Notes, cautions, and warnings

**NOTE:** A NOTE indicates important information that helps you make better use of your product.

**CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

**WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.
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BOSS-S1 is a simple RAID solution card designed specifically for booting a server’s operating system. The card supports up to two 6 Gbps M.2 SATA drives. This card has a x8 connector using PCIe gen 2.0 x2 lanes, available only in the low-profile and half-height form factor.

**NOTE:** There are no status LEDs on the BOSS-S1 card.

**Figure 1. Features of BOSS card**

1. SATA drive connector (2)
2. 80 mm M.2 SATA drive 1
3. 80 mm M.2 SATA drive 2

**Topics:**
- Supported operating systems
- Supported PowerEdge systems
- BOSS-S1 card specifications
- Management applications for the BOSS-S1 controller
- Related documentation

**Supported operating systems**

The BOSS-S1 card supports the following operating systems:

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Red Hat Enterprise Linux version 6.9
- Red Hat Enterprise Linux version 7.3
- SUSE Linux Enterprise Server version 12 SP2
- VMware ESXi 6.0 Update 3
NOTE: For the latest list of supported operating systems and driver installation instructions, see the system documentation at Dell.com/support/operatingsystemmanuals. For specific operating system service pack requirements, see the Drivers and Downloads section at Dell.com/support/manuals.

Supported PowerEdge systems

The following PowerEdge systems support BOSS-S1 card:

- PowerEdge R640
- PowerEdge R740
- PowerEdge R740xd
- PowerEdge R940

BOSS-S1 card specifications

Table 1. BOSS-S1 card feature specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>BOSS-S1 card</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID Levels</td>
<td>RAID 1</td>
</tr>
<tr>
<td>Stripe Size</td>
<td>BOSS-S1 supports default 64K stripe size only</td>
</tr>
<tr>
<td>Battery Backup Unit</td>
<td>No</td>
</tr>
<tr>
<td>Non-Volatile cache</td>
<td>No</td>
</tr>
<tr>
<td>Virtual Disk Cache function</td>
<td>Write Through only</td>
</tr>
<tr>
<td>Maximum number of virtual disks</td>
<td>1</td>
</tr>
<tr>
<td>Maximum number of drives supported</td>
<td>Two</td>
</tr>
<tr>
<td>Support for Non-RAID disks</td>
<td>Yes (supports up to two disks)</td>
</tr>
<tr>
<td>Drive Types</td>
<td>6 Gbps M.2 SATA SSDs</td>
</tr>
<tr>
<td>PCIe Support</td>
<td>Gen 2</td>
</tr>
<tr>
<td>Disk Cache Policy</td>
<td>Drive Default</td>
</tr>
<tr>
<td>TRIM</td>
<td>Non-RAID Disk mode only</td>
</tr>
</tbody>
</table>

Management applications for the BOSS-S1 controller

Management applications enable you to manage and configure the RAID system, create and manage the disk group, and provide online maintenance. The management applications for BOSS-S1 card include:

- Unified Extensible Firmware Interface (UEFI) RAID Configuration Utility — This storage management application is integrated into the System BIOS (F2). See UEFI/HII RAID configuration utility.
- Dell OpenManage Storage Management — This application enables you to perform controller and enclosure functions for all supported RAID controllers and enclosures from a single graphical or command-line interface. For more information, see the Dell OpenManage Storage Management User's Guide at Dell.com/openmanagemanuals.
- BOSS-S1 Command Line Interface (CLI) Utility — This application enables you to check controller, Physical Disk, and Virtual Disk status while booted to an OS. The application is also used to check SMART data from the physical disks or display controller events. The following table lists the common commands:
Table 2. BOSS-S1 common commands and description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Example Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>info -o hba</td>
<td>Display BOSS-S1 controller information.</td>
<td>mvsetup info -o hba</td>
</tr>
<tr>
<td>info -o vd</td>
<td>Display virtual drive information.</td>
<td>mvsetup info -o vd</td>
</tr>
<tr>
<td>info -o pd</td>
<td>Display physical drive information.</td>
<td>./mvcli info -o pd</td>
</tr>
<tr>
<td>smart -p &lt;PD_ID&gt;</td>
<td>Display SMART information of physical drive.</td>
<td>./mvcli smart -p 0</td>
</tr>
<tr>
<td>event</td>
<td>Display controller events.</td>
<td>./mvcli event</td>
</tr>
</tbody>
</table>

