



# How to Replace the Control Server SSD Cache Drive

This document defines the process to identify and replace a failed SSD cache drive in the Control Server using VSAN in an HA (High Availability) configuration. This can be done while the control system is running and without interruption.

## Getting Started

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**Note** This document expects the servers to be used in an HA configuration with the redundant servers having the IP address of HS1 - 172.16.199.8 and HS2 - 172.16.199.9. If this is not the case do not use this guide to replace the failed disk.

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### Prerequisites

- Have the replacement drive available.

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**Note** The drive may not include the carrier. If that is the case the carrier will have to be removed from the defective drive and installed on the new drive before installation.

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- The drive cannot have a partition. If a partition exists it must be deleted before the drive can be used.
- Have physical access to the disk drive bays of the servers. It will be necessary to visually see the drives status lights in each server.
- Have the admin account and password available to log in to MC3 (Management VM).
- Have the admin account and password available to log in to the data center.
- A PC with RDP (remote desktop) capability connected to the PDH (plant data highway) network. This will be used to log in to both MC3 and then the data center. The PC must be in close proximity to the servers to allow visual inspection of the disk drive status LEDs.
- A static safe work area with grounded wrist strap when handling the drive.
- If a raid drive configuration is required, then you will need a monitor with VGA cable, USB keyboard, and a USB mouse.

## High Level Procedure

- **To replace the failed SSD cache drive and return the Control Server back to full HA operation. The sequence of operations that are required to replace the failed disk drive are:**
1. Log on to the data center, refer to the section [Log in to the Control Server](#)
  2. Identify the IP address of the server that contains the failed disk, refer to sections [Identify the Failed Cache Drive](#) and [Physical Drive Identification](#).
  3. Migrate all VMs running on the failed server to the good server (of the redundant pair), refer to section [Migration of VMs](#)
  4. Place the failed server in maintenance mode, refer to section [Place Host Server in Maintenance Mode](#)
  5. Remove the failed SSD cache drive from the vSAN disk group, refer to section [Remove the Defective Drive from the vSAN Disk Group](#)
  6. Replace the failed SSD cache drive, refer to section [Replace the Failed Drive](#)
  7. Add the new drive to a new vSAN disk group, refer to section [Add the Drive to the vSAN Disk Group](#)
  8. Take the failed server out of maintenance mode (Exit Maintenance Mode).
  9. Migrate the previously migrated VM's back to the repaired server.

## Log in to the Control Server

To log in to the data center, open an RDP (Remote Desktop) session to MC3 (172.16.199.5). MC3 is a VM running on the MC2 server. Use the MC3 login credentials to establish a connection. On the MC3 desktop double click on the web browser and enter the IP address of the vCenter VM HC1 (172.16.199.7). Enter your Data Center credentials when prompted. Click to log in to the Vsphere Web Client. The Data Center user interface will then be displayed.

## Identify the Failed Cache Drive

Using the vSphere web client, connect to HC1 and [Navigate to the vSAN Disk Group Configuration](#). The disk drive arrangement for each server will be displayed. Each host (HS1 - 172.16.199.8 and HS2 - 172.16.199.9) will have two disk groups with each disk group containing a cache and a capacity disk drive. By selecting each disk group in the upper panel the drive pair in the group will be displayed in the lower panel. The Virtual SAN columns in both the upper panel and lower panel will display the health status of the disk drives. The failed drive will be identified with the row displayed in red.

## Physical Drive Identification

Select the row in the lower panel of the failed drive. The lower panel tool bar will enable a set of buttons that will be used to physically identify the disk drive in the server. On the tool bar there will be a pair of round icons (one will be green the other gray). Pressing the green icon will cause the locator LED on the physical drive to flash at a 1 second rate. Selecting the gray icon will cause the LED to stop flashing. The locator LED is located on the upper left corner of the disk drive face plate in the server. The locator LED is normally on during normal operation. Remember the IP address of the failed server. Additional operations on this server will be performed later.

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**Note** There is another LED that is located in the lower left corner of the disk drive face plate that will be flashing on and off at random times. This flashing LED can be ignored.

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## Migration of VMs

To ensure continued control system operation, all VMs running on the failed server must be migrated to the other server. Record the names of the VM's that are migrated. This list will be used later to return the VMs to the repaired server.

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**Note** Example – if the failed server is HS1 - 172.16.199.8 then the VM's will be moved to HS2 - 172.16.199.9.

