Open Networking Hardware Diagnostic Guide

August 2018

DELL EMC

Notes, cautions, and warnings

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

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.

2018 - 08

Rev. A06

Contents

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About this guide

This guide provides site preparation recommendations, step-by-step procedures for rack mounting and desk mounting, inserting optional modules, and connecting to a power source.

Notices

CAUTION: To avoid electrostatic discharge (ESD) damage, wear grounding wrist straps when handling this equipment.

WARNING: Only trained and qualified personnel can install this equipment. Read this guide before you install and power up this equipment. This equipment contains two power cords. Disconnect both power cords before servicing.

WARNING: This equipment contains optical transceivers, which comply with the limits of Class 1 laser radiation.

Figure 1. Class 1 laser product tag

WARNING: When no cable is connected, visible and invisible laser radiation may be emitted from the aperture of the optical transceiver ports. Avoid exposure to laser radiation and do not stare into open apertures.

Related documents

For more information about the Open Networking (-ON) platform, see the following documents.

- *Dell EMC OS10 User Guide*
- *Dell EMC OS9 Command Line Reference Guide*
- *Dell EMC OS9 Configuration Guide*
- *Dell EMC Getting Started Guide or Dell EMC Setup Guide*
- *Dell EMC Installation Guide*
- *Dell EMC Release Notes*

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Overview

After running the diagnostic tools, your system displays pass or fail test results. If all tests pass, the diagnostic tools exit normally. If a test fails, each diagnostic tool offers a different result.

NOTE: The troubleshooting package includes a README file that lists the tools version and the overall troubleshooting package version. For more information, see this README file.

NOTE: To download the Release Notes, go to www.dell.com/support.

This system uses the power-on self test (POST) diagnostic tool that automatically runs during the system power-on at the BIOS level. This tool tests for catastrophic hardware failures that prevent booting the system. The error code is saved in CMOS for the next boot. There is no physical alarm indication.

ONIE expansion

To view all the ONIE commands available, from the ONIE prompt, enter `onie-` and click **<tab>** twice.

```
ONIE:/ # onie- <TAB><TAB>
onie-boot-mode         onie-fwpkg             onie-syseeprom
onie-console           onie-nos-install       onie-sysinfo
onie-discovery-start   onie-self-update       onie-uninstaller
onie-discovery-stop    onie-support
```

Topics:

- Boot processes
- View system information

Boot processes

After the BIOS, POST runs to verify the devices required to boot to ONIE GRUB.

POST

POST diagnostics verify the system DRAM, DIMM, SPD, memory, RTC/NVRAM, and PCI devices. Test configuration parameters and test results are saved in NVRAM.

Capture support data from ONIE

1 Capture support data to the screen.

`ONIE:/ # dmesg`

2 Capture support data to the `onie-support.tar.bz2 gzip` file.

ONIE-support creates the support file. To store the file, enter the location; for example, `ONIE:/# onie-support/tmp`.

`ONIE:/ # onie-support <output_directory>`

The ONIE support file includes the following:

- kernel_cmdline
- runtime-export-env
- runtime-process
- runtime-set-env
- log/messages
- log/onie.log

Output example

```
Success: Support tarball created: /tmp/onie-support.tar.bz2
```

Change default grub boot entry

To view or set the default Boot mode, the onie-boot-mode command has two options —l, the default, and —o. The Grub boot default shows the current default entry.

View or set the default Grub boot entry.

```
ONIE:/ # onie-boot-mode [-o <onie_mode>]
```

The -o command options include:

- install—ONIE OS Installer mode
- rescue—ONIE Rescue mode
- uninstall—ONIE OS Uninstall mode
- update—ONIE Self-Update mode
- embed—ONIE Self-Update mode and Embed ONIE
- none—Uses System Default Boot mode. This mode uses the first ONIE boot menu entry.

The -l command option lists the current default entry—this is the default setting.

View system information

To view your system information; for example, the model, part number, serial number, and service tag, use the following commands:

1 Boot into ONIE.

2 Enter the onie-syseeprom command.

```
ONIE:/ # onie-syseeprom
TlvInfo Header:
   Id String:    TlvInfo
   Version:      1
   Total Length: 162
TLV Name             Code Len Value
-------------------- ---- --- -----
Part Number          0x22   6 0W1K08
Serial Number        0x23  20 CN0W1K08779316470002
Product Name         0x21   8 <platform>
Device Version       0x26   1 0
Label Revision       0x27   3 X00
Manufacture Date     0x25  19 04/08/2016 08:43:05
Manufacturer         0x2B   5 77931
Country Code         0x2C   2 CN
Vendor Extension     0xFD   1  0x00
MAC Addresses        0x2A   2 256
```

```
Service Tag          0x2F   7 2WCSG02
Vendor Name          0x2D   4 DELL
Diag Version         0x2E   6 01_010
Base MAC Address     0x24   6 34:17:EB:05:B4:00
Platform Name        0x28  26 x86_64-dell_<platform>_c2538-r0
ONIE Version         0x29   8 x.xx.x.x
CRC-32               0xFE   4 0x99415608
Checksum is valid.
ONIE:/ #
```

3 Enter the `onie-sysinfo -a` command.

```
ONIE:/ # onie-sysinfo -a
CN0W1K08779316470002 0W1K08 34:17:EB:05:B4:00 x.xx.x.x 674 dell_<platform>_c2538 0 x86_64-
dell_<platform>_c2538-r0 x86_64 1 gpt 2016-09-21T10:01-0700 bcm
ONIE:/ #
```

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ONIE installation instructions

This section describes the different methods to install ONIE on your switch.

NOTE: After installing the networking operating software (NOS) and diagnostics operating system (DIAG-OS), if you boot into ONIE Install mode, ONIE assumes ownership of the system; ONIE Install mode is sticky. In this situation, ONIE stays in Install mode until NOS and DIAG-OS are successfully installed again. If you want to boot into ONIE for any reason other than installation, use Rescue mode or Update mode.

NOTE: To access ONIE, use the RJ-45 console port.

ONIE expansion

To view all the ONIE commands available, from the ONIE prompt, enter `onie-` and click **<tab>** twice.

```
ONIE:/ # onie- <TAB><TAB>
onie-boot-mode         onie-fwpkg             onie-syseeprom
onie-console           onie-nos-install       onie-sysinfo
onie-discovery-start   onie-self-update       onie-uninstaller
onie-discovery-stop    onie-support
```

Topics:

- ONIE installation
- ONIE service discovery and OS installation
- Installation ONIE from BIOS

ONIE installation

The following steps describe how to load ONIE:

- Installing ONIE—these instructions use the universal serial bus (USB) method. To boot from a Linux USB, you must preinstall BIOS on your system.
- ONIE operates using a 115200 baud rate. Ensure that any equipment attached to the serial port supports the required 115200 baud rate.

NOTE: The following output examples are for reference only; your output may vary.

NOTE: The management port IP, FTP server IP address, MAC address, and user-id shown are for illustration purpose only. Use your system's applicable values.

ONIE service discovery and OS installation

ONIE attempts to locate the installer through several discovery methods.
To download and run an installer, the ONIE Service Discovery feature follows these steps in order and uses the first successful method found:

1. Pass from the boot loader.
2. Search locally attached storage devices for one of the ONIE default installer filenames—for example, USB.
3. Discover the URLs from DHCPv4.
4. Report discovered URLs based on the DHCPv4 responses.

5 Query to the IPv6 link-local neighbors using HTTP for an installer.
6 Start TFTP waterfall—from the DHCPv4 option 66.

ONIE `ifconfig eth0` command examples

If none of the ONIE Service Discovery methods are successful, you can disable this using the `onie-discovery-stop` command.

You can install an operating system manually from HTTP, USB, FTP, or TFTP using the `onie-nos-install <URL>` command.

NOTE: If you have a recovery USB plugged into your system, you must remove it using the `onie-nos-install <URL>` command.

The ONIE Install environment uses DHCP to assign an IP address to the management interface, `eth0`. If that fails, it uses the link-local IPv4 address 169.254.209.190/16.

To display the IP address, use the `ifconfig eth0` command, as shown:

ONIE:/ # ifconfig eth0

```
eth0 Link encap:Ethernet HWaddr 90:B1:1C:F4:9C:76
 inet addr:x.x.x.x Bcast:x.x.x.x Mask:x.x.x.x
 inet6 addr: fe80::92b1:1cff:fef4:9c76/64 Scope:Link
 UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
 RX packets:18 errors:0 dropped:0 overruns:0 frame:0
 TX packets:24 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000
 RX bytes:1152 (1.1 KiB) TX bytes:6864 (6.7 KiB)
 Interrupt:21 Memory:ff300000-ff320000
```

To assign an IP address to the management interface, `eth0`, and verify network connectivity, use the `ifconfig eth0 <ip address>` command, as shown:

ONIE:/ # ifconfig eth0 x.x.x.x netmask x.x.x.x UP

```
Then set speed on management interface as below

ONIE:/ # ethtool -s eth0 speed 100 duplex full
Verify the network connection with ping.
ONIE:/ # ping x.x.x.x
PING x.x.x.x (x.x.x.x): 56 data bytes
64 bytes from x.x.x.x: seq=0 ttl=62 time=1.357 ms
64 bytes from x.x.x.x: seq=1 ttl=62 time=0.577 ms
^C
```

Installation ONIE from BIOS

Install ONIE from the BIOS using the media (usb) boot—the ONIE installer USB.

Pre-requisites

The BIOS running on your system must meet the following requirements:

- Allows a change to the boot order so the system can boot from media (USB).
- Allows a baud-rate change. This feature is optional; you do not need it if your BIOS is running at 115200 baud rate. The default baud rate for ONIE is 115200.

CAUTION:

- These procedures are for x86-based targets only, particularly targets using Rangeley or Centerton CPU-based boards.
- Check the console (`UART-0/1`) used on the target.
- The log messages included in this guide are subject to change.

NOTE: The following procedure is generic and does not list a particular target. Therefore, the ONIE images are specified using the `<platform>_<cpu>` notation. For example, the ONIE media (usb) iso image is `onie-recovery-x86_64-dell_<platform>_<cpu>-r0.iso`.

ONIE UEFI-based installation using USB

The following steps describe how to create a bootable unified extensible firmware interface (UEFI) ONIE-based USB to install ONIE using Embed mode:

To install ONIE UEFI on your system, use any existing ONIE-based system to make an ONIE UEFI-based bootable USB. To make a bootable USB, use the ONIE ISO file.

1 Boot the ONIE target in ONIE Rescue mode.

Use ONIE Rescue mode to make the ONIE UEFI-bootable USB.

To select which entry is highlighted, use the up and down arrow keys. Press Enter to select an operating software-selected OS or enter `e` to edit the commands before booting. Enter `c` for a command line. The highlighted entry, displaying `*`, executes automatically in the operating system.

```
GNU GRUB  version 2.02~beta2+e4a1fe391

+----------------------------+
|ONIE: Install OS            |
|*ONIE: Rescue               |
|ONIE: Uninstall OS          |
|ONIE: Update ONIE           |
|ONIE: Embed ONIE            |
|EDA-DIAG                    |
|                            |
|                            |
|                            |
+----------------------------+
```

2 Confirm that your system can reach the network.

3 Copy the ONIE ISO image to the solid-state drive (SSD) of the ONIE target.

ONIE:/ # wget --quiet http://xx.xx.x.xxx/tftpboot/users/<*name*>/onie-recovery-x86_64-dell_<*platform*>_c2538-r0.iso

To copy the image, you can use SCP, TFTP, or WGET (ftp/http).

scp username@xx.xx.xxx.xxx:/tftpboot/onie-recovery-x86_64-dell_<*platform*>_c2538-r0.iso .

4 Confirm that the ISO file copied to the SDD over the network.

ONIE:/ # ls -l

```
…
-rw-r--r-- 1 root 0 39780352 Apr 10 11:55 onie-recovery-x86_64-dell_<platform>_c2538-r0.iso
…
```

5 Insert a blank USB in the ONIE target's USB slot. Verify the USB block device using the ONIE logs.

```
Info: eth0: Checking link... scsi 6:0:0:0: Direct-Access Kingston DataTraveler 2.0 1.00 PQ:
0 ANSI: 4
sd 6:0:0:0: [sdb] 15148608 512-byte logical blocks: (7.75 GB/7.22 GiB)
sd 6:0:0:0: [sdb] Write Protect is off
sd 6:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
sd 6:0:0:0: [sdb] Attached SCSI removable disk
```

The logs show that the USB device is present: `/dev/sdb`.

You can also check `/sys/block`.

ONIE:/ # cd /sys/block/sdb
ONIE:/sys/block/sdb # ls -l

```
-r--r--r-- 1 root 0 4096 Apr 10 13:12 alignment_offset
lrwxrwxrwx 1 root 0 0 Apr 10 13:12 bdi -> ../../devices/virtual/bdi/8:16
-r--r--r-- 1 root 0 4096 Apr 10 13:12 capability
-r--r--r-- 1 root 0 4096 Apr 10 13:12 dev
```

```
lrwxrwxrwx 1 root 0 0 Apr 10 13:12 device -> ../../devices/pci0000:00/0000:00:16.0/
usb1/1-1/1-1.1/1-1.1.1/1-1.1.1:1.0/host6/target6:0:0/6:0:0:0
…
```

6 Copy the ISO image to the USB using the `dd` command.

```
ONIE:/ # dd if=./onie-recovery-x86_64-dell_<platform>_c2538-r0.iso of=/dev/sdb bs=10M
3+1 records in
3+1 records out
39780352 bytes (37.9MB) copied, 6.890503 seconds, 5.5MB/s
ONIE:/ #
```

7 Move the USB from the ONIE target—the system with ONIE—to the USB slot in your switch—the system without ONIE.

8 Turn-on your system and enter the **BIOS setup** menu by selecting `Del` when BIOS message is displayed.

If you already powered on your system, reboot the system and enter the **BIOS setup** menu by selecting `Del`.