Related documentation

NOTE:

- For all Dell OpenManage documents, go to Dell.com/openmanagemanuals.
- For all operating system documents, go to Dell.com/operatingsystemmanuals.
- For all PowerEdge documentation, go to Dell.com/poweredgemanuals.
BOSS-S1 card supports the following features:

- Fast initialization
- Foreign Import
- SMART Info
- Auto-Rebuild
- Non-RAID migration
- TRIM (Non-RAID Physical Disk)

Topics:

- Fast Initialization
- Foreign Import
- SMART Info
- Auto-Rebuild
- Non-RAID disks support
- TRIM (Non-RAID Physical Disk)

**Fast Initialization**

A fast initialization on a virtual disk overwrites the first 64 KB of the virtual disk, clearing any boot records or partition information.

**NOTE:** Virtual Disks are created without Fast Initialization by default.

**Foreign Import**

A virtual disk is considered foreign if it is not native to the adapter.

- A virtual disk is considered native to the adapter if:
  - The virtual disk was created or imported on the adapter.
- A physical disk is considered native to the adapter if:
  - There is no previous virtual disk metadata on the adapter and the physical disk(s) are unconfigured.
  - All configured virtual disk(s) on the physical disk(s) are deleted

To check for previous virtual disk metadata, see Controller Information. Only a virtual disk or physical disk(s) native to adapter will be presented to the OS.

Upon migrating two foreign drives to a controller, you must do either of the following:

- Clear the Controller Configuration if using unconfigured drives — Clear Controller Configuration.
- Import the virtual disk if using configured drives — Virtual Disk Import.
SMART Info

SMART monitors certain physical aspects of all motors, heads, and physical disk electronics to help detect predictable physical disk failures. Data on SMART-compliant physical disks can be monitored to identify changes in values and determine whether the values are within threshold limits. Many mechanical and electrical failures display some degradation in performance before failure.

A SMART failure is also referred to as predicted failure. There are numerous factors that are predicted physical disk failures, such as a bearing failure, a broken read/write head, and changes in spin-up rate. In addition, there are factors related to read/write surface failure, such as seek error rate and excessive bad sectors.

Auto-Rebuild

A virtual disk rebuild will begin on system boot automatically if the native virtual disk is degraded and a valid rebuild target is present. A valid rebuild target is any functional drive attached to the BOSS-S1 device which is not part of the native virtual disk and is of equal or greater storage capacity. An auto-rebuild occurs without prompting the user, and any data on the rebuild target is overwritten.

Non-RAID disks support

By default, all disks are in unconfigured state.

- For BOSS-S1, unconfigured drives are automatically non-RAID drives. To convert RAID drives to non-RAID drives, delete the virtual disk.
- BOSS only supports 1 configured (RAID) and 2 unconfigured states. BOSS does not break "unconfigured" into RAID-capable and non-RAID states.

TRIM (Non-RAID Physical Disk)

TRIM allows an operating system to delete a block of data that is no longer considered in use, from SSDs. The TRIM command resolves the Write Amplification issue for operating systems that are supported. When an operating system deletes a file, the file is marked for deletion in the file system, but the contents on the disk are not actually erased. As a result, the SSDs do not know the LBA (Logical Block Addressing) previously occupied can be erased. With the introduction of TRIM, when a file is deleted, the operating system sends a TRIM command along with the LBAs that do not contain valid data to the physical disk(s).
Deploying the BOSS card

This section provides a set of high-level installation and removal instructions for the BOSS-S1 card.

Topics:

- Removing the BOSS-S1 card
- Installing the BOSS-S1 card

Removing the BOSS-S1 card

⚠️ **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

   📌 **NOTE:** It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

2. Open the system.

3. Locate the BOSS-S1 card on the system board.

   ⚠️ **CAUTION:** To prevent damage to the card, you must hold the card by its edges only.

