Drive shelf

Install and maintain

NetApp
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Overview of shelf maintenance - NS224 shelves

You can take the following actions to maintain your NS224 shelf:

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Cold-replace a shelf - NS224 shelves

When replacing a drive shelf in a production system that has disks in use, you need to perform a cold shelf replacement. This is a disruptive procedure. It requires you to halt the controllers in your HA pair.

Use the NetApp Knowledge Base article How to replace a shelf chassis using a cold shelf removal procedure.

Hot-add a drive - NS224 shelves

You can add new drives to a powered-on shelf non-disruptively, even during I/O operations.

Use the NetApp Knowledge Base article Best practices for adding disks to an existing shelf or cluster.

Hot-remove a shelf - NS224 shelves

You can hot-remove an NS224 drive shelf that has had the aggregates removed from the drives, in an HA pair that is up and serving data (I/O is in progress).

This procedure does not apply to ASA r2 systems.

Before you begin

- Your HA pair cannot be in a takeover state.
- You must have removed all aggregates from the drives (the drives must be spares) in the shelf you are removing.

  If you attempt this procedure with aggregates on the shelf you are removing, you could fail the system with a multidisk panic.

  You can use the `storage aggregate offline -aggregate` *`aggregate_name`* command and then the `storage aggregate delete -aggregate` *`aggregate_name`* command.

  To review more information on this step and avoid potential IO issues, see the Disks and aggregates overview.

- If your system shipped in a system cabinet, you need a Phillips screwdriver to remove the screws securing the shelf to the cabinet rack rails.

About this task

- If you are hot-removing more than one shelf, you remove one shelf at a time.
- **Best practice:** The best practice is to clear drive ownership after you remove the aggregates from the drives in the shelf you are removing.

  Clearing ownership information from a spare drive allows the drive to be properly integrated into another node (as needed).

  The procedure for removing ownership from drives can be found in the disks and aggregates content:

  Disks and aggregates overview

  The procedure requires you to disable automatic drive assignment. You reenable automatic drive assignment at the end of this procedure (after you have hot-removed the shelf).

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf: `storage shelf location-led modify -shelf-name shelf_name -led-status on`

  If you do not know the *shelf_name* of the affected shelf, run the `storage shelf show` command.

  A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the off option.

- After disconnecting a shelf from non-dedicated RoCE capable ports (on board the controllers, on RoCE capable PCIe cards, a combination of both, or on I/O modules), you have the option of reconfiguring these ports for networking use.

  If your HA pair is running ONTAP 9.7 or later, you do not need to reboot the controllers, unless one or both controllers are in maintenance mode. This procedure assumes that neither controller is in maintenance mode.

Steps

1. Properly ground yourself.
2. Verify that the drives in the shelf you are removing have no aggregates (are spares) and that ownership is removed:

   a. Enter the following command to list all of the drives in the shelf that you are removing: `storage disk show -shelf shelf_number`

      You can enter the command on either controller module.

   b. Check the output to verify that there are no aggregates on the drives.

      Drives with no aggregates have a dash in the `Container Name` column.

   c. Check the output to verify that ownership is removed from the drives.

      Drives with no ownership have a dash in the `Owner` column.

If you have failed drives, they display broken in the `Container Type` column. (Failed drives do not have ownership.)

The following output shows drives on the shelf being removed (shelf 2) are in a correct state for removing the shelf. The aggregates are removed on all of the drives; therefore, a dash appears in the `Container Name` column for each drive. Ownership is also removed on all of the drives; therefore, a dash appears in the `Owner` column for each drive.

```
cluster1::> storage disk show -shelf 2

           Usable           Disk     Container   Container
Disk         Size Shelf Bay Type     Type        Name        Owner
-------- -------- ----- --- ------   ----------- ----------- ---------
...
2.2.4           -     2   4 SSD-NVM  spare                 -         -
2.2.5           -     2   5 SSD-NVM  spare                 -         -
2.2.6           -     2   6 SSD-NVM  broken                -         -
2.2.7           -     2   7 SSD-NVM  spare                 -         -
...
```

3. Physically locate the shelf you are removing.
4. Disconnect the cabling from the shelf you are removing:
   a. Disconnect the power cords from the power supplies by opening the power cord retainer if they are AC power supplies, or unscrewing the two thumb screws if they are DC power supplies, and then unplug the power cords from the power supplies.