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### ➤ To migrate the VM's from the server with the failed drive:

1. Select the IP address of the server with the failed drive in the tree view. This should be 17.16.199.8 or 172.16.199.9.
2. Select the **Related Objects** tab in the main screen
3. Select **Virtual Machines** in the child tab group on the main screen. A list of VMs will be displayed. These are the VMs currently running or hosted on the selected server.
4. Make a list of the VMs to be migrate so that they can be restored later.
5. Repeat the following sub-steps until all VMs have migrated to the other server.
  - a. Select the VM in the list.
  - b. Right-click the item, then select **Migrate...** The VM migration wizard displays.
  - c. Select the **Change Compute Resource Only** radio button, then select **Next**.
  - d. Select the healthy host to migrate the VM to (the default selection should be correct), then select **Next**.
  - e. The networks in use by the VM should be displayed. Accept the defaults, select **Next**.

- f. Select the **Schedule vMotion with high priority (recommended)** radio button, then select **Next**.
- g. Verify the VM information is correct then select **Finish**.
- h. The VM will be migrated to the other server. The status of the request can be seen at the bottom of the screen in the Tasks list window. Verify that the operation succeeded (the status column should have a green checkmark).

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**Note** If the VM fails to migrate, refer to the section, [Troubleshooting, VM Migration Failed](#).

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## ***Place Host Server in Maintenance Mode***

The server that contains the failed drive must be placed in maintenance mode before any disk operations can be performed. Select the IP address of the failed server in the tree view, right click and select **Maintenance Mode** then select **Enter Maintenance Mode**. The **Confirm Maintenance Mode** wizard will be displayed. Verify that:

- The checkbox **Move Powered off and suspended virtual machines to the other hosts in the cluster** is NOT selected.
- The dropdown list selection is **Ensure Accessibility**.

Select **OK** to place the server in maintenance mode.

## ***Remove the Defective Drive from the vSAN Disk Group***

This section will describe the steps to remove the failed disk from the disk group in the vSAN.

- [Navigate to the vSAN Disk Group Configuration](#).
- On the failed host identified by its IP address, select the disk group with the failed drive. The capacity/cache drive information will be displayed in the lower **Disk Group** panel
- Select the cache drive in this group. The toolbar will display the **Remove the selected disk(s) from the disk group** button.
- The **Remove Disk** will be displayed. Deselect the **Evacuate data** checkbox then select **Yes** to remove the disk.

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**Note** This operation will take a few minutes. When completed the entire disk group will be removed. This is expected.

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## Replace the Failed Drive

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**Note** The disk replacement may come without the carrier. In that case it is necessary to physically remove the disk from the carrier during the replacement procedure.

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### Caution

The SSD disk is considered an electrostatic sensitive device. Perform the procedure to replace the SSD disk in the mounting bay on a static safe work station using an appropriately grounded wrist strap.

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➤ **To replace the failed drive perform the following:**

1. Power down the failed server identified from the previous section.
  - a. Select the IP address in the tree view of the server.
  - b. Right Click, select **Power**, then select **Shut Down**
  - c. Enter a Reason and click **OK**. Wait for the lights to go out on the physical drive which indicates it has completely shut down.
2. Locate the failed drive in the server and remove it by pushing the red button on the left side of the faceplate. The handle will pop open and the drive can be removed.
3. If necessary move the carrier from the failed drive to the new drive.
4. Release the handle on the new drive (push the red button) and slide the new drive in the server bay and close the handle to secure the drive.
5. Press the power button on the server to start up the server. It takes approximately 5 minutes to completely start up.

## Add the Drive to the vSAN Disk Group

1. [Navigate to the vSAN Disk Group Configuration.](#)
  2. Select the host server area with only one Disk group. Do not select the IP address
  3. Select **create a new disk group** (the icon with the GREEN PLUS sign under Disk Groups)
  4. On the Create a Disk Group window, there must be two disks available. If not, refer to the section, [Troubleshooting, EXSi fails to Recognize New Drive.](#)
  5. Select the smaller 200 GB available disk for the cache disk (upper area) and select the larger 800 GB disk for the capacity disk (lower area) and select **OK**
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**Note** Leave the default capacity disk selected as FLASH.

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6. After a minute or two the host server should show two disk groups.
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**Note** It is recommended to remain in this condition until the system has synchronized.

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7. Check the synchronization.
    - a. From the Tree View, select **Cluster1**.
    - b. Select the **Monitor** tab.
    - c. Select **Virtual SAN**.
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- d. Select **Resyncing Components**. The system is synchronized when the list is empty.
8. If there is an error but the disk group was created successfully, proceed to reboot the host server. If the error persists, refer to section [Troubleshooting, How To Clean a New Drive](#).
9. If there is a persisting fault or error, remove the cache SSD disk showing the fault or error, clean the cache SSD disk ([Troubleshooting, How To Clean a New Drive](#)), then refer to sections: [Replace the Failed Drive](#) and [Add the Drive to the vSAN Disk Group](#) to create the new disk group.
10. If the operation did not create a second disk group but added a second capacity disk to the existing disk group, refer to section [Troubleshooting, vSAN Fails to Add New Drive as Cache Drive](#).

