

Emulex® Drivers for Linux

Release 12.6.182.4

Purpose and Contact Information

These release notes describe the new features, resolved issues, FC and NVMe driver known issues, and FC and NVMe technical tips associated with this release of the Emulex® drivers for Linux.

For the latest product documentation, go to www.broadcom.com. If you have questions or require additional information, contact an authorized Broadcom® Technical Support representative at ecd-tech.support@broadcom.com.

New Features

1. Support is added to generate firmware logs directly from the driver on LPe35000-series and LPe32000-series adapters.
2. Support is added for dynamic removal of a CPU in the FC driver.
3. Support is added for the following out-of-box drivers:
 - RHEL 8.1
 - SLES 12 SP5
4. Support is discontinued for the following inbox drivers:
 - SLES 12 SP2 GM
 - SLES 12 SP3 MU6
 - UBUNTU 16 U04 GA
 - UBUNTU 17 U04 GA
5. Support is added for the loop topology on LPe31000-series and LPe32000-series adapters.
6. ARM support is added, if supported by the OEM.

NOTE: The Emulex OneCommand® Manager application has been renamed as the Emulex HBA Manager application.

Resolved Issues

1. Switch diagnostic failures and Emulex HBA Manager D_Port failures no longer occur when the `enable-mds-diags` driver parameter is set to 1.
2. The driver kit `elx-lpfc-extras` RPM no longer fails to install if an instance of `elx-lpfc-vector-map` RPM exists while installing the driver kit.

FC Driver Known Issues

1. Known issue related to software migration.

Beginning with software release 11.2, FC HBAs and OneConnect® adapters have independent software kits. Before updating earlier drivers and applications to the software in release 12.6.1, refer to the *Emulex Software Kit Migration User Guide* for special instructions and considerations for using the 11.2 and later software kits for FC HBAs and OneConnect adapters.

2. PCI Hot Plug might cause applications, such as the Emulex HBA Manager application or third-party applications that use the Emulex libraries (for example, an HBA API), to malfunction.

Workaround

- a. Stop all applications that are accessing the FC HBA API interface (Emulex HBA Manager application or third-party applications) before performing a PCI Hot Plug of an FC adapter.
- b. Use the following command to stop the Emulex HBA Manager application:

```
#/usr/sbin/ocmanager/stop_ocmanager
```
- c. After performing a PCI Hot Plug of the adapter, restart the applications.

3. SCSI errors might occur on deletion of vPorts or PCI Hot Unplug.

On occasion, the kernel might report the following SCSI errors when deleting vPorts through the `sysfs` interface or performing a PCI Hot Unplug of an Emulex adapter:

```
kernel: Synchronizing SCSI cache for disk  
kernel: FAILED
```

Or:

```
SCSI error: return code = 0x00010000
```

Workaround

None. Ignore these messages; they do not indicate a functional failure.

4. An issue exists while deleting vPorts when devices are in use.

Emulex provides management utilities that allow you to delete a vPort. However, no mechanism exists for the FC driver to detect whether devices accessed through that vPort are in use. This situation means that you can delete a vPort when devices accessible through the vPort are mounted or when I/O is outstanding to the device. When file systems are mounted on vPorts and vPorts are deleted, the file systems still appear to be mounted; however, they are inaccessible.

Workaround

Before deleting a vPort, you must prepare the system affected by the vPort deletion accordingly, by unmounting all the devices accessible through the vPort and ensuring that there is no outstanding I/O.

5. A devloss timeout occurs after swapping ports.

The driver might not finish discovery when two initiator ports are swapped. This situation causes all devices accessible through one or both of these initiator ports to time out and all I/O to fail.

Workaround

Do one of the following:

- When swapping cables, replace each cable, one at a time, and allow discovery to finish before replacing the next cable. To determine if discovery is finished, read the `state sysfs` parameter.
- When swapping cables, allow the devloss timeout to occur before replacing the cables (this action fails all outstanding I/O).

6. An error message `Failed to issue SLI_CONFIG ext-buffer` might be displayed when multiple queue operations are performed.

Workaround

During firmware update operations, do not perform queue operations, such as resetting the adapter, the bus, the target, or the host.

7. Revision A of the FOIT AFCT-57F3TMZ-ELX (16GFC longwave optic transceiver) does not support D_Port for MDS Diagnostic for Cisco switches.