9 In the **BIOS Boot** menu, select `UEFI USB`. Select `Save` and `Exit`.

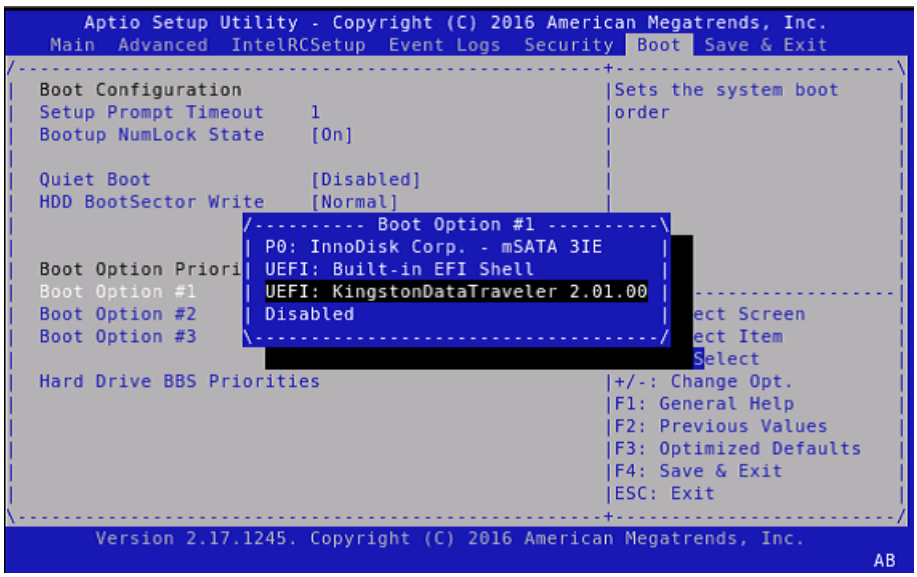

Figure 2. Setup utility

After the system exits the **BIOS Boot** menu, the system boots with the ONIE USB and presents the following menu:

Figure 3. Embed ONIE menu

10 Select the `Embed ONIE` option.

This step installs the UEFI ONIE version 3.26.1.1 on system. Any previous installation is removed.

Do not press any key during the Embed ONIE installation.

The following are the Embed ONIE logs:

```
ONIE: Embedding ONIE ...
Platform : x86_64-dell_<platform>_c2538-r0
Version : x.xx.x.x
Build Date: 2016-04-26T09:14-0700
[ 4.066378] dummy-irq: no IRQ given. Use irq=N
[ 14.296290] esas2r: driver will not be loaded because no ATTO esas2r devices were found
[ 14.463587] mtdoops: mtd device (mtddev=name/number) must be supplied
[ 16.328319] i8042: No controller found
[ 16.397853] fmc_write_eeprom fake-design-for-testing-f001: fmc_write_eeprom: no busid
passed, refusing all cards
[ 16.568122] intel_rapl: driver does not support CPU family 6 model 77
Info: Mounting kernel filesystems... done.
Info: Mounting ONIE-BOOT on /mnt/onie-boot ...
Info: Using eth0 MAC address: 4c:76:25:f4:7c:80
Info: eth0: Checking link... [ 18.571495] scsi 6:0:0:0: Direct-Access Kingston DataTraveler
2.0 1.00 PQ: 0 ANSI: 4
[ 18.707185] sd 6:0:0:0: Attached scsi generic sg1 type 0
[ 18.707703] sd 6:0:0:0: [sdb] 15148608 512-byte logical blocks: (7.75 GB/7.22 GiB)
[ 18.796392] sd 6:0:0:0: [sdb] Write Protect is off
[ 18.797033] sd 6:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support
DPO or FUA
[ 19.159563] sd 6:0:0:0: [sdb] Attached SCSI removable disk
up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: 1[ 20.053045] random: dropbearkey urandom read with 94 bits
of entropy available
x.xx.xxx.xx / xxx.xxx.xxx.x
Starting: dropbear ssh daemon... done.
Starting: telnetd... done.
discover: ONIE embed mode detected. Running updater.
Starting: discover... done.
Please press Enter to activate this console. Info: eth0: Checking link... up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: x.xx.xxx.xx / xxx.xxx.xxx.x
ONIE: Starting ONIE Service Discovery
```

```
Info: Found static url: file:///lib/onie/onie-updater
[ 29.744855] random: nonblocking pool is initialized
ONIE: Executing installer: file:///lib/onie/onie-updater
Verifying image checksum ... OK.
Preparing image archive ... OK.
ONIE: Version : x.xx.x.x
ONIE: Architecture : x86_64
ONIE: Machine : dell_<platform>_c2538
ONIE: Machine Rev : 0
ONIE: Config Version: 1
Installing ONIE on: /dev/sda
/proc/devices: No entry for device-mapper found
/proc/devices: No entry for device-mapper found
ONIE: Success: Firmware update URL: file:///lib/onie/onie-updater
ONIE: Success: Firmware update version: x.xx.x.x
ONIE: Rebooting...
discover: ONIE embed mode detected.
Stopping: discover...start-stop-daemon: warning: killing process 1441: No such process
Stopping: dropbear ssh daemon... done.
Stopping: telnetd... done.

Stopping: syslogd... done.
Info: Unmounting kernel filesystems
The system is going down NOW!
Sent SIGTERM to all processes
Sent SIGKILL to all processes
Requesting system reboot
```

After the Embed-ONIE installation completes, the system bootups and presents the **ONIE** menu.

Figure 4. ONIE install menu

The system comes up in ONIE Install mode by default, as shown:

```
ONIE: OS Install Mode ...
Version : x.xx.x.x
Build Date: 2016-04-26T09:14-0700
ONIE: OS Install Mode ...
Version : x.xx.x.x
Build Date: 2016-04-26T09:14-0700
[ 4.759116] dummy-irq: no IRQ given. Use irq=N

[ 4.835970] esas2r: driver will not be loaded because no ATTO esas2r
devices were found
[ 5.003050] mtdoops: mtd device (mtddev=name/number) must be supplied
[ 6.867708] i8042: No controller found
[ 6.937375] fmc_write_eeprom fake-design-for-testing-f001:
```

```
fmc_write_eeprom: no busid passed, refusing all cards
[ 7.107669] intel_rapl: driver does not support CPU family 6 model 77
Info: Mounting kernel filesystems... done.
Info: Mounting ONIE-BOOT on /mnt/onie-boot ...
[ 8.018377] random: fsck urandom read with 73 bits of entropy available
Info: Mounting EFI System on /boot/efi ...
Info: Using eth0 MAC address: 4c:76:25:f4:7c:80
Info: eth0: Checking link... [ 8.902787] scsi 6:0:0:0: Direct-Access
Kingston DataTraveler 2.0 1.00 PQ: 0 ANSI: 4
[ 9.038475] sd 6:0:0:0: Attached scsi generic sg1 type 0
[ 9.038993] sd 6:0:0:0: [sdb] 15148608 512-byte logical blocks: (7.75
GB/7.22 GiB)
[ 9.253877] sd 6:0:0:0: [sdb] Write Protect is off
[ 9.254546] sd 6:0:0:0: [sdb] Write cache: disabled, read cache: enabled,
doesn't support DPO or FUA
[ 9.492124] sd 6:0:0:0: [sdb] Attached SCSI removable disk
up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: x.xx.xxx.xx / xxx.xxx.xxx.x
Starting: dropbear ssh daemon... done.
Starting: telnetd... done.
[ 11.789298] random: nonblocking pool is initialized
discover: installer mode detected. Running installer.
Starting: discover... done.
Please press Enter to activate this console. Info: eth0: Checking link... up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: x.xx.xxx.xx / xxx.xxx.xxx.x
ONIE: Starting ONIE Service Discovery
Info: Fetching
http://xx.xx.xxx.x/onie-installer-x86_64-dell_<platform>_c2538-r0 ...
Info: Fetching http://xx.xx.xxx.x/onie-installer-x86_64-dell_<platform>_c2538
...
Info: Fetching http://xx.xx.xxx.x/onie-installer-dell_<platform>_c2538 ...
Info: Fetching http://xx.xx.xxx.x/onie-installer-x86_64 ...
Info: Fetching http://xx.xx.xxx.x/onie-installer ...
Info: Fetching
http://xx.xx.xxx.x/onie-installer-x86_64-dell_<platform>_c2538-r0 ...
Info: Fetching http://xx.xx.xxx.x/onie-installer-x86_64-dell_<platform>_c2538
...
```

11 Stop ONIE Discovery mode.

```
ONIE:/ # onie-discovery-stop
The operation has completed successfully.
ONIE:/ #
```

12 Verify the ONIE Linux kernel version and partition layout.

This step verifies that you are running the correct kernel in ONIE as the kernel is separate from the ONIE environment.

```
ONIE:/ # uname -a
Linux onie 4.1.28-onie+ #1 SMP Wed Sep 7 14:38:43 PDT 2016 x86_64 GNU/Linux
ONIE:/ # sgdisk -p /dev/sda
Disk /dev/sda: 31277232 sectors, 14.9 GiB
Logical sector size: 512 bytes
Disk identifier (GUID): 763E53FF-B894-40FD-B0F9-FBAE2ED4B0B5
Partition table holds up to 128 entries
First usable sector is 34, last usable sector is 31277198
Partitions will be aligned on 2048-sector boundaries
Total free space is 30490733 sectors (14.5 GiB)
Number Start (sector) End (sector) Size Code Name
1 2048 526335 256.0 MiB EF00 EFI System
2 526336 788479 128.0 MiB 3000 ONIE-BOOT
ONIE:/ #
```

13 Verify that `efibootmgr` runs and displays the valid boot options.

```
ONIE:/ # efibootmgr
BootCurrent: 0000
Timeout: 1 seconds
```

```
BootOrder: 0000,0006,0001,0003
Boot0000* ONIE: Open Network Install Environment
Boot0001* Hard Drive
Boot0003* UEFI: Built-in EFI Shell
Boot0006* UEFI: KingstonDataTraveler 2.01.00 14
```

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Dell EMC DIAG OS

These sections describe the Dell EMC diagnostics. These instructions apply to systems where ONIE diagnostics are not available.

Topics:

DIAG OS installation or update

Load or update the DIAG-OS—the diag installer image—using the `onie-nos-install` command. The DIAG-OS installer runs in two modes: Update mode or Install mode.

- In Update mode, the DIAG-OS updates the existing DIAG-OS and boots back to ONIE.
- In Install mode, the DIAG-OS erases the existing DIAG-OS and loads the new DIAG-OS.

NOTE: If you have a recovery USB plugged into your system, remove it before using the `onie-nos-install` command.

NOTE: Before you begin, go to www.dell.com/support and download the diagnostic package.

1 Enter the `onie-discovery-stop` command to stop ONIE Discovery mode.

2 Assign an IP address to the management interface and verify the network connectivity.

```
ONIE:/ # ifconfig eth0 xx.xx.xx.xx netmask xxx.xxx.x.x up
ONIE:/ # ifconfig
eth0      Link encap:Ethernet  HWaddr 34:17:EB:05:B4:00
          inet addr:xx.xx.xx.xx  Bcast:xx.xx.xxx.xxx  Mask:xxx.xxx.x.x
          inet6 addr: fe80::3617:ebff:fe05:b400/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:43 errors:0 dropped:0 overruns:0 frame:0
          TX packets:31 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:5118 (4.9 KiB)  TX bytes:7104 (6.9 KiB)
          Memory:dff40000-dff5ffff
```

3 Upgrade the DIAG Installer.

Again, boot to ONIE Rescue mode and install the `onie diag installer`.

NOTE: In Install mode, the DIAG-OS installation removes any existing NOS and DIAG-OS partition. If you do not create `file /tmp/diag_os_install_mode`, the DIAG-OS installs in Upgrade mode. In this case, the installation process does NOT touch any existing NOS.

```
ONIE:/ onie-nos-install tftp://<tftp-server ip>/<filepath>/filename/diag-installer-x86_64-dell_<platform>_c2538-r0-2016-08-12.bin
discover: installer mode detected.
Stopping: discover... done.
Info: Fetching tftp://<tftp-server ip>/users/<user>/<platform>/diag-installer-x86_64-dell_<platform>_c2538-r0-2016-08-12.bin ...
users/<user>/<platform> 100% |*******************************|   154M  0:00:00 ETA
ONIE: Executing installer: tftp://<tftp-server ip>/users/<user>/<platform>/diag-installer-
```

```
x86_64-dell_<platform>_c2538-r0-2016-08-12.bin
Ignoring Verifying image checksum ... OK.
cur_dir / archive_path /var/tmp/installer tmp_dir /tmp/tmp.qlnVIY
Preparing image archive ...sed -e '1,/^exit_marker$/d' /var/tmp/installer | tar xf - OK.
Diag-OS Installer: platform: x86_64-dell_<platform>_c2538-r0

EDA-DIAG Partiton not found.
Diag OS Installer Mode : INSTALL

Creating new diag-os partition /dev/sda3 ...
Warning: The kernel is still using the old partition table.
The new table will be used at the next reboot.
The operation has completed successfully.

EDA-DIAG dev is /dev/sda3
mke2fs 1.42.13 (17-May-2015)
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: 63fc156f-b6c1-415d-9676-ae4478704c5a
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done


Created filesystem on /dev/sda3 with label EDA-DIAG

Mounted /dev/sda3 on  /tmp/tmp.BBEygm

Preparing /dev/sda3 EDA-DIAG for rootfs install
untaring into /tmp/tmp.BBEygm

rootfs copy done
Success: Support tarball created: /tmp/tmp.BBEygm/onie-support.tar.bz2

Updating Grub Cfg /dev/sda3 EDA-DIAG

 ONIE uefi_uuid 69AD-9CBF

INSTALLER DONE...
Removing /tmp/tmp.qlnVIY
ONIE: NOS install successful: tftp://<tftp-server ip>/users/<user>/<platform>/diag-installer-
x86_64-dell_<platform>_c2538-r0-2016-08-12.bin
ONIE: Rebooting...
ONIE:/ # discover: installer mode detected.
Stopping: discover...start-stop-daemon: warning: killing process 2605: No such process
 done.
Stopping: dropbear ssh daemon... done.
Stopping: telnetd... done.
Stopping: syslogd... done.
Info: Unmounting kernel filesystems
umount: can't umount /: Invalid argument
The system is going down NOW!
Sent SIGTERM to all processes
Sent SIGKILL tosd 4:0:0:0: [sda] Synchronizing SCSI cache
reboot: Restarting system
reboot: machine restart


BIOS Boot Selector for <platform>
Primary BIOS Version x.xx.x.x_MRC48

SMF Version: MSS x.x.x, FPGA x.x
Last POR=0x11, Reset Cause=0x55
```

```
POST Configuration
  CPU Signature 406D8
  CPU FamilyID=6, Model=4D, SteppingId=8, Processor=0
  Microcode Revision 125
  Platform ID: 0x10041A43
  PMG_CST_CFG_CTL: 0x40006
  BBL_CR_CTL3: 0x7E2801FF
  Misc EN: 0x840081
  Gen PM Con1: 0x203808
  Therm Status: 0x884C0000
  POST Control=0xEA000100, Status=0xE6000000

BIOS initializations...

CPGC Memtest ............................... PASS

CPGC Memtest ............................... PASS

  Booting `EDA-DIAG'

Loading DIAG-OS ...
[    3.786758] dummy-irq: no IRQ given.  Use irq=N
[    3.792812] esas2r: driver will not be loaded because no ATTO esas2r devices were found
[    3.818171] mtdoops: mtd device (mtddev=name/number) must be supplied
[    4.880285] i8042: No controller found
[    4.890134] fmc_write_eeprom fake-design-for-testing-f001: fmc_write_eeprom: no busid
passed, refusing all cards
[    4.901699] intel_rapl: driver does not support CPU family 6 model 77

Debian GNU/Linux 8 dell-diag-os ttyS1

dell-diag-os login: root
Password:
Linux dell-diag-os x.xx.xx #1 SMP Fri Aug 12 05:14:52 PDT 2016 x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Diag OS version <platform>_DIAG_OS_x.xx.x.x
Build date/time Fri Aug 12 05:23:56 PDT 2016
Build server    netlogin-eqx-03
Build by        <name>
Kernel Info:
Linux x.xx.xx #1 SMP Fri Aug 12 05:14:52 PDT 2016 x86_64 GNU/Linux
Debian GNU/Linux 8 \n \l

Done Initializing Ethernet
root@dell-diag-os:~#
```