4. For Modular V1 card, lift the latch to release the card

5. For Modular V2 card, loosen the screw that secures the card to the system board.

6. After ensuring that the PCIe bracket is unobstructed, lift the card to remove it from the connector on the system board.
Figure 2. Removing the BOSS-S1 card

Figure 3. Removing the Modular V1 card

1. modular V1 card
2. card connector on the system board
Removing the M.2 SSD module

⚠️ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

⚠️ NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

2 Open the system.

3 Remove the card. See Removing the BOSS-S1 card.

4 Loosen the screw that secures the M.2 SSD module on the card.

5 Lift the M.2 SSD module away from the card.
Figure 5. Removing the M.2 SSD module

1. module connector (2)
2. module (2)

Figure 6. Removing the M.2 SSD module for Modular V1 card

1. module connector
2. module
Installing the M.2 SSD module

⚠️ **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

1. Align the M.2 SSD module connectors with the connectors on the card.
2. Tilt the M.2 SSD module downwards until the module is seated firmly on the card.
3. Tighten the screw that secures the M.2 SSD module on the card.
Installing the BOSS-S1 card

⚠️ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

   ☀️ NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

2. Open the system.

3. Hold the card by its edges and align the card connector with the connector on the system board.
To prevent damage to the card, you must hold the card by its edges only.

1. Press the card-edge down until the card is fully seated.
2. For Modular V1 card, push the latch down to secure the card.
3. For Modular V2 card, tighten the screw that secures the card to the system board.
4. Close the system.
5. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

### Figure 11. Installing the BOSS-S1 card

1. BOSS-S1 card
2. Card connector on the system board

### Figure 12. Installing the Modular V1 card

1. Modular V1 card
2. Card connector on the system board
Figure 13. Installing the Modular V2 card

1. modular V2 card
2. card connector on the system board
The BOSS-S1 card uses the native AHCI driver of the supported operating systems.

**Windows driver installation** — Dell provides the Dell Update Package (DUP) to update drivers on systems running Windows Server 2012 R2 and newer operating system. DUP is an executable application that updates drivers for specific devices. DUP supports command line interface and silent execution. For more information, see [Dell.com/support](http://Dell.com/support).

**Linux driver installation** — The driver update disk (DUD) images are created only for those operating system releases in which the native (in-box) driver is insufficient for installation.
The Unified Extensible Firmware Interface (UEFI) RAID configuration utility is a storage management application integrated into the System BIOS <F2>. It is used to configure and manage RAID disk groups, virtual disks, and physical disks. This utility is independent of the operating system.

The following sections provide information about using the UEFI RAID configuration utility. For more information, see the online help option in the UEFI RAID configuration utility.

**NOTE:** Use the UEFI RAID configuration utility for initial setup and disaster recovery. Certain advanced features are also offered in the utility.

### Topics:
- Entering the UEFI configuration utility
- Exiting the UEFI configuration utility
- Navigating to BOSS-S1 configuration utility
- Physical/Virtual Disk Information
- Creating virtual disks
- Deleting virtual disks
- RAID Rebuild
- Erase physical disk
- Controller Information

### Entering the UEFI configuration utility

Perform the following steps to boot to the UEFI configuration utility:

1. Turn on the system.
2. While the system is booting, press <F2> to enter System Setup.
3. Click **Device Settings**.
   - **Device Settings** lists all the RAID controllers in the system.
   - To access the management menu for the controller, use the arrow keys or the mouse.

   **NOTE:** For more information in all the options, click Help that is available on the top right-hand corner of the browser screen. Help information for individual option menus can also be viewed by scrolling down on each option.

   **NOTE:** Some of the options within the UEFI RAID configuration utility are not present if the controller does not support the corresponding feature. Options may also be grayed out if the feature is not supported in the existing configuration.

### Exiting the UEFI configuration utility

To exit the UEFI configuration utility, perform the following steps:

1. Click **Finish** at the bottom-right corner on the System Setup Main Menu screen.
Displays a warning message to confirm your choice.

2. Click **Yes** to exit the configuration utility.

**NOTE:** Depending on the device configuration changes, exiting the UEFI configuration utility may prompt for a system reboot.

### Navigating to BOSS-S1 configuration utility

1. Enter the UEFI configuration utility. See [Entering the UEFI RAID configuration utility](#).

   The **Device Settings** screen displays a list of NIC ports and the BOSS-S1 configuration utility.