Workaround

None.

8. Neither Revision A nor Revision B of the FOIT AFCT-57F3TMZ-ELX (16GFC longwave optic transceiver) supports D_Port for Brocade® switches.

Workaround

None.

9. Boot from SAN is not supported if FC-SP-2 authentication (DH-CHAP) is enabled.

Workaround

None.

10. Due to limitations in the FC-LS-3 RDP ELS definition, FC switches do not issue RDP commands on trunked links.

Workaround

None.

11. The remote switched diagnostic test will fail with a Latency Err-Drop error if you run diagnostics on multiple HBAs simultaneously.

Workaround

Run diagnostics on only one port at a time.

12. On SLES 12 and SLES 15, the driver might not unload due to BTRFS.

If a discovered SCSI device has a BTRFS partition on it, the upper layers maintain a reference count on the driver, which will cause it to not be unloaded. After the SCSI layer discovers an FC device and you see the following BTRFS message:

```
[ 5.502273] sd 0:0:0:1: [sdd] Attached SCSI disk
[ 5.552774] BTRFS: device fsid 69ca50b4-c061-4f66-9ada-0287d76269a0 devid 1 transid 274 /dev/sdd2
```

The BTRFS subsystem takes a reference count on the `lpfc` driver. This extra reference count might stop the administrator from unloading the `lpfc` driver. In order to unload the driver, the reference count for it must be 0:

```
# cat /sys/module/lpfc/refcnt
0
#
```

13. Brocade switches using Fabric OS® version 8.2.1B and earlier might encounter the following issues with DH-CHAP authentication:

- You might not be able to configure the secret pair between the switch and the HBA.
- When authentication is enabled on the switch, and authentication is disabled on the HBA, the switch disables the port, but it does not issue the expected status messages.
- The Brocade switch authenticates the HBA port when authentication is disabled on the switch or when a frame is dropped.

Workaround

None.

14. Firmware dump is unavailable for LPe35000-series adapters using standard Emulex applications, such as the Emulex HBA Manager application and the Emulex HBA Capture utility, on the following Linux inbox drivers:
- SLES 15
 - RHEL 7.6 (except the RHEL 7.6 errata kernel-3.10.0-990.el7)
 - Ubuntu 18.04 (except the Ubuntu 18.04.3 HWE release)

To perform a firmware dump on these inbox drivers, see [FC Driver Technical Tips, Item 4](#), in these release notes.

15. Loading a Broadcom ECD-signed driver on a system using legacy BIOS might result in an error message similar to the following:

```
Request for unknown module key 'Broadcom Inc.: Emulex Connectivity Division:
d17ecabc92cd490989959b37f05f0eda48c53895' err -11
```

or

```
PKCS#7 signature not signed with a trusted key
```

Workaround

None. This is a benign error message, and it can be ignored.

16. On RHEL 8.0 inbox systems, the GUI displays incorrect trunking information.

Workaround

Use the RHEL 8.0 out-of-box driver.

17. On some inbox Linux distributions, the `lpfc_enable_mds_diags` driver parameter cannot be enabled dynamically.

Workaround

Enable the `lpfc_enable_mds_diags` parameter temporarily by issuing the following commands:

```
rmmod lpfc
modprobe lpfc lpfc_enable_mds_diags=1
```

After the diagnostics are complete, reload the driver without the `lpfc_enable_mds_diags` parameter.

18. In the latest inbox RHEL and SLES operating system releases, SCSI multi-queue might be enabled by default, which could dramatically increase the amount of preallocated I/O buffers. Depending on your system configuration, out-of-memory errors might occur on boot.

Workaround

If the system cannot boot because of memory issues, perform the following steps:

- a. Temporarily change the FC driver parameters by adding the following command to the kernel boot command line:

```
lpfc.lpfc_hdw_queue=1 lpfc.lpfc_fcp_io_sched=0
```

Refer to the operating system documentation for details.

- b. Install the latest release 12.6 out-of-box FC driver.

19. On certain Linux distributions, the inbox driver might fail to discover LUNs, and the link might remain down. This issue occurs if the firmware version used is 12.4.243.8 or later.

Workaround

Use the out-of-box driver version 12.4.64.0 or later for proper discovery of LUNs.