4 Start diagnostics.

To start the ONIE diagnostics, use the `DIAG-OS` option from the GRUB menu.

a Boot into the DIAG OS.

b Log in as `root`.

Password: `calvin`.

c Install the EDA-DIAG tools package.

NOTE: To return to your networking operating software, enter the `reboot` command.

Install or upgrade DIAG tools

To install or upgrade the DIAGs in the DIAGs OS, use the `dpkg --install dn-diags-<platform>-DiagOS-<version>-<date>.deb` command.

```
root@dell-diag-os:~#dpkg --install dn-diags-<platform>-DiagOS-<version>-<date>.deb
Selecting previously unselected package dn-diags-<platform>.deb.
(Reading database ... 18873 files and directories currently installed.)
Preparing to unpack dn-diags-<platform>-DiagOS-<version>-<date>.deb ...
Unpacking dn-diags-<platform>.deb (1.10) ...
Setting up dn-diags-<platform>.deb (1.10) ...
root@dell-diag-os:~#
```

Diagnostic test suite

After the system boots up, select the `EDA-DIAG` option to run the diagnostic test suite.

To select which entry is highlighted, use the up and down arrow keys. Press Enter to select an operating software-selected OS or enter `e` to edit the commands before booting. Enter `c` for a command line. The highlighted entry, displaying `*`, executes automatically in the operating system.

```
GNU GRUB  version 2.02~beta2+e4a1fe391

+----------------------------+
|ONIE: Install OS            |
|ONIE: Rescue                |
|ONIE: Uninstall OS          |
|ONIE: Update ONIE           |
|ONIE: Embed ONIE            |
|*EDA-DIAG                   |
|                            |
|                            |
|                            |
+----------------------------+
```

View DIAG versions

To display the DIAG version installed in the DIAG OS, use the `dpkg -l | grep dn-diags` command at the `root@dell-diag-os:~` prompt.

```
root@dellemc-diag-os:~# dpkg -l | grep dn-diags
ii dn-diags-<platform>-on.deb 3.xx.4.1-x amd64 Dell Networking Diagnostics
```

View CPLD versions

To view CPLD data, including the fan status, PSU status, current programmed version, and image packed version, use the `cpldupgradetool` or `updatetool` command at the prompt.

- For the `cpldupgradetool` command:

  ```
  root@dell-diag-os:/# cpldupgradetool --cpldver
  CPLD1 Version 0x00
  CPLD2 Version 0x01
  CPLD3 Version 0x01
  CPLD4 Version 0x01
  root@dell-diag-os:/#
  ```

- For the `updatetool` command:

```
root@dellemc-diag-od~#updatetool --device_version --dev=CPU_CPLD
CPU_CPLD version:
```

```
System CPLD Version : offset 0x00 = 0xc
7: 4 Major Revision = 0
3: 0 Minor Revision = c
Scratch Register : offset 0x01 = 0x0
```

Restore factory defaults

To restore your system factory defaults, reboot the system to ONIE: Uninstall OS mode.

If it is not possible to restore your factory defaults with the installed OS, reboot the system from the Grub menu and select `ONIE: Rescue`. ONIE Rescue bypasses the installed OS and boots the system into ONIE until you reboot the system. After ONIE Rescue completes, the system resets and boots to the ONIE console.

CAUTION: Restoring factory defaults erases any installed OS and requires a long time to erase storage.

1 Restore the factory defaults on your system from the Grub menu using the `ONIE: Uninstall OS` command.

To select which entry is highlighted, use the up and down arrow keys.

```
GNU GRUB  version 2.02~beta2+e4a1fe391

 +----------------------------------+
 | ONIE: Install OS                 |
 | ONIE: Rescue                     |
 |*ONIE: Uninstall OS               |
 | ONIE: Update ONIE                |
 | ONIE: Embed ONIE                 |
 | EDA-DIAG                         |
 |                                  |
 |                                  |
 |                                  |
 +----------------------------------+
```

2 Press **ENTER** to activate the console.

3 Return to the default ONIE settings using the `onie-uninstaller` command.

```
ONIE:/ # onie-uninstaller
Erasing internal mass storage device: /dev/sda4 (32MB)
  Percent complete: 100%
Erase complete.
Deleting partition 4 from /dev/sda
Erasing internal mass storage device: /dev/sda5 (300MB)
  Percent complete: 100%
Erase complete.
Deleting partition 5 from /dev/sda
Erasing internal mass storage device: /dev/sda6 (300MB)
  Percent complete: 100%
Erase complete.
Deleting partition 6 from /dev/sda
Erasing internal mass storage device: /dev/sda7 (12461MB)
  Percent complete: 100%
Erase complete.
Deleting partition 7 from /dev/sda
Installing for i386-pc platform.
Installation finished. No error reported.
Uninstall complete.  Rebooting...
ONIE:/ # discover: Rescue mode detected. No discover stopped.
Stopping: dropbear ssh daemon... done.
Stopping: telnetd... done.
Stopping: syslogd... done.
Info: Unmounting kernel filesystems
The system is going down NOW!
Sent SIGTERM to all processes
Sent SIGKILL tosd 4:0:0:0: [sda] Synchronizing SCSI cache
Restarting system.
machine restart
```

5

Dell EMC DAIG-OS tools

This section describes how to use the Dell EMC diagnostics operating system (DIAG-OS). The DIAG-OS provides a suite of tools to help diagnose issues seen on the system, or to run a health check to ensure that the hardware is operating properly.

Diagnostic tools

The DIAG-OS uses standard Linux drivers and contains the following tools you can use to evaluate the health of your system. The tools are packaged for both the DIAG-OS, which is a simple OS of the same kernel version, and small `rootfs` to support the tools and drivers.

NOTE: By default, the system's I/O modules are down. Power up the I/O modules or the Opticstool and NPUtool reports failures. For information about how to power up the I/O modules, see the *Dell EMC Installation Guide* for your system at www.dell.com/support.

Topics:

edatool

The diagnostics tools include `edatool`. To test the basic functionality of the system, use the **edatool**.

The `edatool` executes a script of simple commands, similar to commands in the CLI. Usually, the diagnostics tools run these types of tests. The success or failure of these tools is reported. At the end of the `edatool` run, reports the PASSED or FAILED results in a standard format the test scripts can easily parse.

Tests

The `edatool` does not have a test command, but instead runs all the tests that are scripted.

CLI options

```
Syntax: ./edatool <option>
Show the Help-text:=
        edatool --h                                 (or)
        edatool -h
Lists tests in config files:=
        edatool --list                              (or)
        edatool -l
Config file to use for tests:=
        edatool --config=<config_file>              (or)
        edatool -f <config_file>
Config file to use for extended tests:=
        edatool --extended-config=<config_file>  (or)
        edatool -X <config_file>
Display test list or test result or modify test item status:=
        edatool --testlist=show/result/<on/off,<test_id>,<test_id>...>  (or)
        edatool -L show/result/<on/off,<test_id>,<test_id>...>
Run all or selected test item in test list:=
        edatool --testrun=all/<test_id>           (or)
        edatool --R all/<test_id>
Execute repeatedly command by count:=
        edatool --iteration=max/<count> [option1] [option2]... (or)
        edatool -I max/<count> [option1] [option2]...
Display System Information:=
        edatool --sysinfo     (or)
        edatool -Y

Usage:=
 -h, --h                Show the help text
 -l, --list             List operation
 -I, --iteration=       Iteration command execution
 -L, --testlist=        Test list status
 -R, --testrun=         Run test item
 -f, --config=          To specify the location of the config file e.g. /etc/dn/diag/
<file_name>
 -X, --extended-config=  Config file to use for extended tests
 -Y, --sysinfo          System Information


root@dellemc-diag-os:~# ./edatool --sysinfo
Gathering System Data ... Please Wait ....

Software Info:
        Diag SW Version       : ..-
        Diag SW Build Date    : 2018/05/14
        DiagOS Version        : x.xx.x.x-x
        Linux Version         : x.xx.xx
```

```
        SDK Version           : sdk-x.x.x
        Bios Version          : x.xx.x.x-x
        Bios Build Date       : mm/dd/yyyy

Physical Memory Information:
        Maximum Capacity      : 32924832 kB
        Number of Devices     : 1
        Device Size           : 16384 MB
        Error Correction Type : ECC: yes
        Device Frequency      :

Manufacturing Information:
        Serial Number (PPID)  : CN0VFFWX7793171C0001
        Device Version        : 1
        Label Revision        : X01
        Service Tag           : 5F2RG02
        Express Service Code  : 11795544002
        Part Number           : 0VFFWX
```

Output

```
root@dell-diag-os:~# edatool
*****************************
*  Diagnostics Application  *
*****************************
Dell-EMC Diag edatool version x.x, package x.xx.x.x 2016/11/21
Dell-EMC Diag cputool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag fantool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag gpiotool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag i2ctool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag ledtool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag lpctool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag memtool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag nputool - version x.x sdk-x.x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag nvramtool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag opticstool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag pcitool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag pltool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag psutool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag rtctool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag smbiostool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag storagetool - version x.x package x.xx.x.x 2016/11/21
Dell-EMC Diag temptool - version x.x package x.xx.x.x 2016/11/21

Testing PCI devices:
+ Checking PCI 00:00.0, ID=1f0c8086 ..................... Passed
+ Checking PCI 00:01.0, ID=1f108086 ..................... Passed
+ Checking PCI 00:02.0, ID=1f118086 ..................... Passed
+ Checking PCI 00:03.0, ID=1f128086 ..................... Passed
+ Checking PCI 00:0e.0, ID=1f148086 ..................... Passed
+ Checking PCI 00:0f.0, ID=1f168086 ..................... Passed
+ Checking PCI 00:13.0, ID=1f158086 ..................... Passed
+ Checking PCI 00:14.0, ID=1f418086 ..................... Passed
+ Checking PCI 00:14.1, ID=1f418086 ..................... Passed
+ Checking PCI 00:14.2, ID=1f418086 ..................... Passed
+ Checking PCI 00:16.0, ID=1f2c8086 ..................... Passed
+ Checking PCI 00:17.0, ID=1f228086 ..................... Passed
+ Checking PCI 00:18.0, ID=1f328086 ..................... Passed
+ Checking PCI 00:1f.0, ID=1f388086 ..................... Passed
+ Checking PCI 00:1f.3, ID=1f3c8086 ..................... Passed
+ Checking PCI 01:00.0, ID=837514e4 ..................... Passed
+ Checking PCI 01:00.1, ID=837514e4 ..................... Passed
PCI devices: Overall test results -------------------- >>> Passed
Testing I2C devices:

Checking I2C devices on bus 0:
```

```
+ Checking Clock GEN             0x69  ..... Passed
+ Checking SPD0                  0x50  ..... Passed
Checking I2C devices on bus 1:
+ Checking CPU Board I2C Mux     0x70  ..... Passed
+ Checking CPU Board EEPROM1     0x53  ..... Passed
+ Checking CPU Board EEPROM2     0x57  ..... Passed
+ Checking Switch Brd EEPROM     0x50  ..... Passed
+ Checking CPLD2                 0x3e  ..... Passed
+ Checking CPLD3                 0x3e  ..... Passed
+ Checking CPLD4                 0x3e  ..... Passed
+ Checking SFP+ 1                  0x50  ..... Passed
+ Checking SFP+ 2                  0x50  ..... Passed
+ Checking SFP+ 3                  0x50  ..... Passed
+ Checking SFP+ 4                  0x50  ..... Passed
+ Checking SFP+ 5                  0x50  ..... Passed
+ Checking SFP+ 6                  0x50  ..... Passed
+ Checking SFP+ 7                  0x50  ..... Passed
+ Checking SFP+ 8                  0x50  ..... Passed
+ Checking SFP+ 9                  0x50  ..... Passed
+ Checking SFP+ 10                  0x50  ..... Passed
+ Checking SFP+ 11                 0x50  ..... Passed
+ Checking SFP+ 12                 0x50  ..... Passed
+ Checking SFP+ 13                 0x50  ..... Passed
+ Checking SFP+ 14                 0x50  ..... Passed
+ Checking SFP+ 15                 0x50  ..... Passed
+ Checking SFP+ 16                 0x50  ..... Passed
+ Checking SFP+ 17                 0x50  ..... Passed
+ Checking SFP+ 18                 0x50  ..... Passed
+ Checking SFP+ 19                 0x50  ..... Passed
+ Checking SFP+ 20                 0x50  ..... Passed
+ Checking SFP+ 21                 0x50  ..... Passed
+ Checking SFP+ 22                 0x50  ..... Passed
+ Checking SFP+ 23                 0x50  ..... Passed
+ Checking SFP+ 24                 0x50  ..... Passed
```

```
+ Checking SFP+ 25                0x50  ..... Passed
+ Checking SFP+ 26                0x50  ..... Passed
+ Checking SFP+ 27                0x50  ..... Passed
+ Checking SFP+ 28                0x50  ..... Passed
+ Checking SFP+ 29                0x50  ..... Passed
+ Checking SFP+ 30                0x50  ..... Passed
+ Checking SFP+ 31                0x50  ..... Passed
+ Checking SFP+ 32                0x50  ..... Passed
+ Checking SFP+ 33                0x50  ..... Passed
+ Checking SFP+ 34                0x50  ..... Passed
+ Checking SFP+ 35                0x50  .....
```

Verbose mode

Use the following steps to enable and set the verbose level.