## Navigate to the vSAN Disk Group Configuration

### ➤ To navigate to the disk group display:

1. Select **Hosts and Clusters**. The tree view on the left will now display 172.16.199.7 at the root. Expand the tree until all nodes under “Cluster 1” are displayed.
2. Select **Cluster #1** in the tree view.
3. Select the **Manage Tab** and then select **Settings Tab** in the child tab group
4. Select and expand the **Virtual SAN** panel and then select **Disk Management**

The disk groups for 172.16.199.8 and 172.16.199.9 will be displayed. The screen shot below shows the selection of the first disk group 172.16.199.8 and the selection of the cache drive assigned to the disk group in the lower panel.

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**Note** The toolbars are enabled due to the selections of the disk group and cache drive. The “Virtual SAN Health Status columns” will indicate the group and drive health status.

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Disk Group	Disks in Use	State	Virtual SAN	Fault Domain	Network Part...	Disk Format Version
172.16.199.8	4 of 4	Connected	Healthy	FD1	Group 1	2
Disk group (02000000055cd2e404c1fb0a1494e54454c20)	2	Mounted	Healthy			2
Disk group (02000000055cd2e404c1fb09e494e54454c20)	2	Mounted	Healthy			2
172.16.199.9	4 of 4	Connected	Healthy	FD2	Group 1	2
Disk group (02000000055cd2e404c1f53b5494e54454c20)	2	Mounted	Healthy			2
Disk group (02000000055cd2e404c1f53b5494e54454c20)	2	Mounted	Healthy			2
172.16.199.10 (External witness host for vSAN Stretched Clust...	2 of 2	Connected	Healthy		Group 1	2
Disk group (0000000000766d686261313a323a30)	2	Mounted	Healthy			2

  

Name	Drive Type	Disk Role	Capacity	Virtual SAN Health Status	Operational ...	Transport Type
Local ATA Disk (naa.55cd2e404c1fb0a1)	Flash	Cache	186.31 GB	Healthy	Mounted	Block Adapter
Local ATA Disk (naa.55cd2e404c1f085a)	Flash	Capacity	745.21 GB	Healthy	Mounted	Block Adapter

# **Troubleshooting**

## **VM Migration Failed**

If any VM fails to migrate successfully the following must be considered:

- Is the availability of the VM critical to the operation of the control system? If the answer is Yes, the drive replacement should be postponed until there is a scheduled outage.
- The availability is not critical, the VM can remain on the host and just powered down.

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**Note** After Rebooting the server, restart the VM.

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## **How To Clean a New Drive**

The SSD disk uses a standard SATA interface and can be used in a PC or server class platform. If an external USB to SATA cable is available it can be used to connect the drive to any USB 3.x port. The drive can also be plugged into a PC with an available SATA open slot. Using the OS's drive tools the drive's partition can be removed. If the above is not available contact GE Field Support for assistance.

## **vSAN Fails to Add New Drive as Cache Drive**

If the new spare disk has partition information, the vSAN will identify the disk as available but it will fail to create a new group. Instead it will add a second capacity disk to the existing disk group when executing the "create a new disk group" operation. In this case the drive has an existing partition that is not recognized by ESXi and must be cleaned. Refer to the section, [How To Clean a New Drive](#).

## **EXSi fails to Recognize New Drive**

When a new disk is added to the server it must be configured as Non Raid. The server must be rebooted and the drive configuration must be verified.

### **Prerequisites**

The following must be done before rebooting the server:

- All [VMs must be migrated](#) off the server.
- The server must be put into [Maintenance Mode](#).

### ➤ **To configured the drive as Non Raid:**

1. Connect a keyboard to the server's USB port and a monitor to the server's VGA port. This will display the boot up information and allow access to the system setup menu.
2. Power down the server with the new drive installed.
3. Restart the server and press F2 to enter the System Setup Menu
4. Select Device Settings.
5. Select **Integrated RAID Controller 1: .... Configuration Utility**
6. Select **Physical Disk Management**.
7. Select the **Ready** disk.
8. From the drop-down menu, select **Convert to Non-Raid Disk**.
9. Select **Convert To Non-Raid Disk**
10. Select **GO**, then the message **the operation has been performed successfully** appears, click **OK**.
11. Select **Back, Back, Finish, Finish, and Finish**.
12. Click **Yes** to the question, Are you sure you want to exit?

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**Note** The boot sequence will continue.

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