules to match the host/application load or adjust the load to the VVs on this system.

**rc**

Checks for the following Remote Copy issues.

- Remote Copy targets
- Remote Copy links
- Remote Copy Groups and VVs
- Remote Copy internal structure
- Too many Remote Copy targets configured as sync

**Format of possible rc exception messages**

- `RC rc:<name>  "All links for target <name> are down but target not yet marked failed."`
- `RC rc:<name>  "Target <name> has failed."`
- `RC rc:<name>  "Link <name> of target <target> is down."`
- `RC rc:<name>  "Group <name> is not started to target <target>."
- `RC rc:<vvname>  "VV <vvname> of group <name> is stale on target <target>.
- `RC rc:<vvname>  "VV <vvname> of group <name> is not synced on target <target>.
- `RC Structure  "Remote Copy internal structure is incompatible."
- `RC rc:         "Target" "More than 8 sync targets have been setup."

**rc example**

<table>
<thead>
<tr>
<th>Component</th>
<th>Detailed Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC</td>
<td>Stale volumes</td>
<td>1</td>
</tr>
</tbody>
</table>

**rc suggested action**

Perform Remote Copy troubleshooting such as checking the physical links between the storage system, and using CLI commands such as:

- `showrcopy`
- `showrcopy -d`
- showport -rcip
- showport -rcfc
- shownet -d
- controlport rcip ping

**snmp**

Displays issues with SNMP. Attempts the `showsnmpmgr` command and reports errors if the CLI returns an error.

**Format of possible snmp exception messages**

```
SNMP -- <err>
```

**snmp example**

```
Component -Identifier- --------------Detailed Description--------------
SNMP -- Could not obtain snmp agent handle. Could be misconfigured.
```

**snmp suggested action**

Any error message that can be produced by `showsnmpmgr` might be displayed.

**sp**

Checks the status of the Ethernet connection between the service processor (SP) and nodes.

This can only be run from the SP because it performs a short Ethernet transfer check between the SP and the storage system.

**Format of possible sp exception messages**

```
Network SP->InServ "SP ethernet Stat <stat> has increased too quickly check SP network settings"
```

**sp example**

```
Component -Identifier- --------------Detailed Description--------------
SP ethernet "State rx_errs has increased too quickly check SP network settings"
```

**sp suggested action**

The `<stat>` variable can be any of the following: `rx_errs, rx_dropped, rx_fifo, rx_frame, tx_errs, tx_dropped, tx_fifo`.

This message is caused by customer network issues, but might be caused by conflicting or mismatching network settings between the service processor (SP), customer switches, and the storage system. Check the SP network interface settings using the SPMaint interface or SPOCC. Check the storage system settings using commands such as `shownet` and `shownet -d`.

**task**

Displays failed tasks. Checks for any tasks that have failed within the past 24 hours. This is the default time frame for the `showtask -failed all` command.
Format of possible task exception messages

Task Task:<Taskid> "Failed Task"

**task example**

<table>
<thead>
<tr>
<th>Component --Identifier---</th>
<th>Detailed Description--------</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Failed Task</td>
</tr>
</tbody>
</table>

In this example, checkhealth also showed an Alert. The task failed, because the command was entered with a syntax error:

<table>
<thead>
<tr>
<th>Component -Identifier-</th>
<th>Detailed Description------------------------</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td>sw_task:6313 Task 6313 (type 'background_command', name 'upgradecage -a -f') has failed (Task Failed). Please see task status for details</td>
</tr>
</tbody>
</table>

**task suggested action**

The CLI command `showtask -d <Task_id>` will display detailed information about the task. To clean up the Alerts and the Alert-reporting of checkhealth, you can delete the failed-task alerts if they are of no further use. They will not be auto-resolved and they will remain until they are manually removed with the SSMC (GUI) or CLI with `removealert` or `setalert ack`. To display system-initiated tasks, use `showtask -all`.

```
cli% showtask -d 6313
```

```
Id Type               Name              Status Phase Step
6313 background_command upgradecage -a -f failed   ---  ---
```

Detailed status is as follows:

```
2010-10-22 10:35:36 PDT Created task.
2010-10-22 10:35:36 PDT Updated Executing "upgradecage -a -f" as 0:12109
2010-10-22 10:35:36 PDT Errored upgradecage: Invalid option: -f
```

**vlun**

- Displays inactive Virtual LUNs (VLUNs) and those which have not been reported by the host agent.
- Reports VLUNs that have been configured but are not currently being exported to hosts or host-ports.
- Displays when too many VLUNs have been created.