1 Set the Verbose level with a value of 0–3 using bits 4 and 5 of the EDA control reg (0x55).
For example, to set the verbose level to 2, set bit 5–1 (`5=1`) and bit 4–0 (`4=0`).

```
root@dellemc-diag-os:~# nvramtool --write --reg=0x55 --val=0x25
```

The value is written in hexadecimal. The `xx10x1xx` shows the bit positions of 2, 4&5, and bit 0 on the right.

2 Enable Verbose mode by setting bit 2 of the same reg to `1`.

NOTE: If you disable Verbose mode, or bit 2 of reg 0x55 is set to `0`, the default verbosity level is `0/zero`.

EDA control reg (0x55):

- 5:4—EDA Verbose Level = 0/1/2/3 or verbosity level 0, 1, 2, or 3
- 3—EDA Extended Tests
- 2—EDA Verbose Mode = 0/1 (0=disabled; 1=enabled)
- 1—EDA stop on Error
- 0—EDA Enable

NOTE: If you do not need the Verbose mode settings to persist through reboots, you can use the environment variable method to enable Verbose Mode.

```
export VERB_LEVEL=<setting 0,1,2 or 3>
```

To clear the environment variable, use the `unset VERB_LEVEL` command.

cpldupgradetool

The `cpldupgradetool` shows the CPLD version that is being used to upgrade the CPLD.

NOTE: For newer platforms, such as the S5200-ON Series and Z9264F-ON, `cpldupgradetool` is replaced with the `updatetool`.

Tests

There are no defined tests with `cpldupgradetool`.

CLI options

```
root@dellemc-diag-os:~# cpldupgradetool
DellEmc Diag - CPLD Upgrade Tool
version 1.1, x.xx.x.x-x
build, 2017/05/23,

Syntax: cpldupgradetool <option>
 Print the Help-Text:=
      cpldupgradetool --h                                    (or)
      cpldupgradetool -h
 Print the CPLD versions:=
      cpldupgradetool --cpldver                              (or)
      cpldupgradetool -c
 Program a new CPLD image into CPLD's by specified index:=
      cpldupgradetool --write [--index=-1] [--image=<file>]  (or)
      cpldupgradetool -w [-i -1] [-m <file>]

Usage:=
      -h, --h          Show the help text
      -c, --cpldver    CPLD version
      -w, --write      Write operation
      -i, --index=     Index
      -m, --image=     CPLD image
```

Output

```
root@dell-diag-os:/# cpldupgradetool --h
Dell Diag - CPLD Upgrade Tool
version 1.1, x.xx.x.x
build, 2016/08/12,
Syntax: cpldupgradetool <option>
 Print the Help-Text:=
      cpldupgradetool --h                                    (or)
      cpldupgradetool -h
 Print the CPLD versions:=
      cpldupgradetool --cpldver                              (or)
      cpldupgradetool -c
 Program a new CPLD image into CPLD's by specified index:=
      cpldupgradetool --write [--index=-1] [--image=<file>]  (or)
      cpldupgradetool -w [-i -1] [-m <file>]
Usage:=
      -h, --h          Show the help text
      -c, --cpldver    CPLD version
      -w, --write      Write operation
      -i, --index=     Index
      -m, --image=     CPLD image
root@dell-diag-os:/#

root@dell-diag-os:/# cpldupgradetool --cpldver
CPLD1 Version 0x00
CPLD2 Version 0x01
CPLD3 Version 0x01
CPLD4 Version 0x01
root@dell-diag-os:/#
```

```
root@dell-diag-os:cpldupgradetool--write --image=<platform>_cpld_v01.vme
                Lattice Semiconductor Corp.
             ispVME(tm) V12.2 Copyright 1998-2011.
For daisy chain programming of all in-system programmable devices
Invalid Format: CPLD_WE assertion level
TDI:39,TCK:35,TMS:36,WE:57,TRST:58,TDO:49,SelPin:0, Freq:2400
g_CoresiIspPins Init= 30000 g_SussiIspPins Init= 2000134 g_WEAssertLevel= 0
Processing virtual machine file (./<platform>_cpld_v01.vme)......
CREATED BY: ispVM(R) System Version 18.0.1
CREATION DATE: 06/23/16 14:26:03
+========+
| PASS! |
+========+
```

cputool

The `cputool` displays the CPU information, reads and writes of the MSR and the LPC bus.

Tests

There are no defined tests with the `cputool`.

CLI options

```
root@dellemc-diag-os:~# cputool
DellEmc Diag - Cpu Tool
version 1.1, x.xx.x.x-x
build, 2017/05/23,

Syntax: cputool <option>
 Show the help-text:=
      cputool --h                                                          (or)
      cputool -h
 Display the CPU info using CPU-ID:
      cputool --cpuid[=--option]                                           (or)
      cputool -i [option]
 Display the CPU info using x86info:=
      cputool --x86info[=--option]                                         (or)
      cputool -x [option]
 Read CPU register:=
      cputool --readmsr --cpu=<cpuNumber> --reg=<regOffset>                (or)
      cputool -r -n <cpuNumber> -R <regOffset>
 Write CPU register:=
      cputool --writemsr --cpu=<cpuNumber> --reg=<regOffset> --val=<value> (or)
      cputool -w <cpuNumber> -R <regOffset> -V <value>
 Execute repeatedly command by count:=
      cputool --iteration=max/<count> [option1] [option2]...               (or)
      cputool -I max/<count> [option1] [option2]...
 Read the specified regiser in LPC bus:=
      cputool --readlpc --reg=<reg> --size=<size>                          (or)
      cputool -d -R <reg> -Z <size>
 Write the specified regiser in LPC bus:=
      cputool --writelpc --reg=<reg> --val=<value> --size=<size>           (or)
      cputool -W -R <reg> -V <value> -Z <size>

Usage:=
       -h, --h             Show the help text
       -i, --cpuid         CPU-Id
       -x, --x86info       x86 info
       -r, --readmsr       Read operation
       -w, --writemsr      Write operation
       -n, --cpu=          CPU
```

```
       -R, --reg=          Register
       -V, --val=          Value to be set
       -Z, --size=         Size
       -I, --iteration=    Iteration command execution
       -d, --readlpc       Read from LPC bus
       -W, --writelpc      Write to LPC bus
```

Output

```
root@dell-diag-os:/# cputool --h
Dell Diag - Cpu Tool
version 1.1, x.xx.x.x
build, 2016/08/12,
Syntax: cputool <option>
 Show the help-text:=
      cputool --h                                                                    (or)
      cputool -h
 Display the CPU info using CPU-ID:
      cputool --cpuid[=--option]                                                     (or)
      cputool -i [option]
 Display the CPU info using x86info:=
      cputool --x86info[=--option]                                                   (or)
      cputool -x [option]
 Read CPU register:=
      cputool --readmsr --cpu=<cpuNumber> --reg=<regOffset>                          (or)
      cputool -r -n <cpuNumber> -R <regOffset>
 Write CPU register:=
      cputool --writemsr --cpu=<cpuNumber> --reg=<regOffset> --val=<value>           (or)
      cputool -w <cpuNumber> -R <regOffset> -V <value>
 Read the specified regiser in LPC bus:=
      cputool --readlpc --reg=<reg> --size=<size>                                    (or)
      cputool -d -R <reg> -Z <size>
 Write the specified regiser in LPC bus:=
      cputool --writelpc --reg=<reg> --val=<value> --size=<size>                     (or)
      cputool -W -R <reg> -V <value> -Z <size>
Usage:=
       -h, --h             Show the help text
       -i, --cpuid         CPU-Id
       -x, --x86info       x86 info
       -r, --readmsr       Read operation
       -w, --writemsr      Write operation
       -n, --cpu=          CPU
       -R, --reg=          Register
       -V, --val=          Value to be set
       -Z, --size=         Size
       -d, --readlpc       Read from LPC bus
       -W, --writelpc      Write to LPC bus
root@dell-diag-os:/#
```

```
root@dell-diag-os:/# cputool --x86info
x86info v1.30.  Dave Jones 2001-2011
Feedback to <davej@redhat.com>.
Found 4 identical CPUs
Extended Family: 0 Extended Model: 4 Family: 6 Model: 77 Stepping: 8
Type: 0 (Original OEM)
CPU Model (x86info's best guess): Unknown model.
Processor name string (BIOS programmed): Intel(R) Atom(TM) CPU  C2538  @ 2.40GHz
Total processor threads: 4
This system has 1 dual-core processor with hyper-threading (2 threads per core) running at an
estimated 2.40GHz
root@dell-diag-os:/#
```

eepromtool

To program the type, length, value (TLV) format EEPROMs, use the `eepromtool`. You can also use the `eepromtool` to show all the TLV-formatted EEPROM contents or show specific EEPROM content by specifying the EEPROM type.

Tests

The test option in EEPROM devices allows you to verify the MAC address. Use this test for MAC address consistency.

CLI options

```
DellEmc Diag - Eeprom Tool
version 1.5, x.xx.x.x-x
build, 2017/05/23,

Syntax:= eepromtool <option>
  Display help-text:=
      eepromtool --help                                          (or)
      eepromtool -h
  List the understood TLV codes and names:=
      eepromtool --list                                          (or)
      eepromtool -l
  List all eeprom devices:=
      eepromtool --listdevices                                   (or)
      eepromtool -L
  Dump the PSU eeprom:=
      eepromtool --psueepromdump                                 (or)
      eepromtool -m
  Dump the FAN eeprom:=
      eepromtool --faneepromdump                                 (or)
      eepromtool -F
  Show the EEPROM data:=
     eepromtool --eeprom=<eepromtype> --show                     (or)
     eepromtool -P <eepromtype>  -x
  Reset the EEPROM data:=
     eepromtool --eeprom=<eepromtype> --erase                    (or)
     eepromtool -P <eepromtype>  -e
  Verify the MAC address in system-eeprom and mac-eeprom:=
     eepromtool --eeprom=<eepromtype> --test                     (or)
     eepromtool -P <eepromtype>  -t
  Look up a TLV by code and write the value to stdout:=
     eepromtool --eeprom=<eepromtype> --get <code>               (or)
     eepromtool -P <eepromtype>  -g <code>
  Execute repeatedly command by count:=
     eepromtool --iteration=max/<count> [option1] [option2]...  (or)
     eepromtool -I max/<count> [option1] [option2]...
  Set a TLV code to a value:=
     eepromtool --eeprom=<eepromtype> --set <code>=<value>,<code>=<value>...(or)
     eepromtool -P <eepromtype> -s <code>=<value>,<code>=<value>...

Usage:=
    -h, --h              Show the help text
    -l, --list           List the understood TLV codes and names
    -L, --listdevices    List all EEPROM devices
    -m, --psueepromdump  Dump the PSU EEPROM
    -F, --faneepromdump  Dump the FAN EEPROM
    -P, --eeprom=        EEPROM type
    -x, --show           Show operation
    -e, --erase          Erase operation
    -t, --test           Test using the pre-programmed configuration or use supplied config
    -I, --iteration=     Iteration command execution
```

```
    -g, --get            Get operation
    -s, --set            Set operation
```