      Power supplies do not have a power switch.

   b. Disconnect the storage cabling (from the shelf to the controllers).
5. Physically remove the shelf from the rack or cabinet.

   A fully loaded NS224 shelf can weigh up to 66.78 lbs (30.29 kg) with NSM100 modules or an average of 56.8 lbs (25.8 kg) with NSM100B modules and requires two people to lift or use of a hydraulic lift. Avoid removing shelf components (from the front or rear of the shelf) to reduce the shelf weight, because shelf weight will become unbalanced.

   If your system was shipped in a cabinet, you must first unscrew the two Phillips screws securing the shelf to the rack rails. The screws are located on the inside shelf walls of the bottom NSM. You should remove both NSMs to access the screws.
6. If you are removing more than one shelf, repeat the preceding steps.

   Otherwise, go to the next step.
7. If you disabled automatic drive assignment when you removed ownership from the drives, reenable it: `storage disk option modify -autoassign on`

   You run the command on both controller modules.

8. You have the option of reconfiguring the non-dedicated RoCE capable ports for networking use, by completing the following substeps. Otherwise, you are done with this procedure.

   a. Verify the names of the non-dedicated ports, currently configured for storage use: `storage port show`

      You can enter the command on either controller module.

      > The non-dedicated ports configured for storage use are displayed in the output as follows: If your HA pair is running ONTAP 9.8 or later, the non-dedicated ports display `storage` in the `Mode` column. If your HA pair is running ONTAP 9.7, the non-dedicated ports, which display `false` in the `Is Dedicated?` column, also display `enabled` in the `State` column.

   b. Complete the set of steps applicable to the version of ONTAP your HA pair is running:

If your HA pair is running…	Then…
ONTAP 9.8 or later	a. Reconfigure the non-dedicated ports for networking use, on the first controller module: `storage port modify -node` *`node name`* `-port` *`port name`* `-mode network` You must run this command for each port you are reconfiguring. b. Repeat the above step to reconfigure the ports on the second controller module. c. Go to substep 8c to verify all port changes.
ONTAP 9.7	a. Reconfigure the non-dedicated ports for networking use, on the first controller module: `storage port disable -node` *`node name`* `-port` *`port name`* You must run this command for each port you are reconfiguring. b. Repeat the above step to reconfigure the ports on the second controller module. c. Go to substep 8c to verify all port changes.

   c. Verify that the non-dedicated ports of both controller modules are reconfigured for networking use: `storage port show`

      You can enter the command on either controller module.

      If your HA pair is running ONTAP 9.8 or later, the non-dedicated ports display `network` in the `Mode` column.

      If your HA pair is running ONTAP 9.7, the non-dedicated ports, which display `false` in the `Is Dedicated?` column, also display `disabled` in the `State` column.

Monitor drive shelf LEDs - NS224 shelves

You can monitor the health of your drive shelf by understanding the location and status conditions of the LEDs on your drive shelf components.

- The location (blue) LEDs, on a shelf's operator display panel (ODP) and both NSMs, can be activated to aid in physically locating the shelf that needs servicing: `storage shelf location-led modify -shelf-name shelf_name -led-status on`

  If you do not know the *`shelf_name`* of the affected shelf, run the `storage shelf show` command.

  Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- An LED state can be:
  - "On": The LED illumination is solid/steady
  - "Off": The LED is not illuminated
  - "Blink": The LED turns on and off at varying intervals depending on the FRU status
  - "Any state": The LED can be "On", "Off", or "Blink"

Operator display panel LEDs

The LEDs on the drive shelf front operator display panel (ODP) indicate whether your drive shelf is functioning normally or there are problems with the hardware.