Format of possible vlun exception messages

```
vlun vlun:(<vvID>, <lunID>, <hostname>)"Path to <wwn> is not is not seen by host" vlun vlun:(<vvID>, <lunID>, <hostname>) "Path to <wwn> is failed" vlun host:<hostname> "Host <ident>(<type>):<connection> is not connected to a port" vlun -- "<count> active VLUNs exceeds the supported limit of <max count>"
```

**vlun example**

```
Component ---------Summary Description--------- Qty
vlun                Hosts not connected to a port 1
```

Component -----Identifier----- ---------Detailed Description--------
vlun suggested action

Check the export status and port status for the VLUN and HOST with CLI commands such as:

- `showvlun`
- `showvlun -pathsum`
- `showhost`
- `showhost -pathsum`
- `showport`
- `servicehost list`

For example:

```
cli% showvlun -host cs-wintec-test1
Active VLUNs
Lun VVName HostName        -Host_WWN/iSCSI_Name-  Port Type
  2 BigVV  cs-wintec-test1 10000000C964121D      2:5:1 host
-----------------------------------------------------------
1 total

VLUN Templates
Lun VVName HostName        -Host_WWN/iSCSI_Name- Port Type
  2 BigVV  cs-wintec-test1 ----------------       --- host

cli% showhost cs-wintec-test1
Id Name            Persona -WWN/iSCSI_Name- Port
  0 cs-wintec-test1 Generic 10000000C964121D ---
       10000000C964121C 2:5:1

cli% servicehost list
HostName -WWN/iSCSI_Name-  Port
host0    10000000C98EC67A 1:1:2
host1    210100E08B289350 0:5:2

Lun VVName HostName        -Host_WWN/iSCSI_Name-  Port    Type
  2  BigVV       cs-wintec-test1 10000000C964121D 3:5:1 unknown

vv

Displays virtual volumes (VV) that are not optimal. Checks for VVs and common provisioning groups (CPG) whose State is not normal.

Format of possible vv exception messages

```
VV vv:<vtypename>  "IO to this volume will fail due to no_stale_ss policy"
VV vv:<vtypename>  "Volume has reached snapshot space allocation limit"
VV vv:<vtypename>  "Volume has reached user space allocation limit"
VV vv:<vtypename>  "VV has expired"
VV vv:<vtypename>  "Detailed State: <state>" (failed or degraded)
VV cpg:<cpg>      "CPG is unable to grow SA (or SD) space"
VV cpg:<cpgname>  "CPG growth increment is below threshold"
```

vv suggested action

Check status with CLI commands such as `showvv, showvv -d, showvv -cpg`.
Controlled thermal shutdown

**Symptom**
If the thermal temperature of the controller nodes or drives increases to the point that temperature exceeds the acceptable range, alert notifications are displayed in the HPE 3PAR StoreServ Management Console (SSMC), and then a controlled shutdown of the component occurs automatically as a protective action.

**Cause**
Internal sensors monitor the temperature of the controller nodes and drives. If the temperature of these components exceeds the specified component temperature threshold, a controlled shutdown occurs. The storage system attempts to remain online and not shutdown any additional controller nodes, unless multiple drives have been spun down due to exceeding the acceptable temperature range. If the system shuts down due to a pending TOC quorum loss from the spin down of too many drives, power remains on for the controller nodes, drives, and drive enclosures.

For overheated controller nodes, a single controller node is shut down if one of its sensors reports a critical temperature.

For overheated drives, the drives are spun down individually. With multiple overheated drives being spun down, there is the danger of a TOC quorum loss, so the system executes a controlled shutdown. For a controlled shutdown, the hardware remains powered on and the controller nodes reboot when the ambient temperature has reduced and remains in the acceptable range for at least 30 minutes.

Log files collection
For a service event, it might be necessary to collect the HPE 3PAR Service Processor (SP) log files for Hewlett Packard Enterprise support.

**Collecting HPE 3PAR SmartStart log files—OS 3.2.2 and SP 4.x**
The HPE 3PAR SmartStart log files are located in this folder:

```
C:\Users\<username>\SmartStart\log
```

Add these log files to a zip file for Hewlett Packard Enterprise support.

**NOTE:** You can continue to access the HPE 3PAR SmartStart log files in the Users folder even after you have removed HPE 3PAR SmartStart from your storage system.

**Collecting service processor log files—SP 5.x**
The following tools collect data from the service processor (SP):

- **Audit and Logging Information**—Provides audit and logging information of an attached storage system and service processor usage. This file is gathered as part of an SPLOR and Hewlett Packard Enterprise Support personnel can view the file using HPE Service Tools and Technical Support (STaTS).

  The service processor audit Information is contained in the audit.log file, which provides the following audit information:
- Users who accessed the HPE 3PAR SP
- Logon and logoff times
- The functionality used, such as Interactive CLI.

- SPLOR—Gathers files to diagnose service processor issues. The SPLOR data can be retrieved through the Collect support data action from the Service Processor page.

Procedure

1. Connect and log in to the service processor.
2. From the Service Console (SC) main menu, select Service Processor.
3. Select Actions > Collect support data.
4. Select SPLOR data, and then click Collect to start data retrieval.

   When support data collection is in progress, it will start a task which will be displayed at the top of the page. To see details for a specific collection task in Activity view, expand the task message and click the Details link for the task.

Collecting the service processor log files—SP4.x

Procedure

1. Connect and log in to the service processor (SP).
2. From the Service Processor Onsite Customer Care (SPOCC) main menu, click Files from the navigation pane.
3. Click the folder icons for files > syslog > apilogs.
4. In the Action column, click Download for each log file:

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPSETLOG.log</td>
<td>Service processor set up log</td>
</tr>
<tr>
<td>ARSETLOG.system_serial_number.log</td>
<td>Storage System setup log</td>
</tr>
<tr>
<td>errorLog.log</td>
<td>General errors</td>
</tr>
</tbody>
</table>

5. Zip the downloaded log files.
Websites

Hewlett Packard Enterprise general websites:
Information Library
   www.hpe.com/info/EIL
Customer Self Repair Services Media Library
   www.hpe.com/support/sml-csr
InfoSight
   infosight.hpe.com
Safety and Compliance
   www.hpe.com/support/Safety-Compliance-EnterpriseProducts
Software Depot
   www.hpe.com/support/softwaredepot
Software License Manager
   enterprislicense.hpe.com/
Software updates and licensing
   www.hpe.com/downloads/software
Support Center
   www.hpe.com/support/hpesc
SPOCK
   www.hpe.com/storage/spock
White papers and analyst reports
   www.hpe.com/storage/whitepapers

Hewlett Packard Enterprise storage websites:
Data Storage
   www.hpe.com/info/storage
Information Library Storage
   www.hpe.com/info/storage/docs
Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
  
  http://www.hpe.com/assistance

- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:

  http://www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

- To download product updates:

  Hewlett Packard Enterprise Support Center
  
  www.hpe.com/support/hpesc

  Hewlett Packard Enterprise Support Center: Software downloads
  
  www.hpe.com/support/downloads

  Software Depot
  
  www.hpe.com/support/softwaredepot

- To subscribe to eNewsletters and alerts:

  www.hpe.com/support/e-updates

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center More Information on Access to Support Materials page:

  www.hpe.com/support/AccessToSupportMaterials