2. To enter BOSS-S1 configuration utility, click **BOSS-S1 Configuration Utility**.

   Displays the list of **Configuration Options**:
   - **Physical/Virtual Disk Information** — allows you to view the properties of physical disks and virtual disks
   - **Create RAID Configuration** — allows you to configure a virtual disk
   - **Delete RAID Configuration** — allows you to delete a virtual disk
   - **RAID Rebuild** — allows you to rebuild a degraded RAID volume, if a suitable peer drive is available
   - **Erase Physical Disk** — allows you to clear RAID setting on a physical disk
   - **Controller Information** — allows you to view BOSS-S1 adapter information

### Physical/Virtual Disk Information

The **Physical/Virtual Disk Information** menu allows the user to view physical disk properties and virtual disk properties.

#### Physical Disk Information

To view physical disk information:

1. Enter the **BOSS-S1 Configuration Utility**. See [Navigating to BOSS-S1 Configuration Utility](#).
2. Click **Physical/Virtual Disk Information**.
3. By default, **Physical Disk Info** radio button is selected.
4. All available physical disks are displayed.
5. Select a physical disk to view its information.

#### Virtual Disk Information

To view virtual disk information:

1. Enter the **BOSS-S1 Configuration Utility**. See [Navigating to BOSS-S1 Configuration Utility](#).
2. Click **Physical/Virtual Disk Information**.
3. Select the **Virtual Disk Info** radio button.
4. All available virtual disks are displayed.
5. Select a virtual disk to view its information.
Virtual Disk Import

The Import operation sets foreign virtual disk as the Native to the configuration.

1. Click Virtual Disk Information.
2. Select Import.
3. Press Enter.

Creating virtual disks

1. Enter the BOSS-S1 Configuration Utility. See Navigating to BOSS-S1 Configuration Utility.
2. Click Create RAID Configuration.
3. Select the devices by selecting the radio button next to the available physical disks.
4. Click Next.
5. Specify the name for the virtual disk in the Name field.
   
   **NOTE:** You cannot use the following symbols for the Virtual Disk name:

   `~!@#$%^&*()-+=[]{}\|;":",.<>/?

6. Click Next and the virtual disk is created with the specified parameters.

Deleting virtual disks

1. Enter the BOSS-S1 Configuration Utility. See Navigating to BOSS-S1 Configuration Utility.
2. Click Delete RAID Configuration.
3. Select the virtual disk by selecting the check box next to the available RAID configuration.
4. Select Yes by selecting the radio button next to the message Are you sure you want to delete the selected Virtual Disk?
5. Click Next to delete the selected virtual disk.

RAID Rebuild

You can manually rebuild a degraded virtual disk. RAID rebuild is available only when a degraded RAID volume is present and there is an available target device.

Erase physical disk

1. Enter the BOSS-S1 Configuration Utility. See Navigating to BOSS-S1 Configuration Utility.
2. Click Erase Physical Disk.
3. Select the devices by selecting the check box next to the available PD configuration.
4. Select the radio button Yes next to the message Would you like to erase this Physical disk?
5. Click Next.
   
   After the PD is successfully erased, the Physical Disk Information tab shows the PD status as unconfigured.
Controller Information

The Controller Information menu allows the user to view the properties of the RAID Controller.

1. Enter the BOSS-S1 Configuration Utility. See Navigating to BOSS-S1 Configuration Utility.
2. Click Controller Information.
   The RAID adapter information is displayed.

Clear Controller Configuration

The Clear Config operation is used to clear RAID metadata from the adapter.

NOTE: The Clear Config operation does not delete any data on the Virtual Disk.

1. Click Controller Information.
2. Select Clear Config.
3. Press Enter.
To get help with your Dell BOSS-S1 card, you can contact your Dell Technical Service representative or see Dell.com/support.

Topics:
- Physical Disk(s) not visible to Operating System
- Virtual Disk Not visible to Operating System
- Drive Replacement
- Controller Replacement
- Controller Failure
- Cannot Boot to M.2 in slot 1
- CLI Features state they are unsupported when run
- Failure to Install ESXi on a RAID 1

**Physical Disk(s) not visible to Operating System**

**Issue:** One or both physical disks are not appearing for use by an operating system.

**Probable Cause:**
A physical disk will not be presented to the operating system in the following scenarios:
- There is RAID metadata on the physical disk and no RAID metadata on the controller.
- The BOSS-S1 controller has RAID metadata on it and the physical disk(s) do not have the RAID metadata on it.