The following illustration and table describes the three LEDs on the ODP:

LED icon	LED name & color	State	Description
	Power (Green)	On	One or more power supplies are supplying power to the drive shelf.

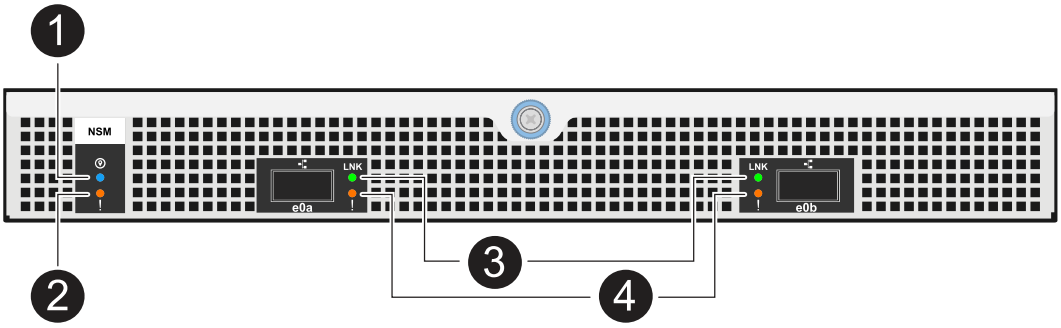
LED icon	LED name & color	State	Description
!	Attention (Amber)	On	• An error occurred with the function of one of more shelf FRUs. Check event messages to determine corrective action to take. • If the two-digit shelf ID is also blinking, the shelf ID is in a pending state. Power cycle the drive shelf for the shelf ID to take affect.
	Location (Blue)	On	The system administrator activated this LED function.

NSM LEDs

The LEDs on an NSM indicate whether the module is functioning normally, whether it is ready for I/O traffic, and whether there are any problems with the hardware.

The following illustration and tables describe NSM LEDs associated with the function of a module and the function of each NVMe port on a module.

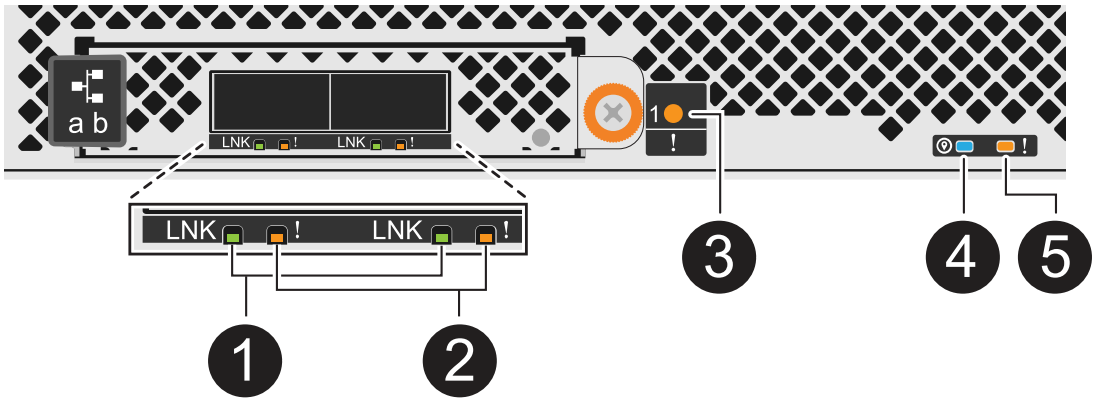
NSM100 modules



Call out	LED icon	Color	Description
1	⦿	Blue	NSM: Location
2	!	Amber	NSM: Attention
3	LNK	Green	NVMe port/link: status
4	!	Amber	NVMe port/link: attention

Status	NSM Attention (Amber)	Port LNK (Green)	Port Attention (Amber)
NSM normal	Off	Any state	Off
NSM fault	On	Any state	Any state
NSM VPD Error	On	Any state	Any state
No host port connection	Any state	Off	Off
Host port connection link active	Any state	On/Blinks with activity	Any state
Host port connection w/ fault	On	On/Off if all lanes are faulted	On
BIOS boot from BIOS image after power up	Blink	Any state	Any state