IMPORTANT: Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

http://www.hpe.com/support/selfrepair

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information
HPE Get Connected
  www.hpe.com/services/getconnected
HPE Proactive Care services
  www.hpe.com/services/proactivecare
HPE Proactive Care service: Supported products list
  www.hpe.com/services/proactivecaresupportedproducts
HPE Proactive Care advanced service: Supported products list
  www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information
Proactive Care central
  www.hpe.com/services/proactivecarecentral
Proactive Care service activation
  www.hpe.com/services/proactivecarecentralgetstarted

Warranty information

To view the warranty information for your product, see the links provided below:

HPE ProLiant and IA-32 Servers and Options
  www.hpe.com/support/ProLiantServers-Warranties
HPE Enterprise and Cloudline Servers
  www.hpe.com/support/EnterpriseServers-Warranties
HPE Storage Products
  www.hpe.com/support/Storage-Warranties
HPE Networking Products
  www.hpe.com/support/Networking-Warranties
Regulatory information

To view the regulatory information for your product, view the Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

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Acronyms

1U
one-unit rack space

2U
two-unit rack space

4U
four-unit rack space

AC
alternating current

AFA
all flash array

CC
control cache (DIMMs)

CDA
confidential disclosure agreement

CLI
command line interface

CNA
converged network adapter

CSI
Customer Self Install

CSR
Customer Self Repair

CSU
Customer Self Upgrade

DAR
data at rest

DC
direct current (power) or data cache (DIMMs)

DHCP
dynamic host configuration protocol

DNS
domain name system

ESD
electrostatic discharge
FC
Fibre Channel (protocol) or fast class (drive type)

FCoE
Fibre Channel over Ethernet (protocol)

FIPS
Federal Information Processing Standard

FRU
field replaceable unit

Gb/s or Gbps
Gigabits per second

GbE
Gigabit Ethernet

GUI
graphical user interface

HBA
host bus adapter

I/O
input/output

iLO
integrated lights out

IOM
I/O Module

LAN
local area network

LFF
large form factor

LUN
logical unit number

MOB
moment of birth

NIC
network interface card

NL
near line (drive type)

NTP
network time protocol
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>OOTB</td>
<td>out of the box</td>
</tr>
<tr>
<td>OVF</td>
<td>open virtual format</td>
</tr>
<tr>
<td>PCIe</td>
<td>peripheral component interconnect express</td>
</tr>
<tr>
<td>PCM</td>
<td>Power Cooling Module</td>
</tr>
<tr>
<td>PDU</td>
<td>Power Distribution Unit</td>
</tr>
<tr>
<td>RAID</td>
<td>redundant array of independent disks</td>
</tr>
<tr>
<td>RPS</td>
<td>redundant power supply</td>
</tr>
<tr>
<td>SAN</td>
<td>storage area network</td>
</tr>
<tr>
<td>SAS</td>
<td>serial attached SCSI</td>
</tr>
<tr>
<td>SC</td>
<td>HPE 3PAR SP Service Console</td>
</tr>
<tr>
<td>SFF</td>
<td>small form factor</td>
</tr>
<tr>
<td>SFP</td>
<td>small form-factor pluggable</td>
</tr>
<tr>
<td>SFRM</td>
<td>Hewlett Packard Enterprise StoreFront Remote</td>
</tr>
<tr>
<td>SP</td>
<td>Service Processor</td>
</tr>
<tr>
<td>SPOCC</td>
<td>HPE 3PAR Service Processor Onsite Customer Care</td>
</tr>
<tr>
<td>SPOCK</td>
<td>Single Point of Connectivity Knowledge</td>
</tr>
<tr>
<td>SPS</td>
<td>single power supply</td>
</tr>
<tr>
<td>SSA</td>
<td>secure service agent</td>
</tr>
</tbody>
</table>
SSD
solid state drive (drive type)

SSH
Secure Shell

SSMC
HPE 3PAR StoreServ Management Console

TCP
transmission control protocol

TOTP
time-based one-time password

TUI
HPE 3PAR SP Text-based User Interface

U
unit of space in a rack

UID
unit identification

VM
virtual machine

VV
virtual volume

W
watt