**Corrective Action:**
If the RAID metadata is on the controller, follow the steps listed in Clear Controller Configuration.
If the RAID metadata is on the physical disk(s), follow the steps specified in Erase physical disk.
Alternatively, if you wish to keep the RAID drive(s), refer to Virtual Disk Not visible to Operating System.

**Virtual Disk Not visible to Operating System**

**Issue:** In RAID mode a virtual disk is not appearing for use by an operating system.

**Probable Cause:** Virtual disks will not be presented to the system if they are not native to the controller.

**Corrective Action:** Import the virtual disk via HII as specified in section Virtual Disk Import.

**Drive Replacement**

**Issue:** An installed drive is not listed in the BOSS-S1 configuration utility
OpenManage reports PD offline state

**Probable Cause:** Drive is either in failure state or has corrupted firmware.
Corrective Action: Reseat drive to ensure drive is inserted correctly. If error persists, attempt to update drive firmware using DUP. If error is still present, replace erroneous drive.

**Controller Replacement**

**Issue:** Controller's UEFI Configuration Utility Menu entry not appearing.

**Probable Cause:** Either a firmware or a hardware fault

**Corrective Action:**
- Flash the latest Firmware on the BOSS adapter.
- If the problem persists, shutdown the server and unplug the BOSS-S1 adapter.
- Plug the BOSS-S1 adapter into the PCIe slot.
- Boot the system and check the UEFI Configuration Utility Menu again.

If the problem still persists, see Controller Failure

**NOTE:** Ensure that the system is completely disconnected from all power sources before making any hardware changes.

**Controller Failure**

**Issue:** BOSS-S1 device is not presented to system.

**Probable Cause:** Hardware fault on the card.

**Corrective Action:** Replace the BOSS-S1 adapter with a new one.

**Cannot Boot to M.2 in slot 1**

**Issue:** When two unconfigured bootable M.2 drives are inserted into the BOSS-S1 device, only the slot 0 drive may be booted to.

**Probable Cause:** Working as designed, Dell BIOS only allows booting from the first listed boot device (in this case, slot 0) per peripheral controller. This only occurs in legacy BIOS boot mode.

**Corrective Action:** Swap the drive in slot 1 to slot 0.

**CLI Features state they are unsupported when run**

**Issue:** Several commands, options, or other features listed by the Marvell CLI state that they are unsupported when run.

**Probable Cause:** Marvell CLI shows the same information on all Marvell products, but only implements the functions which are pertinent to that platform or system.

**Corrective Action:** Use supported Features.

**Failure to Install ESXi on a RAID 1**

**Issue:** Attempting to install ESXi on a RAID 1 results in an invalid partition table error.

**Probable Cause:** If an unconfigured PD containing an ESXi partition is used in a Virtual Disk, any attempts to install a partition of ESXi on this Virtual Disk will raise an error due to failure to clear out the previous partition.
Corrective Action: Delete the existing RAID 1, run "erase physical disk" on both drives, re-create the RAID 1, then attempt to reinstall ESXi on the Virtual Disk.
Getting help

You can get help with your Dell product by contacting Dell, or send feedback on product documentation.

Contacting Dell

Dell provides several online and telephone based support and service options. If you do not have an active internet connection, you can find contact information about your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer service issues:

1. Go to Dell.com/support.
2. Select your country from the drop-down menu on the lower right corner of the page.
3. For customized support:
   a. Enter your system Service Tag in the Enter your Service Tag field.
   b. Click Submit.
      The support page that lists the various support categories is displayed.
4. For general support:
   a. Select your product category.
   b. Select your product segment.
   c. Select your product.
      The support page that lists the various support categories is displayed.
5. For contact details of Dell Global Technical Support:
   a. Click Global Technical Support.
   b. The Contact Technical Support page is displayed with details to call, chat, or e-mail the Dell Global Technical Support team.

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Click the Feedback link in any of the Dell documentation pages, fill out the form, and click Submit to send your feedback.