20. The RHEL 7.x, RHEL 8.1, and SLES 15 inbox driver fail to discovery LUNs in private loop mode on LPe31000-series and LPe32000-series adapters and the link remains down.

Workaround

Use the latest 12.6 out-of-box FC driver.

21. On LPe35000-series and LPe32000-series adapters with a RHEL 7.7, RHEL 8.1, or SLES 12 SP5 inbox driver, performing a firmware update through sysfs (`lpfc_req_fw_upgrade`) might result in an error message similar to the following:

```
3199 Firmware write complete: Firmware write complete: Firmware reset required to instantiate
```

Workaround

Instead of a firmware reset, perform a PCI bus reset to activate the newly downloaded firmware. For instructions on issuing a PCI bus reset, refer to the *Emulex Drivers for Linux User Guide*.

22. Enabling the ExpressLane™ feature on a LUN, when maximum LUNs are already enabled for ExpressLane, might result in an error.

Workaround

Use the `/usr/sbin/lpfc/lpfc_clean_xlane_conf.sh` script to clear any unwanted entries and retry enabling ExpressLane.

23. On inbox drivers, the ExpressLane configuration is not persistent.

Workaround

Install the `elx-lpfc-extras` (`elx-lpfc-vector-map` in case of older distributions) RPM from the out-of-box lpfc driver package. The `lpfc_configure_oas.sh` script that is a part of this RPM will take care of making the ExpressLane configuration persistent.

24. An unrecoverable operating system fault might occur when unloading the lpfc 12.0.0.10 inbox driver.

Workaround

None.

NVMe Driver Known Issues

1. In the latest SLES 12, SLES 15, and RHEL 7.x operating system variants, the `nvme list` command might not display all namespaces when the maximum number of namespaces (255) are created on the target.

Workaround

Use the `lsblk` command to display all namespaces.

2. The deliberate faulting of NVMe discovery commands (also called jamming) is not supported. If a discovery command is faulted during initial linkup or during the LIP linkup recovery time, NVMe discovery fails on the affected controller.

Workaround

Perform a LIP on the initiator link, and remove the condition that is faulting discovery.

3. If you are adding a subsystem dynamically on a target, you must issue a LIP on the initiator host port that is bound to the target. If you are adding new namespaces dynamically to existing subsystems, you must perform a manual scan on the initiator. See [NVMe Driver Technical Tips](#) for more information.

4. Configuring initiator ports as NVMe over FC is not supported on ports that are configured as Fabric Assigned Port World Wide Names (FA-PWWNs).

5. Unloading the FCP driver using the `modprobe -r` command might cause issues on the initiator before NVMe devices are disconnected.

Workaround

Unload the driver with `rmmmod lpfc`, or if `modprobe -r lpfc` is required, wait for the device loss period of 60 seconds before unloading the driver.

6. On systems with version 1.7 of the `nvme-cli` utility installed, connection attempts might fail, and you might not see NVMe-FC storage. Console log messages and Systemd log messages indicate the failure to connect.

Workaround

Do one of the following:

- Contact the operating system vendor to obtain a newer version of the `nvme-cli` utility.
- Download and use the latest `nvme-cli` utility at <https://github.com/linux-nvme/nvme-cli>.

7. An I/O error can occur while resetting an NVMe controller. Error messages similar to the following might be shown, and the I/O request could fail.

```
nvme nvme0: NVME-FC{0}: controller reset complete
print_req_error: I/O error, dev nvme0c2n3, sector 11715.
```

Workaround

Upgrade to the latest operating system kernel version.

The minimum supported kernel versions are:

- RHEL 7.6 3.10.0-930.el7 and later
- SLES 12 SP4 GA kernel and later
- SLES 15 maintenance update kernel 4.12.14-25.16.1 and later

During RHEL 8.1 installation, the operating system reports an error while attempting to add an UEFI boot entry. This is an operating system issue and has been reported to Red Hat. **Workaround**

Ignore the warning prompt and continue the installation. On the first reboot, use the server UEFI menu to select the adapter port that is attached to the fabric to boot the operating system.

8. On SLES 12 SP5 and SLES 15 SP1, the `nvme-fc-boot-connections` systemd unit is disabled after the operating system is installed using NVMe-Boot-From-SAN. This leads to the operating system failing to discover all NVMe subsystems when a large number of NVMe subsystems exist.