Output

```
root@dell-diag-os:/opt/dellemc/diag/bin# eepromtool --list
TLV Code TLV Name
======== =================
0x21 Product Name
0x22 Part Number
0x23 Serial Number
0x24 Base MAC Address
0x25 Manufacture Date
0x26 Device Version
0x27 Label Revision
0x28 Platform Name
0x29 Loader Version
0x2a MAC Addresses
0x2b Manufacturer
0x2c Country Code
0x2d Vendor Name
0x2e Diag Version
0x2f Service Tag
0xfd Vendor Extension
0xfe CRC-32
root@dell-diag-os:/opt/dellemc/diag/bin# eepromtool --listdevices
CPUEEPROM1
CPUEEPROM2
CPUEEPROM3
CPUEEPROM4
CPUEEPROM5
CPUEEPROM6
CPUEEPROM7
CPUEEPROM8
FAN1EEPROM
FAN2EEPROM
FAN3EEPROM
FAN4EEPROM
FAN5EEPROM
SwitchEEPROM
root@dell-diag-os:/# eepromtool --psueepromdump
************PSU1_CountryCode*************
Registers 0x24a - 0x24b
CN
************PSU1_DellPartNumber*************
Registers 0x24c - 0x251
02RPHX
************PSU1_MfgID*************
Registers 0x252 - 0x256
17972
************PSU1_MfgDate*************
Registers 0x257 - 0x25e
151117
************PSU1_SerialNo*************
Registers 0x25f - 0x262
01CG
************PSU1_ServiceTag*************
Registers 0x263 - 0x269
************PSU1_LabelRevision*************
Registers 0x26a - 0x26c
A00
************PSU2_CountryCode*************
Registers 0x283 - 0x284
CN
************PSU2_DellPartNumber*************
Registers 0x285 - 0x28a
```

```
02RPHX
************PSU2_MfgID*************
Registers 0x28b - 0x28f
17972
************PSU2_MfgDate*************
Registers 0x290 - 0x297
151117
************PSU2_SerialNo*************
Registers 0x298 - 0x29b
015F
************PSU2_ServiceTag*************
Registers 0x29c - 0x2a2
************PSU2_LabelRevision*************
Registers 0x2a3 - 0x2a5
A00
root@dell-diag-os:/#

root@dell-diag-os:/opt/dellemc/diag/bin#
root@dell-diag-os:/opt/dellemc/diag/bin# eepromtool --eeprom=cpueeprom2 --set 0x21='cpu2'
Notice: Invalid TLV checksum found. Using default contents.
Adding TLV 0x21: Product Name
Programming passed.
TlvInfo Header:
Id String: TlvInfo
Version: 1
Total Length: 12
TLV Name Code Len Value
-------------------- ---- --- -----
Product Name 0x21 4 cpu2
CRC-32 0xFE 4 0x338B2B86
Checksum is valid.
root@dell-diag-os:/opt/dellemc/diag/bin#
root@dell-diag-os:/opt/dellemc/diag/bin# eepromtool --eeprom=cpueeprom2 --get 0x21
cpu2
root@dell-diag-os:/opt/dellemc/diag/bin#
root@dell-diag-os:/opt/dellemc/diag/bin# eepromtool --eeprom=cpueeprom2 --show
TlvInfo Header:
Id String: TlvInfo
Version: 1
Total Length: 12
TLV Name Code Len Value
-------------------- ---- --- -----
Product Name 0x21 4 cpu2
CRC-32 0xFE 4 0x338B2B86
Checksum is valid.
root@dell-diag-os:/opt/dellemc/diag/bin#
root@dell-diag-os:/opt/dellemc/diag/bin# eepromtool --eeprom=cpueeprom1 --erase
Programming passed.
EEPROM does not contain data in a valid TlvInfo format.
root@dell-diag-os:/opt/dellemc/diag/bin# eepromtool --eeprom=cpueeprom1 --show
Notice: Invalid TLV header found. Using default contents.
Notice: Invalid TLV checksum found. Using default contents.
TlvInfo Header:
Id String: TlvInfo
Version: 1
Total Length: 6
TLV Name Code Len Value
-------------------- ---- --- -----
CRC-32 0xFE 4 0xD4431C18
Checksum is valid.
root@dell-diag-os:/opt/dellemc/diag/bin#
```

ethtool

The `ethtool` provides management interface details.

fantool

The `fantool` tests the fans in the system, sets, and reports the fan speeds and the fan tray field replaceable unit (FRU) registers. The `fantool` also reports the airflow direction of the fans. The `psutool` command controls the PSU fans.

Tests

The `fantool` tests the fans by setting them to different speeds and then verifying the configured fan speeds.

Registers and values pass as hexadecimal values with or without the preceding `0x`. Fans display from `1` to `Max System Fans`.

CLI options

```
DellEmc Diag - Fan Controller Tool
version 1.5, x.xx.x.x-x
build, 2017/05/23

Syntax: fantool <option>
 Show the help-text:=
     fantool --h                                                  (or)
     fantool -h
 Initialize the fans to the default state:=
     fantool --init                                               (or)
     fantool -i
 Test using the Fan Controller config file:=
     fantool --test [--fan=<fan>] [--lpc]                         (or)
     fantool -t [-F <fan>] [-l]
 Get the speed of the specified fan or all fans in RPM:=
     fantool --get --fan=<fan | all> [--lpc]                      (or)
     fantool -g -F <fan | all> [-l]
 Set the fan(s) to the speed:=
     fantool --set --fan=<fan | all> --speed=<speed in RPM>       (or)
     fantool -s -F <fan | all> -S <speed in RPM>
 Execute repeatedly command by count:=
     fantool --iteration=max/<count> [option1] [option2]...       (or)
     fantool -I max/<count> [option1] [option2]...
 Read the Register from the fan controller:=
     fantool --read --fan=<fan | all> --reg=<register | all>      (or)
     fantool -r -F <fan | all> -R <register | all>
 Write the Register in the Fan Controller:=
     fantool --write --fan=<fan | all> --reg=<register> --val=<value> (or)
     fantool -w -F <fan | all> -R <register> -V <value>

Usage:=
     -h, --h             Show the help text
     -i, --init          Initilize to default
     -t, --test          Test using the pre-programmed configuration or use supplied config
     -g, --get           Get operation
     -s, --set           Set operation
     -r, --read          Read operation
     -w, --write         Write operation
     -I, --iteration=    Iteration command execution
     -F, --fan=          Fan Id
     -R, --register=     Register
     -V, --val=          Value to be set
     -S, --speed=        Speed of the fan
     -q, --lpc           Test by reading or modifying SmartFusion registers.
                         When this flag is used, it must be clubbed with one of above flags
```

```
  *Registers and Values are passed as Hexadecimal values with or without the preceding 0x.
  *Fans are from 1 to Max System Fans.
```

The `fantool` uses long options which requires two hyphens in front of the options. Options are required, optional, or none. If you require a parameter, specify it and include an equal sign. If a parameter is optional, enclose it with square brackets to show that it is optional, but do not type the brackets at the CLI. For example, `--fan` is optional and enter it as `--fan=1` or `--fan=all`, and so forth. Parameters with angle brackets are required but have multiple options for the input. Do not type the angle brackets or the vertical line character in the CLI. Only use one option per command; for example, `--fan=1` or `--fan=all`.

- `test`—Runs through the speeds for the fan, from highest to lowest, and checks that the fan can run at the speeds of the test. If a single fan is listed on the CLI, that fan is tested. If you use the `all` option, all fans are tested. The number in the parentheses during the test is the speed the system tries to reach during the test. If a fan cannot reach the desired speed within an acceptable range after 10 checks, the fan fails for that speed and the system moves on to the next fan.
- `get`—Gets the speed of the fan and returns it in the rate process module (RPM).
- `set`—Sets the speed of the fan in the RPM.

NOTE: Commonly, fan speeds are in two registers and must be written in a specific order. The `write` command cannot change the fan speeds; use the `set` command.

Output

Test output

```
root@dell-diag-os:~# fantool --test --lpc
Fan Controller Test LPC.....................................
Max number of Fan Trays in the System : 5
Number of fans per tray : 2
Max Fan Speed set(PWM): 255
Getting Details for  Fan 1
 Fan 1 is Present
 Fan 1 Air flow type is Front To Rear
 Fan 1 status Normal
 Fan 1 speed is 8420 RPM
Getting Details for  Fan 2
 Fan 2 is Present
 Fan 2 Air flow type is Front To Rear
 Fan 2 status Normal
 Fan 2 speed is 8738 RPM
Getting Details for  Fan 3
 Fan 3 is Present
 Fan 3 Air flow type is Front To Rear
 Fan 3 status Normal
 Fan 3 speed is 8474 RPM
Getting Details for  Fan 4
 Fan 4 is Present
 Fan 4 Air flow type is Front To Rear
 Fan 4 status Normal
 Fan 4 speed is 8757 RPM
Getting Details for  Fan 5
 Fan 5 is Present
 Fan 5 Air flow type is Front To Rear
 Fan 5 status Normal
 Fan 5 speed is 8492 RPM
Getting Details for  Fan 6
 Fan 6 is Present
 Fan 6 Air flow type is Front To Rear
 Fan 6 status Normal
 Fan 6 speed is 8777 RPM
Getting Details for  Fan 7
 Fan 7 is Present
 Fan 7 Air flow type is Front To Rear
 Fan 7 status Normal
```

```
 Fan 7 speed is 8348 RPM
Getting Details for  Fan 8
 Fan 8 is Present
 Fan 8 Air flow type is Front To Rear
 Fan 8 status Normal
 Fan 8 speed is 8585 RPM
Getting Details for  Fan 9
 Fan 9 is Present
 Fan 9 Air flow type is Front To Rear
 Fan 9 status Normal
 Fan 9 speed is 8420 RPM
Getting Details for  Fan 10
 Fan 10 is Present
 Fan 10 Air flow type is Front To Rear
 Fan 10 status Normal
 Fan 10 speed is 8566 RPM
Fan Controller Test LPC.......................... Passed
root@dell-diag-os:~#
```

root@dell-diag-os:~# fantool --get --lpc

```
Fan 1 speed is 8420 RPM
Fan 2 speed is 8757 RPM
Fan 3 speed is 8474 RPM
Fan 4 speed is 8738 RPM
Fan 5 speed is 8474 RPM
Fan 6 speed is 8757 RPM
Fan 7 speed is 8366 RPM
Fan 8 speed is 8604 RPM
Fan 9 speed is 8420 RPM
Fan 10 speed is 8566 RPM
[2]+  Done                    dhclient -q eth0
root@dell-diag-os:~#
```

root@dell-diag-os:~# fantool --get --fan=2 --lpc

```
Fan 2 speed is 8738 RPM
root@dell-diag-os:~#
```

gpiotool

The `gpiotool` controls the state of the GPIO lines from the CPU or any other device that drives the GPIO lines.

The CPU GPIO alines the map in Linux to `/sys/class/gpio` entries, which are manipulated through the standard read/write interfaces. There is chip numbering to support multiple GPIO chips, or chips at an offset. For devices such as the complex programmable logic device (CPLD) or field programmable gate arrays (FPGA), `gpiotool` accesses those devices to drive the GPIO lines using the standard bus interfaces such as `i2c`, `mem`, or `pci`.

CLI options

```
DellEmc Diag - GPIO Tool
version 1.4, x.xx.x.x-x
build, 2017/05/23,

Syntax: gpiotool <option>
 Show the help-text:=
      gpiotool --h                                                (or)
      gpiotool -h
 List available gpio chips and pins:=
      gpiotool --list                                             (or)
      gpiotool -l
 Set GPIO pin:=
      gpiotool --set [--chip=<chip>] --pin=<pin> --val=<value> (or)
      gpiotool -s [-c <chip>] -H <pin> -V <value>
 Get GPIO pins value:=
      gpiotool --get [--chip=<chip>] [--pin=<pin>]             (or)
```

```
      gpiotool -g [-c <chip>] [-H <pin>]
 Execute repeatedly command by count:=
      gpiotool --iteration=max/<count> [option1] [option2]...  (or)
      gpiotool -I max/<count> [option1] [option2]...
Usage:=
      -h, --h           Show the help text
      -l, --list        List the understood TLV codes and names
      -s, --set         Set operation
      -g, --get         Get operation
      -c, --chip=       GPIO chip
      -I, --iteration=  Iteration command execution
      -H, --pin=        GPIO pin number
      -V, --val=        Value to be set
```

Output

list output

```
root@dell-diag-os:~# gpiotool --list
Chip 0  Core Gpio  bits: 60 CORE gpiochip196
========================================
Bit             Name    Dir  AC  Value
========================================
15        SATA_GP0      IN   LOW    0
16        SATA_LEDN     OUT  LOW    0
17        SATA3_GP0     IN   LOW    0
19        FLEX_CLK_SE0  IN   LOW    0
20        FLEX_CLK_SE1  IN   LOW    0
32           GPIO_SUS1  IN   LOW    0
33           GPIO_SUS2  OUT  LOW    0
34         CPU_RESET_B  OUT  LOW    0
36          PMU_SUSCLK  OUT  LOW    0
37    PMU_SLP_DDRVTT_B  IN   LOW    0
38       PMU_SLP_LAN_B  IN   LOW    0
39          PMU_WAKE_B  OUT  LOW    0
40        PMU_PWRBTN_B  IN   LOW    0
49          GBE_SDP0_1  IN   LOW    0
50            GBE_LED0  IN   LOW    0
51            GBE_LED1  IN   LOW    0
52            GBE_LED2  IN   LOW    0
53            GBE_LED3  IN   LOW    0
54           NCSI_RXD1  OUT  LOW    0
55   GBE_MDIO0_I2C_CLK  OUT  LOW    0
58  GBE_MDIO1_I2C_DATA  IN   LOW    0
59           JTAG_TRST  OUT  LOW    0
root@dell-diag-os:~#
```

get output

```
root@dell-diag-os:~# gpiotool --get --pin=1
Chip 0  Core Gpio  bits: 60 CORE gpiochip196
====================================
Bit             Name    Dir  Value
====================================
```

set output

```
root@dellemc-diag-os:~# gpiotool --set --pin=1 --val=1
```

i2ctool

The `i2ctool` allows for scanning, reading, and writing of the `I2c` bus devices.

To read and write to devices on the `i2c` bus, use the `i2ctool`. The `i2ctool` also scans the `i2c` busses and reports what devices are found. The scan reads address 0x0 from all the devices in the address range of 0x0 to 0x7f on all `i2c` busses present. The `i2ctool` does not automatically traverse MUXes along the `i2c` bus. Other tools use this tool to read `i2c` device information and pass the results back through a named pipe.

Tests

To test, the `i2ctool` has a configuration file that lists all the devices on the busses. The tool runs through the list and tries to reach the devices. The `i2ctool` reports when a device is not returning data.