NSM100B modules



Call out	LED icon	Color	Description
1	LNK	Green	NVMe port/link: status
2	!	Amber	NVMe port/link: attention
3	!	Amber	I/O module: attention
4	⊙	Blue	NSM: Location
5	!	Amber	NSM: Attention

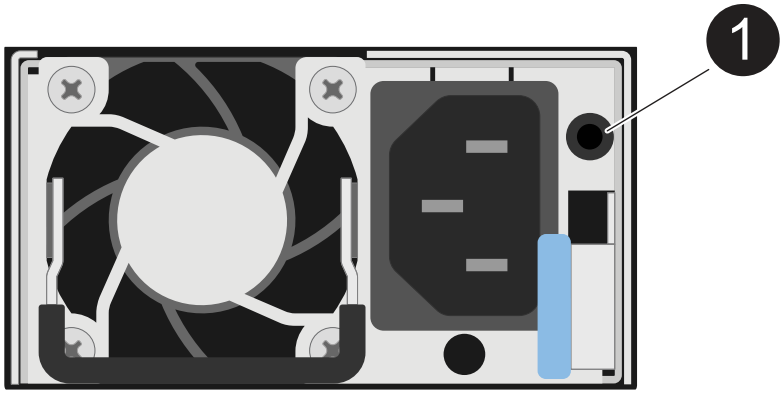
Status	NSM Attention (Amber)	Port LNK (Green)	Port Attention (Amber)	I/O Module Attention
NSM normal	Off	Any state	Off	Off
NSM fault	On	Any state	Any state	Off
NSM VPD Error	On	Any state	Any state	Off
No host port connection	Any state	Off	Off	Off
Host port connection link active	Any state	On/Blinks with activity	Any state	Off
Host port connection w/ fault	On	On/Off if all lanes are faulted	On	Off
BIOS boot from BIOS image after power up	Blink	Any state	Any state	Off

Status	NSM Attention (Amber)	Port LNK (Green)	Port Attention (Amber)	I/O Module Attention
I/O Module is missing	On	N/A	N/A	On

Power supply LEDs

The LEDs on an AC or DC power supply (PSU) indicate whether the PSU is functioning normally or there are hardware problems.

The following illustration and tables describe the LED on a PSU. (The illustration is an AC PSU; however, the LED location is the same on the DC PSU):



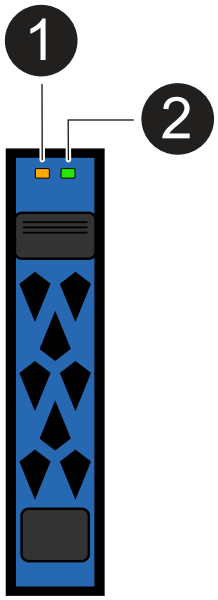
Call out	Description
1	The bi-color LED indicates power/activity when green and a fault when red.

Status	Power/activity (Green)	Attention (Red)
No AC/DC power to the enclosure	Off	Off
No AC/DC power to the PSU	Off	On
AC/DC power on, but PSU not in enclosure	Blink	Off
PSU operating correctly	On	Off
PSU failure	Off	On
Fan failure	Off	On
Firmware update mode	Blink	Off

Drive LEDs

The LEDs on an NVMe drive indicates whether it is functioning normally or there are problems with the hardware.

The following illustration and tables describe the two LEDs on an NVMe drive:



Call out	LED name	Color
1	Attention	Amber
2	Power/activity	Green

Status	Power/Activity (Green)	Attention (Amber)	Associated ODP LED
Drive installed and operational	On/Blinks with activity	Any state	N/A
Drive failure	On/Blinks with activity	On	Attention (Amber)
SES device identify set	On/Blinks with activity	Blinks	Attention (Amber) is off
SES device fault bit set	On/Blinks with activity	On	Attention (Amber)
Power control circuit failure	Off	Any state	Attention (Amber)

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