Workaround

Manually enable the `nvme-fc-boot-connections` systemd unit. Refer to [NVMe Driver Technical Tips, Item 11](#), for more information.

FC Driver Technical Tips

1. Locked optics are supported on Emulex LPe31000-series and LPe32000-series adapters.

The adapters perform the following operations:

- Detect and enable both Broadcom or Emulex certified SFP optics.
- For firmware revision 11.x and later, unqualified optics are disabled, the link is down, and an error message is written to the log file.
- The `lpfc` out-of-box driver revision 11.x and later show the following message, and the link will not come up.
"3176 Port Name [wwpn] Unqualified optics - Replace with Avago optics for Warranty and Technical support"

When a 32 Gb/s optic is installed in an Emulex LPe31000-series, LPe32000-series, or LPe35000-series adapter, the link supports 32 Gb/s, 16 Gb/s, and 8 Gb/s speeds.

When a 16 Gb/s optic is installed in an Emulex LPe31000-series or LPe32000-series adapter, the link supports 16 Gb/s, 8 Gb/s, and 4 Gb/s speeds.

2. For secure boot of the RHEL operating system, download the public key file for the RHEL operating system from www.broadcom.com and place it in the system's key ring before installing the signed `lpfc` driver for the RHEL operating system. Refer to the Red Hat documentation for instructions on adding a kernel module to the system.

3. Dynamic D_Port is enabled by default and cannot be simultaneously enabled with FA-PWWN or DH-CHAP.

Workaround

To enable FA-PWWN or DH-CHAP, disable Dynamic D_Port first.

4. To perform a firmware dump on the inbox drivers listed in [FC Driver Known Issues, Item 14](#), perform the following steps:
 - a. Ensure that the latest Emulex HBA Manager core application kit for Linux is installed on the host.
 - b. Download the LPe35000-series HBA FW Dump Tool from the Broadcom website at www.broadcom.com.
 - c. Type the following commands to extract and install the tool:

```
tar xzf elx-lpe-35000-fw-dump-tool-<version>-ds-1.tar.gz
cd elx-lpe-35000-fw-dump-tool-<version>-ds-1/
rpm -ivh elx-lpe-35000-fw-dump-tool-<version>.<platform>.rpm
```

A window similar to the following is displayed.

```
[root@dhcp-10-231-221-134 elx_lpe_35000_fw_dump_tool]# elx-lpe-35000-fw-dump-tool
*****
*                               *
*   Emulex LPe35000-series HBA FW Dump Tool   *
*                               *
*   Copyright 2018-2019 Broadcom. All Rights Reserved. *
*   The term "Broadcom" refers to Broadcom Inc. and/or its subsidiaries. *
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*                               *
*****

LPe35000 Devices Detected:
1. pci 0000:01:00.0 WWPN 0x10000090fa9488a2 host8 <-- Current handle
2. pci 0000:01:00.1 WWPN 0x10000090fa9488a3 host9
3. pci 0000:04:00.0 WWPN 0x10000090fa9488f6 host10
4. pci 0000:04:00.1 WWPN 0x10000090fa9488f7 host11

Warning:      Triggering a dump on current port handle (host8)
              will also affect port(s): host9

Menu options:
  1. Change port handle.
  2. Trigger Firmware Dump.
  3. Exit.
Please enter option [1 - 3]: █
```

- d. Type 1 and press Enter to select the port for which you want to perform the firmware dump.

A window similar to the following is displayed.

```
[root@dhcp-10-231-221-134 elx_lpe_35000_fw_dump_tool]# elx-lpe-35000-fw-dump-tool

*****
*               Emulex LPe35000-series HBA FW Dump Tool               *
*                                                                 *
*   Copyright 2018-2019 Broadcom. All Rights Reserved.             *
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*****

LPe35000 Devices Detected:
1. pci 0000:01:00.0 WWPN 0x10000090fa9488a2 host8 <-- Current handle
2. pci 0000:01:00.1 WWPN 0x10000090fa9488a3 host9
3. pci 0000:04:00.0 WWPN 0x10000090fa9488f6 host10
4. pci 0000:04:00.1 WWPN 0x10000090fa9488f7 host11

Warning:      Triggering a dump on current port handle (host8)
              will also affect port(s): host9

Menu options:
  1. Change port handle.
  2. Trigger Firmware Dump.
  3. Exit.
Please enter option [1 - 3]: 1
```

NOTE: If initiating a firmware dump on a specific port will also affect another port on the same adapter ASIC, a warning message notifies you of this fact.