CLI options

```
DellEmc Diag - I2C Tool
version 1.5, x.xx.x.x-x
build, 2017/05/23,

Syntax: i2ctool <option>
 To Scan the (Specific) I2C devices:=
        i2ctool --scan [--bus=/dev/i2c-
<bus_number>]
                  (or)
        i2ctool -n [-b /dev/i2c-<bus_number>]
 To Test the pre-programmed configuration or from config file:=
        i2ctool --test [--
config=<config_file_name>]
                             (or)
        i2ctool -t [-f <config_file_name>]
 Execute repeatedly command by count:=
        i2ctool --iteration=max/<count> [option1]
[option2]...
       (or)
        i2ctool -I max/<count> [option1] [option2]...
 Read:=
        i2ctool --read --bus=/dev/i2c-<bus_number> --addr=<address> --reg=<register> --
count=<count> --width=<width> --display_size=<display_size>          (or)
        i2ctool -r -b /dev/i2c-<bus_number> -a <address> -R <register> -C <count> -W <width> -D
<display_size>
 Read(16 bit addressing):=
        i2ctool --read --bus=/dev/i2c-<bus_number> --addr=<address> --reg16=<register(16bit)>
[--reg_le] --count=<count> --width=<width> --display_size=<display_size> (or)
        i2ctool -r -b /dev/i2c-<bus_number> -a <address> -o <register(16bit)> [-L] -C <count> -
W <width> -D <display_size>
 Write:=
        i2ctool --write --bus=/dev/i2c-<bus_number> --addr=<address> --reg=<regiser> --
width=<width>  --val=<value>                                    (or)
        i2ctool -w -b /dev/i2c-<bus_number> -a <address> -R <register> -W <width> -V <value>
 Write(16 bit addressing):=
        i2ctool --write --bus=/dev/i2c-<bus_number> --addr=<address> --reg16=<register(16bit)>
[--reg_le] --val=<value>                                          (or)
        i2ctool -w -b /dev/i2c-<bus_number> -a <address> -o <register(16bit)> [-L] -V <value>

Usage:
  -h, --h              Show the help text
  -n, --scan           Scan operation
  -t, --test           Test using the pre-programmed configuration or use supplied config
  -r, --read           Read operation
```

```
  -w, --write           Write operation
  -f, --config=         To specify the location of the config file e.g. /etc/dn/diag/<file_name>
  -C, --count=          Count
  -R, --reg=            Register
  -o, --reg16=          Register(16 bit addressing)
  -V, --val=            Value to be set
  -W, --width=          Width {8,16}
  -b, --buspath=        To specify the i2c bus   e.g.: /dev/i2c-<bus number>
  -a, --addr=           Address
  -D, --display_size=   Display size, {1,2,4} of bytesDisplay size, {1,2,4} of bytes
  -I, --iteration=      Iteration command execution
```

Output

NOTE: The `i2ctool` does not automatically scan multiple MUXed segments. Before scanning, you MUST set the MUXes to select the devices you want to see on the busses. By default, the `i2ctool` scans the `i2c` devices from the root MUX where it sees the list of devices directly connected to the CPU MUX. The default scan function scans all connected busses. By specifying a bus, you can limit the scan to one bus. In the scan data, `RR` indicates a reserved address which is not used for any devices and `UU` indicates that the device is busy or mapped to the OS.

scan Output

root@dell-diag-os:/etc/dn/diag# i2ctool --scan

```
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: RR RR RR RR RR RR RR RR -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- 18 -- 1a -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- 2e --
30: 30 -- 32 -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: 50 -- 52 -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- 69 -- -- -- -- -- --
70: -- -- -- -- -- -- -- -- RR RR RR RR RR RR RR RR
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: RR RR RR RR RR RR RR RR -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- 3e --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: 50 51 52 53 54 55 56 57 -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: 70 -- -- -- -- -- -- -- RR RR RR RR RR RR RR RR
I2C devices found on bus #0: 8
 0x18  0x1a  0x2e  0x30  0x32  0x50  0x52  0x69
I2C devices found on bus #1: 10
 0x3e  0x50  0x51  0x52  0x53  0x54  0x55  0x56
 0x57  0x70
root@dell-diag-os:/etc/dn/diag#
```

test Output

root@dell-diag-os:/etc/dn/diag# i2ctool --test

```
Testing I2C devices:
Checking I2C devices on bus 0:
+ Checking Clock GEN               0x69  ..... Passed
+ Checking SPD0                    0x50  ..... Passed
Checking I2C devices on bus 1:
+ Checking CPU Board I2C Mux       0x70  ..... Passed
+ Checking CPU Board EEPROM1       0x53  ..... Passed
+ Checking CPU Board EEPROM2       0x57  ..... Passed
+ Checking Switch Brd EEPROM       0x50  ..... Passed
```

```
+ Checking CPLD2                    0x3e  ..... Passed
+ Checking CPLD3                    0x3e  ..... Passed
+ Checking CPLD4                    0x3e  ..... Passed
+ Checking SFP+ 1                   0x50  ..... Passed
+ Checking SFP+ 2                   0x50  ..... Passed
+ Checking SFP+ 3                   0x50  ..... Passed
+ Checking SFP+ 4                   0x50  ..... Passed
+ Checking SFP+ 5                   0x50  ..... Passed
+ Checking SFP+ 6                   0x50  ..... Passed
+ Checking SFP+ 7                   0x50  ..... Passed
+ Checking SFP+ 8                   0x50  ..... Passed
+ Checking SFP+ 9                   0x50  ..... Passed
+ Checking SFP+ 10                  0x50  ..... Passed
+ Checking SFP+ 11                  0x50  ..... Passed
+ Checking SFP+ 12                  0x50  ..... Passed
+ Checking SFP+ 13                  0x50  ..... Passed
+ Checking SFP+ 14                  0x50  ..... Passed
+ Checking SFP+ 15                  0x50  ..... Passed
+ Checking SFP+ 16                  0x50  ..... Passed
+ Checking SFP+ 17                  0x50  ..... Passed
+ Checking SFP+ 18                  0x50  ..... Passed
+ Checking SFP+ 19                  0x50  ..... Passed
+ Checking SFP+ 20                  0x50  ..... Passed
+ Checking SFP+ 21                  0x50  ..... Passed
+ Checking SFP+ 22                  0x50  ..... Passed
+ Checking SFP+ 23                  0x50  ..... Passed
+ Checking SFP+ 24                  0x50  ..... Passed
+ Checking SFP+ 25                  0x50  ..... Passed
+ Checking SFP+ 26                  0x50  ..... Passed
+ Checking SFP+ 27                  0x50  ..... Passed
+ Checking SFP+ 28                  0x50  ..... Passed
+ Checking SFP+ 29                  0x50  ..... Passed
+ Checking SFP+ 30                  0x50  ..... Passed
+ Checking SFP+ 31                  0x50  ..... Passed
+ Checking SFP+ 32                  0x50  ..... Passed
+ Checking SFP+ 33                  0x50  ..... Passed
+ Checking SFP+ 34                  0x50  ..... Passed
+ Checking SFP+ 35                  0x50  ..... Passed
+ Checking SFP+ 36                  0x50  ..... Passed
+ Checking SFP+ 37                  0x50  ..... Passed
+ Checking SFP+ 38                  0x50  ..... Passed
+ Checking SFP+ 39                  0x50  ..... Passed
+ Checking SFP+ 40                  0x50  ..... Passed
+ Checking QSFP+ 41                 0x50  ..... Passed
+ Checking QSFP+ 42                 0x50  ..... Passed
+ Checking QSFP28 43                0x50  ..... Passed
+ Checking QSFP28 44                0x50  ..... Passed
+ Checking QSFP28 45                0x50  ..... Passed
+ Checking QSFP28 46                0x50  ..... Passed
+ Checking QSFP28 47                0x50  ..... Passed
+ Checking QSFP28 48                0x50  ..... Passed
I2C Devices: Overall test results -------- >>> Passed
root@dell-diag-os:/etc/dn/diag#
```

read Output

```
/opt/dellemc/diag/bin# ./i2ctool --read --bus=/dev/i2c-1 --addr=0x50 --reg=0 --count=256
0x92 0x13 0x0b 0x08 0x04 0x21 0x02 0x09 0x0b 0x11 0x01 0x08 0x0c 0x00 0x7e 0x00
0x69 0x78 0x69 0x30 0x69 0x11 0x20 0x89 0x20 0x08 0x3c 0x3c 0x00 0xf0 0x83 0x05
0x80 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x85 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0f 0x11 0x23 0x00
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00 0x00 0x00 0x00 0x80 0x2c 0x0f 0x13 0x35 0xe9 0x8d 0xe0 0xbb 0x80 0x50
0x31 0x38 0x4b 0x53 0x46 0x31 0x47 0x37 0x32 0x48 0x5a 0x2d 0x31 0x47 0x34 0x45
0x32 0x20 0x45 0x32 0x80 0x2c 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
```

```
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff
0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff
0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff
0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff
0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff
```

write Output

```
/opt/dellemc/diag/bin# ./i2ctool --write --bus=/dev/i2c-2 --addr=0x48 --reg=0x14 --val=1
```

ipmitool

The `ipmitool` accesses the baseboard management controller (BMC) from the processor.

CLI options

```
root@dellemc-diag-os:~# ipmitool -V
ipmitool version 1.8.18
root@dellemc-diag-os:~# ipmitool
No command provided!
Commands:
   raw          Send a RAW IPMI request and print response
   i2c          Send an I2C Master Write-Read command and print response
   spd          Print SPD info from remote I2C device
   lan          Configure LAN Channels
   chassis      Get chassis status and set power state
   power        Shortcut to chassis power commands
   event        Send pre-defined events to MC
   mc           Management Controller status and global enables
   sdr          Print Sensor Data Repository entries and readings
   sensor       Print detailed sensor information
   fru          Print built-in FRU and scan SDR for FRU locators
   gendev       Read/Write Device associated with Generic Device locators sdr
   sel          Print System Event Log (SEL)
   pef          Configure Platform Event Filtering (PEF)
   sol          Configure and connect IPMIv2.0 Serial-over-LAN
   tsol         Configure and connect with Tyan IPMIv1.5 Serial-over-LAN
   isol         Configure IPMIv1.5 Serial-over-LAN
   user         Configure Management Controller users
   channel      Configure Management Controller channels
   session      Print session information
   dcmi         Data Center Management Interface
   nm           Node Manager Interface
   sunoem       OEM Commands for Sun servers
   kontronoem   OEM Commands for Kontron devices
   picmg        Run a PICMG/ATCA extended cmd
   fwum         Update IPMC using Kontron OEM Firmware Update Manager
   firewall     Configure Firmware Firewall
   delloem      OEM Commands for Dell systems
   shell        Launch interactive IPMI shell
   exec         Run list of commands from file
   set          Set runtime variable for shell and exec
   hpm          Update HPM components using PICMG HPM.1 file
   ekanalyzer   run FRU-Ekeying analyzer using FRU files
   ime          Update Intel Manageability Engine Firmware
   vita         Run a VITA 46.11 extended cmd
   lan6         Configure IPv6 LAN Channels


root@dellemc-diag-os:~# ipmitool mc info
Device ID                 : 32
```

```
Device Revision           : 1
Firmware Revision         : 0.55
IPMI Version              : 2.0
Manufacturer ID           : 12290
Manufacturer Name         : Unknown (0x3002)
Product ID                : 1146 (0x047a)
Product Name              : Unknown (0x47A)
Device Available          : yes
Provides Device SDRs      : no
Additional Device Support :
    Sensor Device
    SDR Repository Device
    SEL Device
    FRU Inventory Device
    IPMB Event Receiver
    IPMB Event Generator
    Chassis Device
Aux Firmware Rev Info     :
    0x00
    0x00
    0x00
    0x00
```

Output

sensor output

root@dellemc-diag-os:~# ipmitool sensor

```
PT_Mid_temp      | 31.000    | degrees C | ok    | na    | na       | na    | na     | na     |
na
NPU_Near_temp    | 37.000    | degrees C | ok    | na    | na       | na    | 78.000 | 80.000 |
85.000
PT_Left_temp     | 29.000    | degrees C | ok    | na    | na       | na    | 64.000 | 67.000 |
na
PT_Right_temp    | 29.000    | degrees C | ok    | na    | na       | na    | na     | na     |
na
ILET_AF_temp     | 29.000    | degrees C | ok    | na    | na       | na    | na     | na     |
na
PSU1_AF_temp     | 30.000    | degrees C | ok    | na    | na       | na    | na     | na     |
na
PSU2_AF_temp     | 32.000    | degrees C | ok    | na    | na       | na    | na     | na     |
na
PSU1_temp        | 46.000    | degrees C | ok    | na    | na       | na    | na     | na     |
na
PSU2_temp        | 37.000    | degrees C | ok    | na    | na       | na    | na     | na     |
na
CPU_temp         | 38.000    | degrees C | ok    | na    | na       | na    | 90.000 | 94.000 |
na
FAN1_Rear_rpm    | 8160.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
FAN2_Rear_rpm    | 8160.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
FAN3_Rear_rpm    | 8160.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
FAN4_Rear_rpm    | 8160.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
FAN1_Front_rpm   | 8880.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
FAN2_Front_rpm   | 9000.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
FAN3_Front_rpm   | 9000.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
FAN4_Front_rpm   | 9120.000  | RPM       | ok    | na    | 1080.000 | na    | na     | na     |
na
```

```
PSU1_rpm          | 8280.000 | RPM       | ok    | na    | na       | na    | na    | na    |
na
PSU2_rpm          | 8160.000 | RPM       | ok    | na    | na       | na    | na    | na    |
na
PSU_Total_watt    | 110.000  | Watts     | ok    | na    | na       | na    | na    | na    |
na
PSU1_stat         | 0x0      | discrete  | 0x0180| na    | na       | na    | na    | na    |
na
PSU2_stat         | 0x0      | discrete  | 0x0180| na    | na       | na    | na    | na    |
na
PSU1_In_watt      | 60.000   | Watts     | ok    | na    | na       | na    | na    | na    |
na
PSU1_In_volt      | 235.400  | Volts     | ok    | na    | na       | na    | na    | na    |
na
PSU1_In_amp       | 0.160    | Amps      | ok    | na    | na       | na    | na    | na    |
na
PSU1_Out_watt     | 30.000   | Watts     | ok    | na    | na       | na    | na    | na    |
na
PSU1_Out_volt     | 12.500   | Volts     | ok    | na    | na       | na    | na    | na    |
na
PSU1_Out_amp      | 3.000    | Amps      | ok    | na    | na       | na    | na    | na    |
na
PSU2_In_watt      | 60.000   | Watts     | ok    | na    | na       | na    | na    | na    |
na
PSU2_In_volt      | 225.500  | Volts     | ok    | na    | na       | na    | na    | na    |
na
PSU2_In_amp       | 0.160    | Amps      | ok    | na    | na       | na    | na    | na    |
na
PSU2_Out_watt     | 50.000   | Watts     | ok    | na    | na       | na    | na    | na    |
na
PSU2_Out_volt     | 12.400   | Volts     | ok    | na    | na       | na    | na    | na    |
na
PSU2_Out_amp      | 4.500    | Amps      | ok    | na    | na       | na    | na    | na    |
na
ACPI_stat         | 0x0      | discrete  | 0x0180| na    | na       | na    | na    | na    |
na
FAN1_prsnt        | 0x0      | discrete  | 0x0180| na    | na       | na    | na    | na    |
na
FAN2_prsnt        | 0x0      | discrete  | 0x0180| na    | na       | na    | na    | na    |
na
FAN3_prsnt        | 0x0      | discrete  | 0x0180| na    | na       | na    | na    | na    |
na
FAN4_prsnt        | 0x0      | discrete  | 0x0180| na    | na       | na    | na    | na    |
na
FAN1_Rear_stat    | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
FAN2_Rear_stat    | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
FAN3_Rear_stat    | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
FAN4_Rear_stat    | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
FAN1_Front_stat   | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
FAN2_Front_stat   | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
FAN3_Front_stat   | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
FAN4_Front_stat   | 0x0      | discrete  | 0x0080| na    | na       | na    | na    | na    |
na
INTER_5.0V_volt   | 4.900    | Volts     | ok    | 4.200 | 4.500    | 4.700 | 5.200 | 5.500 |
5.700
INTER_3.3V_volt   | 3.200    | Volts     | ok    | 2.800 | 3.000    | 3.100 | 3.500 | 3.600 |
3.800
FPGA_1.0V_volt    | 0.990    | Volts     | ok    | 0.850 | 0.900    | 0.950 | 1.050 | 1.100 |
1.150
FPGA_1.2V_volt    | 1.190    | Volts     | ok    | 1.020 | 1.080    | 1.140 | 1.260 | 1.320 |
1.380
FPGA_1.8V_volt    | 1.780    | Volts     | ok    | 1.530 | 1.620    | 1.710 | 1.890 | 1.980 |
```

```
2.070
FPGA_3.3V_volt    | 3.200     | Volts      | ok     | 2.800 | 3.000     | 3.100 | 3.500  | 3.600  |
3.800
BMC_2.5V_volt     | 2.400     | Volts      | ok     | 2.100 | 2.200     | 2.300 | 2.600  | 2.800  |
2.900
BMC_1.15V_volt    | 1.140     | Volts      | ok     | 0.980 | 1.030     | 1.090 | 1.210  | 1.270  |
1.320
BMC_1.2V_volt     | 1.200     | Volts      | ok     | 1.020 | 1.080     | 1.140 | 1.260  | 1.320  |
1.380
SWITCH_6.8V_volt | 7.000     | Volts      | ok     | 5.800 | 6.100     | 6.400 | 7.200  | 7.500  |
7.800
SWITCH_3.3V_volt | 3.300     | Volts      | ok     | 2.800 | 3.000     | 3.100 | 3.500  | 3.600  |
3.800
SWITCH_1.8V_volt | 1.790     | Volts      | ok     | 1.530 | 1.620     | 1.710 | 1.890  | 1.980  |
2.070
USB_5.0V_volt     | 5.000     | Volts      | ok     | 4.200 | 4.500     | 4.700 | 5.200  | 5.500  |
5.700
NPU_1.2V_volt     | 1.190     | Volts      | ok     | 1.020 | 1.080     | 1.140 | 1.260  | 1.320  |
1.380
NPU_VDDCORE_volt | 0.860     | Volts      | ok     | 0.700 | 0.720     | 0.740 | 0.910  | 0.930  |
0.950
NPU_VDDANLG_volt | 0.790     | Volts      | ok     | 0.680 | 0.720     | 0.760 | 0.840  | 0.880  |
0.920
BMC boot          | 0x0       | discrete   | 0x0180| na     | na        | na    | na     | na     |
na
SEL_sensor        | 0x0       | discrete   | 0x2080| na     | na        | na    | na     | na     |
na
root@dellemc-diag-os:~#
```

ledtool

The `ledtool` allows you to control the state of the front and back panel light emitting diodes (LEDs). ASIC and Phys control the port LEDs and are beyond the scope of this tool.

You can manually control the front and back panel LEDs normally controlled through the CPLD or FPGA access. When set, bits in these registers control the state of the LED.

Tests

To test the LEDs, use the `ledtool --test` command.

```
root@dell-diag-os:/opt/dellemc/diag/bin# ./ledtool --test
LED Test Started... Will take few mins to complete.
LED Tool: Overall test results ---------------------- >>> Passed
```

CLI options

```
DellEmc Diag - Led Tool
version 1.0, x.xx.x.x-x
build, 2017/05/23,

Usage:
 List the LEDs:=
     ledtool --list                                                                    (or)
     ledtool -l
 Get the state of (specific) LED(s):=
     ledtool --get [--led=<led>]                                                       (or)
     ledtool -g [-D <led>]
 Set the state of specific LED(color and blink):=
     ledtool --set --led=<led> [--instance=<instance>] {--state=<state> | --val=<value>} (or)
     ledtool -s -D <led> [-I <instance>] {-T <state> | -V <value>}
 Execute repeatedly command by count:=
```

```
     ledtool --iteration=max/<count> [option1] [option2]...                              (or)
     ledtool -I max/<count> [option1] [option2]...
 Test using config file:=
     ledtool --test [--config=<config_file>]                                             (or)
     ledtool -t [-f <config_file>]

Syntax: ledtool <option>
  -h, --h            Show the help text
  -l, --list         List the LEDs
  -g, --get          Get operation
  -s, --set          Set operation
  -t, --test         Test using the pre-programmed configuration or use supplied config
  -D, --led=         LED
  -I, --iteration=   Iteration command execution
  -S, --instance=,   Instance
  -T, --state=,      State of the LED
  -V, --val=,        Value to be set
  -f, --config=,     To specify the location of the config file e.g. /etc/dn/diag/<file_name>

[led] selections are:
Power
States: green amber flashing-amber off
System
States: amber flashing-green flashing-amber green
Fan
States: green flashing-amber off
Beacon
States: flashing-blue off
CPLD2-Mode
States: normal-mode test-mode
Port#1-18-Amber
States: off flashing-amber-fast amber flashing-amber
Port#1-18-Green
States: off flashing-green-fast green flashing-green
CPLD3-Mode
States: normal-mode test-mode
Port#19-36-Amber
States: off flashing-amber-fast amber flashing-amber
Port#19-36-Green
States: off flashing-green-fast green flashing-green
CPLD4-Mode
States: normal-mode test-mode
Port#37-48-Amber
States: off flashing-amber-fast amber flashing-amber
Port#37-48-Green
States: off flashing-green-fast green flashing-green
```

Output

list output

root@dell-diag-os:/etc/dn/diag# ledtool --list

```
    Power Led  : options
        green amber flashing-amber off
    System Led  : options
        amber flashing-green flashing-amber green
    Fan Led  : options
        green flashing-amber off
    Beacon LED  : options
        flashing-blue off
    Ports 1-18 PortLED Mode        : options
        normal-mode test-mode
    Ports 1-18 FrontEnd AmberLed   : options
        off flashing-amber-fast amber flashing-amber
```

```
    Ports 1-18 FrontEnd GreenLed   : options
        off flashing-green-fast green flashing-green
    Ports 19-36 PortLED Mode       : options
        normal-mode test-mode
    Ports 19-36 FrontEnd AmberLed  : options
        off flashing-amber-fast amber flashing-amber
    Ports 19-36 FrontEnd GreenLed  : options
        off flashing-green-fast green flashing-green
    Ports 37-48 PortLED Mode       : options
        normal-mode test-mode
    Ports 37-48 FrontEnd AmberLed  : options
        off flashing-amber-fast amber flashing-amber
    Ports 37-48 FrontEnd GreenLed  : options
        off flashing-green-fast green flashing-green
root@dell-diag-os:/etc/dn/diag#
```

get Output

```
root@dell-diag-os:/etc/dn/diag# ledtool --get
    Power Led : flashing-amber
    System Led : flashing-green
    Fan Led : green
    Beacon LED : off
    Ports 1-18 PortLED Mode       : normal-mode
    Ports 1-18 FrontEnd AmberLed  : off
    Ports 1-18 FrontEnd GreenLed  : off
    Ports 19-36 PortLED Mode      : normal-mode
    Ports 19-36 FrontEnd AmberLed : off
    Ports 19-36 FrontEnd GreenLed : off
    Ports 37-48 PortLED Mode : normal-mode
    Ports 37-48 FrontEnd AmberLed : off
    Ports 37-48 FrontEnd GreenLed : off
root@dell-diag-os:/etc/dn/diag#
```

lpctool

To access devices on the LPC bus, use the `lpctool`.

The `lpctool` allows access on the LPC bus by using I/O transactions at the processor level. This access does not include LPC interfaces in other devices. Other DIAG-OS tools use `lpctool` to read LPC-connected registers.

CLI options

```
DellEmc Diag - LPC Tool
version 1.0, x.xx.x.x-x
build, 2017/05/23,

Syntax: lpctool <option>
   Show the help-text:=
       lpctool --h                                                                    (or)
       lpctool -h
   Read the specified address:=
       lpctool --read --addr=<address> --count=<number_of_bytes> [--size=<b,w or l>] (or)
       lpctool -r -a <address> -C <number_of_bytes> [-z <b,w or l>]
   Write data at the specified address:=
       lpctool --write --addr=address --val=data [--size=b,w or l]                    (or)
       lpctool -w -a <address> -V <data> [-z <b,w or l>]
   Execute repeatedly command by count:=
       lpctool --iteration=max/<count> [option1] [option2]...                         (or)
       lpctool -I max/<count> [option1] [option2]...
Usage:=
```

```
      -h, --h           Show the help text
      -w, --write       Write operation
      -r, --read        Read operation
      -z, --size=       Size
      -I, --iteration=  Iteration command execution
      -C, --count=      Count
      -a, --addr=       Address
```

Output

Read output

```
root@dell-diag-os:/opt/dellemc/diag/bin# ./lpctool --read --addr=102
Byte Port 0x102 : 0xde
```

Write output

```
root@dell-diag-os:/opt/dellemc/diag/bin# ./lpctool --write --addr=102 --val=10
```

memtool

The `memtool` tests the physical memories in the system.

The `memtool` performs address bus and data tests that moves 1s or 0s through the bus lines to detect stuck, missing, bridged, or other issues found during board tests. The tool also places hamming values or addresses into memory to test and report failing bits. All tests are similar to the `memtest86` application but are available through the CLI.

In addition, the `memtool` reads the types and locations of memory in the system. The memory may be physical RAMs connected to the CPU covered by caches, or memory attached or embedded in other devices or across buses. The tool must know the addressable location of the memory, the memory address, data bus sizes, and any addressing constraints; for example, byte or word addressable boundaries.

The `memtool` allocates a memory region to tests in, which is either `malloc` space or opens a memory map to the memory, and passes the pointer to access the memory.

Tests

- `Address Read`—Causes read transactions on the memory bus. Address read can loop for several iterations, checking for any changes in the data between iterations. You can specify patterns on the address bus for the bits to allow the testing for stuck address bits.
- `Address Write`—Creates write transactions on the memory bus. Address writes can loop for several iterations, and works similar to the Address Read test.
- `Address Walking 1`—Walks a 1 though the provided address space in memory for the available address bits. Address Walking 1 writes the address of the cell in the location it is referencing. After it completes writing all the locations, it walks back through and verifies that the data is correct.
- `Address Walking 0`—Walks a 0 address bit through the memory area available to it. Address walking 0 writes the additive inverse of the address to the location. After writing all addressed locations, it walks back through and verifies the locations data.
- `Data Read`—Reads transactions similar to the Address Read test, but focuses on the data bits. Patterns are placed on the data bus to test for stuck data bits.
- `Data Write`—Places data patterns on the bus for testing the bus and looks for stuck data bits.
- `Data Walking 1`—Walks a 1 through the data bits within an address location and verifies that the values are valid before overwriting.

- `Data Walking 0`—Walks a 0 through the data bits and verifies the value as it is testing.
- `Data Sliding 1`—Slides a 1 through the data testing for stuck bits. By `xor` of each shift to the data, when complete, the cell holds all the 1s.
- `Data Sliding 0`—Slides a 0 through the data bits set to 1. By `xor` of each shift of the data, when complete, the cell holds all the 1s.
- `Data Pattern`—Writes four different patterns to memory locations within the specified region. The patterns are 0xFFFF, 0xFF00, 0xF0F0, 0xAAAA, 0xAA55 and 0x5555. The patterns are written as repeated portions of these patterns in the memory to fill the memory and as Hamming patterns (such as Hamming [8,4], Hamming[16,11], Hamming[32,26] or Hamming[64,57]) encoding with the additional most significant byte (MSB) parity bit to cover the parity bits in the Hamming code. This pattern allows for detecting multiple bit errors.
- `Data Cache`—Performs a rotation of a 16MB array in four clockwise rotations for 16 iterations of the complete rotation. The 16MB size ensures that memory is not within the cache lines and causes cache ejections through each of the rotations.