- e. Type the number of the port for which you want to perform the firmware dump, and press **Enter**.

A window similar to the following is displayed.

```
LPe35000 Devices Detected:
1. pci 0000:01:00.0 WWPN 0x10000090fa9488a2 host8 <-- Current handle
2. pci 0000:01:00.1 WWPN 0x10000090fa9488a3 host9
3. pci 0000:04:00.0 WWPN 0x10000090fa9488f6 host10
4. pci 0000:04:00.1 WWPN 0x10000090fa9488f7 host11
Please select new handle: 3

*****
*               Emulex LPe35000-series HBA FW Dump Tool               *
*                                                                 *
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*****

LPe35000 Devices Detected:
1. pci 0000:01:00.0 WWPN 0x10000090fa9488a2 host8
2. pci 0000:01:00.1 WWPN 0x10000090fa9488a3 host9
3. pci 0000:04:00.0 WWPN 0x10000090fa9488f6 host10 <-- Current handle
4. pci 0000:04:00.1 WWPN 0x10000090fa9488f7 host11

Warning:      Triggering a dump on current port handle (host10)
              will also affect port(s): host11

Menu options:
  1. Change port handle.
  2. Trigger Firmware Dump.
  3. Exit.
Please enter option [1 - 3]:
```

- f. When the desired port is identified as the current port, type 2 and press **Enter** to initiate the firmware dump on the current port.
- g. If the firmware dump is successful, the firmware dump tool closes automatically.

- h. Restart the `elxhbmgrd` service by typing the following command:

```
service elxhbmgrd restart
```

This allows applications such as the Emulex HBA Manager application to be refreshed.

By default, the firmware dump file is available on the host in the `/var/opt/Emulex/ocmanager/Dump/` directory after the `elxhbmgrd` service has been restarted.

On SLES 12 SP4 or SLES 15, initiating a firmware dump might result in an error message similar to the following:

```
error: Invalid argument (src/elx_lpe_35000_pci_device.cpp:TriggerFWDump:510)
Consider adding "iomem=relaxed" to grub cfg kernel commandline.
[0x10000090fa9488a2], [host8], [0000:01:00.0] Failed to trigger firmware dump...
```

If this message appears, do the following:

- a. Add the following kernel command line to the host grub configuration file:

```
iomem=relaxed
```

- b. Reboot the host.
- c. Repeat the process to initiate a firmware dump.

NOTE: For the Ubuntu x86_64 architecture operating system, the HBA Manager application is unavailable. You must use the Emulex HBA Capture utility to read the firmware dump from flash. You can download and use the latest Emulex HBA Capture utility for Ubuntu from the Broadcom website at www.broadcom.com.

For instructions on reading the firmware dump file, refer to the “Output File” section under “Running HBA Capture on Linux, Citrix, and Solaris” in the *Emulex HBA Capture Utility User Guide*.

NVMe Driver Technical Tips

1. Creation of N_Port ID Virtualization (NPIV) connections on initiator ports that are configured for NVMe over FC is not supported. However, initiator ports can connect to Fibre Channel Protocol (FCP) and NVMe targets simultaneously.
2. NVMe disks might not reconnect after a device timeout greater than 60 seconds has occurred.

Workaround

You must perform a manual scan or connect via the `nvme connect-all` CLI command.

3. To manually scan for targets or dynamically added subsystems, type the following command (all on one line):

```
nvme connect-all --transport=fc --host-traddr=nn-<initiator_WWNN>:pn-<initiator_WWPN>
--traddr=nn-<target_WWNN>:pn-<target_WWPN>
```

where:

- `<initiator_WWNN>` is the WWNN of the initiator, in hexadecimal.
- `<initiator_WWPN>` is the WWPN of the initiator, in hexadecimal.
- `<target_WWNN>` is the WWNN of the target, in hexadecimal.
- `<target_WWPN>` is the WWPN of the target, in hexadecimal.

For example:

```
# nvme connect-all --transport=fc --host-traddr=nn-0x20000090fa942779:pn-0x10000090fa942779
--traddr=nn-0x20000090fae39706:pn-0x10000090fae39706
```

4. To enable autoconnect on the SLES 15 SP1 operating system, install `nvme-cli` from the operating system distribution media.
5. This release supports FC-NVMe specification version 1.19.

6. If the following files are present on the system after the operating system is installed, the operating system has already installed NVMe over FC autoconnect facilities. Do not install the Emulex autoconnect script file for inbox NVMe over FC drivers.

- /usr/lib/systemd/system/nvmefc-boot-connections.service
- /usr/lib/systemd/system/nvmefc-connect@.service
- /usr/lib/udev/rules.d/70-nvmefc-autoconnect.rules

7. On Red Hat operating systems, apply a volume label to a USB storage device.

You must set the USB storage device volume label to OEMDRV.

When the volume label is set to OEMDRV, the Red Hat operating system installer automatically searches for a driver update disk (DUD) on the USB storage device. This simplifies operating system installation since adding the `dd` option to the boot loader, which asks the installer to look for a DUD, is not necessary.

Use `fdisk` to locate the USB storage device. This example assumes that the USB storage device is `/dev/sdc` formatted with a FAT32 filesystem with partition `/dev/sdc1`.

Example:

```
# fdisk -l
```

```
Disk /dev/sdc: 15.9 GB, 15938355200 bytes, 31129600 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x0d7584c8
...
```

If the device is formatted FAT32, use `mlabel` to set the volume label.

```
# mlabel -i /dev/sdc1 ::OEMDRV
```

If the device is formatted ext2/ext3/ext4, use `e2label` to set the volume label.

```
# e2label /dev/sdc1 ::OEMDRV
```

8. On Red Hat operating systems apply a volume label to an ISO.

You must set the ISO volume label to OEMDRV.

When the volume label is set to OEMDRV, the Red Hat operating system installer automatically searches for a DUD on the CD-R/DVD-R media. This simplifies the operating system installation since adding the `dd` option to the boot loader, which asks the installer to look for a DUD, is not necessary.

When generating an ISO, include the volume label.

```
# genisoimage -V OEMDRV -o sample.iso ISOROOT
```

...

9. Enable NVMe support at boot time.

If the operating system was installed using FC-NVMe Boot-From-SAN and NVMe support is disabled due to a system misconfiguration, perform the following steps to manually re-enable NVMe support.

- a. Edit the boot loader to enable NVMe support. At the boot loader screen, press `E` to edit the boot entry. At the end of the `linuxefi` boot entry, add the driver parameter `lpfc.lpfc_enable_fc4_type=3`. Press `Ctrl+X` to boot the operating system.
- b. Create a `modprobe` configuration file that enables NVMe support during boot. Refer to the [NVMe Driver Technical Tips, Item 10](#), which explains how to enable NVMe support using a `modprobe` configuration file.

10. Enable NVMe support using a `modprobe` configuration file.

Create a `modprobe` configuration file called `/etc/modprobe.d/elx-lpfc.conf` that sets the `lpfc` driver parameter `lpfc_enable_fc4_type` to 3.

Example:

```
# cat /etc/modprobe.d/elx-lpfc.conf
# This file is used to configure lpfc parameters and aliases
# Emulex lpfc options
options lpfc lpfc_enable_fc4_type=3
```

Rebuild the initial ramdisk to enable NVMe support during boot.

Example:

```
# dracut -f
```

11. Enable nvme-fc-boot-connections to start during boot.

Use `systemctl enable` to enable the `nvme-fc-boot-connections` systemd unit to start during boot.

```
# systemctl enable nvme-fc-boot-connections
Created symlink /etc/systemd/system/default.target.wants/nvme-fc-boot-connections.service ? /usr/
lib/systemd/system/nvme-fc-boot-connections.service.
```

12. Back up the initial ramdisk before upgrading the operating system.

During an operating system upgrade, the kernel or `nvme-cli` might be upgraded. You must back up the initial ramdisk before upgrading the operating system. This will ensure that the operating system is still bootable in the event that NVMe Boot-From-SAN fails due to a change in either the kernel or `nvme-cli`.

Change directory to `/boot` and make a copy of the initial ramdisk.

Example for SUSE operating systems:

```
# cd /boot
# cp initrd-$(uname -r) initrd-$(uname -r).bak
```

Example for Red Hat operating systems:

```
# cd /boot
# cp initramfs-$(uname -r).img initramfs-$(uname -r).img.orig
```

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