CLI options

```
DellEmc Diag - Memory Tool
version 1.5, x.xx.x.x-x
build, 2017/05/23,

Syntax: memtool <option>
 Show the Help-text:=
      memtool --h                                                                    (or)
      memtool -h
 Display the configuration info of the device:=
      memtool --info                                                                 (or)
      memtool -i
 List all of the memory regions in the config file:=
      memtool --list                                                                 (or)
      memtool -l
 Test using the MEM test config file:=
      memtool --test --region=<region/'ALL'> [--testlist=<test0>,<test1>...]         (or)
      memtool -t -G <region/ALL> [-T <test0>,<test1>,...]
 Read the specified physical address:=
      memtool --read --addr=<address> --count=<bytes> [--width=<8/16/32>]            (or)
      memtool -r -a <address> -C <bytes> [-W <#8,16,32>]
 Write at the specified physical address:=
      memtool --write --addr=<address> --val=<data0>,<data1>, ... ,<dataN> [--width=<8/16/32>]
(or)
      memtool -w -a <address> -V <data0>,<data1>...,<dataN> [-W <8/16/32>]
 Execute repeatedly command by count:=
      memtool --iteration=max/<count> [option1] [option2]...                         (or)
      memtool -I max/<count> [option1] [option2]...

Usage:=
  -h, --h            Show the help text
  -t, --test         Test using the pre-programmed configuration or use supplied config
  -i, --info         Configuration information
  -l, --list         List the understood TLV codes and names
  -G, --region       Region
  -T, --testlist     List of tests
  -I, --iteration=   Iteration command execution
  -C, --count=       Count
  -a, --addr=        Address
  -r, --read         Read operation
  -w, --write        Write operation
  -V, --val=         Value to be set
  -W, --width        Width {8,16}
Available Tests are:
    ALL_TESTS, ADDRESS_READ, ADDRESS_WRITE, ADDRESS_WALKING1, ADDRESS_WALKING0, DATA_READ,
    DATA_WRITE, DATA_WALKING1, DATA_WALKING0, DATA_SLIDING1, DATA_SLIDING0, DATA_PATTERN,
    DATA_CACHE
e.g. ADDRESS_WALKING1,DATA_WALKING1
```

The `memtool` uses long options for the parameters which requires two hyphens in front of the options. Options are required, optional, or none. If a parameter is required, it is specified as such and must include an equal sign; if an option is optional, it is enclosed with square brackets. However, do not type the brackets at the CLI. For example, the `-region` and `-testlist` options are optional and you must enter them as `-region=0` and `-testlist=0`.

- `List`—Lists the memory regions SDI knows. The tool queries SDI for the regions and prints a list of the regions with a region number that you can use for the subsequent options requiring a region number.
- `Info`—Lists the SPD information for the specified regions. Specifying a region allows the tool to read SPD from different DIMM modules, each specified in its own region. The output lists the actual data read and completes some parsing of the parameters so you do not have to decode the values. Decoding is based on the SPD standard definition for DDR3 and DDR4 DIMM memory.
- `Test`—Runs tests that include: Address Read/Write, Address Walking 1/0, Data Read/Write, Data Walking 1/0, Data Sliding 1/0, and Data Patterns (that writes Hamming patterns that you can use to detect multiple bit errors and identify single bit errors). These tests run during the normal memory tests. In extended memory tests, the data cache memory test runs. This test is lengthy and causes multiple ejections of data from the cache and tests the caches.

  In Verbosity 0, only the pass/fail message prints for all the tests. In Verbosity 1, each test prints its own pass/fail and other information; for example, what failed in the test. Higher verbosities show where each pass of the test performs and has verbose output. All output, regardless of verbosity, is in the log. You can see every level of detail by referring to the log.
- `Read`—Reads physical memory locations. You can loop over address read cycles to look for data that is volatile or read physical devices on the memory bus (`localbus` for Power-PC processors). You can specify a region, address, and count of successive bytes to read.
- `Write`—Writes to a physical memory address to test write cycles and memory. Similar to the `Read` command, this command takes a region, address in that region, and a comma-separated list of values to write.

Output

List output

```
root@dell-diag-os:~# memtool --list
==================================
Region ID: 0
Region Name: DDR3-0
Address: dynamically allocated, Chunk: 0x2800 KB
Largest Cache Size: 0, Cache Line Size : 0
Access: d Increment: 8 Ecc: Y Iterations: 1
Configuration device: SPD (/dev/i2c-0) at 0x50, Regs 0 to 255
Tests:
Address Read Test
Address Write Test
Address Walking 1's Test
Address Walking 0's Test
Data Read Test
Data Write Test
Data Walking 1's Test
Data Walking 0's Test
Data Sliding 1's Test
Data Sliding 0's Test
Data Pattern Tests
Data Cache Test
root@dell-diag-os:~#
```

Info output

```
root@dell-diag-os:~# memtool --info
==== SPD Data ====
 Density 8192 MB,  Rows: 16, Cols: 10
 Bus Width: 64 bits, ECC: yes
 Manufacturer: Unknown
 Part Number : AW48M7228BNK0M
```

```
[00000000]: 0x92 0x13 0x0b 0x08 0x05 0x22 0x00 0x09 0x0b 0x11 0x01 0x08 0x0a 0x00 0xfe 0x00
  || .....".........
[00000010]: 0x69 0x78 0x69 0x3c 0x69 0x11 0x18 0x81 0xf0 0x0a 0x3c 0x3c 0x01 0x40 0x83 0x05
  || ixi<i.....<<.@..
[00000020]: 0x80 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x88 0x00 0x00 0x00 0x00 0x00 0x00
 || ..............
[00000030]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0f 0x11 0x5f 0x00
 || ..............._.
[00000040]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ..............
[00000050]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ..............
[00000060]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ..............
[00000070]: 0x00 0x00 0x00 0x00 0x00 0x86 0xe3 0x05 0x16 0x04 0xb3 0xd1 0x0d 0x05 0xec 0x10
 || ..............
[00000080]: 0x41 0x57 0x34 0x38 0x4d 0x37 0x32 0x32 0x38 0x42 0x4e 0x4b 0x30 0x4d 0x00 0x00
 || AW48M7228BNK0M..
[00000090]: 0x00 0x00 0x00 0x00 0x00 0x00 0x41 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ......A.........
[000000a0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ..............
[000000b0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ..............
[000000c0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ..............
[000000d0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ..............
[000000e0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ..............
[000000f0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ..............
root@dell-diag-os:~#
```

Test output

```
root@dell-diag-os:~# memtool --test
Testing Memory Regions:
Testing Memory Region 0:
Address Read Test ..................................... Passed
Address Write Test .................................... Passed
Address Walking 1's Test .............................. Passed
Address Walking 0's Test .............................. Passed
Data Read Test ........................................ Passed
Data Write Test ....................................... Passed
Data Walking 1's Test ................................. Passed
Data Walking 0's Test ................................. Passed
Data Sliding 1's Test ................................. Passed
Data Sliding 0's Test ................................. Passed
Data Pattern Test ..................................... Passed
Memory: Overall test results ------------------------- >>> Passed
root@dell-diag-os:~#
```

Read output

```
root@dell-diag-os:~# memtool --read --addr=200
[00000200]: 0x00  || .
```

Write output

```
root@dell-diag-os:~# memtool --write --addr=200 --val=0x50
```

Constraints

You cannot perform memory tests while other tests that allocate and use memory within the region are performing. However, you can perform the Read tests concurrently with other processes. You cannot run multiple memory tests at the same time as they may collide within the memory spaces.

Memory tests cannot test all the memory, and without cache flushes, memory tests may not get out of the caches. The SDI must ensure the memory accessed is accessing the physical memory. This check slows down the tests.

Data flow

The `memtool` is not part of the data path and does not participate in the data flow.

nputool

The `nputool` allows for configuring and testing the switch ASICs.

The `nputool` tests the NPU in the system. The `nputool` verifies that ports are up and traffic between the ports is working either using the CPU-generated packet or using IXIA connected to port-1 and port-2 based on the configuration.

Tests

Tests are shown in the following sections.

CLI options

The `nputool` shows the available options with the `nputool -h` or `nputool` command.

```
DellEmc Diag ---- NPU Tool
version 1.0, x.xx.x.x-x
build, 2017/05/23,

Syntax: nputool
   -h, --help             := Show this help
   -i, --init             := Initialize NPU chip
   -t, --test
               all        := Run All NPU tests
               id         := Run test based on test ID
   -s, --show
               counter    := Dump packet counters
               temp       := Display NPU temperature

   -l, --lpbk [phy/mac/ext]:= Specify Loopback type for traffic test
   -T, --traffic [ixia_self,ixia_adj,cpu_self,cpu_adj]
                          := Send IXIA or CPU traffic based on specified cfg
                                self->timbercon lpbk, adj->fiber lpbk
   -I, --iteration [count]:= Execute repeatedly command by count
   -v, --version          := Display version

Usage:
   nputool -i -t [all/0/1,2,3/4/../7] -T [ixia_self/ixia_adj/cpu_self/cpu_adj]
           -l [phy/mac/ext]  := Run NPU tests based on user input
```

```
   nputool -I [count] -i -t 1 -T cpu_self   := Run NPU test repeatedly by count
   nputool -i -s temp        := Display NPU temperature
```

For the `nputool -i -t [all/0/1,2,3/4/../7]` usage:

- 0 = `Test link status`
- 1 = `Test snake traffic`
- 2 = `Test prbs mac test`
- 3 = `Test prbs ext`
- 4 = `Test uplink link status`
- 5 = `Test uplink snake traffic`
- 6 = `Test uplink prbs mac`
- 7 = `Test uplink prbs ext`

nputool version

```
root@dell-diag-os:/etc/dn/diag# nputool --v
Dell Diag nputool - version 1.0 sdk-6.5.3 package x.xx.x.x.xx 2016/08/12
root@dell-diag-os:/etc/dn/diag#

root@dell-diag-os:/etc/dn/diag# nputool --version
Dell Diag nputool - version 1.0 sdk-6.5.3 package x.xx.x.x.xx 2016/08/12
root@dell-diag-os:/etc/dn/diag#
```

Port link status test

- `nputool -i -t 0`
- `nputool --i --test 0`

```
root@dell-diag-os:~# root@dell-diag-os:/etc/dn/diag# nputool -i -t 0
8375_B0
-bash: root@dell-diag-os:/etc/dn/diag#: No such file or directory
sysconf_probe successful
global_sal_config successful
***  1 BCM devices are detected
Diag NPU initialization over
         Test link_status_test for NPU 0 .......... Passed
       Test snake_traffic_test for NPU 0 .......... SKIPPED <<<---
            Test prbs_mac_test for NPU 0 .......... SKIPPED <<<---
            Test prbs_ext_test for NPU 0 .......... SKIPPED <<<---
  Test uplink_link_status_test for NPU 0 .......... SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 .......... SKIPPED <<<---
     Test uplink_prbs_mac_test for NPU 0 .......... SKIPPED <<<---
     Test uplink_prbs_ext_test for NPU 0 .......... SKIPPED <<<---
NPU tests ....................................... Passed

root@dell-diag-os:/etc/dn/diag# nputool -init -test 0
DMA pool size: 16777216
PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0, Driver BCM88375_B0
sysconf_probe successful
global_sal_config successful
***  1 BCM devices are detected
Diag NPU initialization over
         Test link_status_test for NPU 0 .......... Passed
       Test snake_traffic_test for NPU 0 .......... SKIPPED <<<---
            Test prbs_mac_test for NPU 0 .......... SKIPPED <<<---
            Test prbs_ext_test for NPU 0 .......... SKIPPED <<<---
  Test uplink_link_status_test for NPU 0 .......... SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 .......... SKIPPED <<<---
     Test uplink_prbs_mac_test for NPU 0 .......... SKIPPED <<<---
     Test uplink_prbs_ext_test for NPU 0 .......... SKIPPED <<<---
NPU tests ....................................... Passed
```

CPU traffic with external loopback

Tests the traffic sent from the CPU internally generated packet to the front-end ports that are connected with external Loopback optics.

Connect all the ports with QSFP28 Loopback optics.

- `nputool -i -t 1 -T cpu_self`
- `nputool --init --test 1 --traffic cpu_self`

```
root@dell-diag-os:/opt/dellemc/diag/bin# nputool -i -t 1 -T cpu_self
DMA pool size: 16777216 PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0,
  Driver BCM88375_B0 sysconf_probe successful global_sal_config successful ***
  1 BCM devices are detected Diag NPU initialization over
Test link_status_test for NPU 0 ............. SKIPPED <<<---
Test snake_traffic_test for NPU 0 ........... Passed
Test prbs_mac_test for NPU 0 ................ SKIPPED <<<---
Test prbs_ext_test for NPU 0 ................ SKIPPED <<<---
Test uplink_link_status_test for NPU   0 .... SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 .... SKIPPED <<<---
Test uplink_prbs_mac_test for NPU      0 .... SKIPPED <<<---
Test uplink_prbs_ext_test for NPU 0 ......... SKIPPED <<<---
NPU tests ................................... Passed

root@dell-diag-os:~# nputool --init --test 1 --traffic cpu_self
  DMA pool size: 16777216 PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0,
  Driver BCM88375_B0 sysconf_probe successful global_sal_config successful ***
  1 BCM devices are detected Diag NPU initialization over
Test link_status_test for NPU 0 ............. SKIPPED <<<---
Test snake_traffic_test for NPU 0 ........... Passed
Test prbs_mac_test for NPU 0 ................ SKIPPED <<<---
Test prbs_ext_test for NPU 0 ................ SKIPPED <<<---
Test uplink_link_status_test for NPU 0 ...... SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 .... SKIPPED <<<---
Test uplink_prbs_mac_test for NPU 0 ......... SKIPPED <<<---
Test uplink_prbs_ext_test for NPU 0 ......... SKIPPED <<<---
NPU tests ................................... Passed
```

CPU traffic with adjacent loopback

Tests the traffic sent from the CPU internally generated packet to the front-end ports which are connected with direct attach cables (DACs) or optics with cables connected top-to-bottom.

Connect all the ports with DACs or 40G/100G optics with cables.

- `nputool -i -t 1 -T cpu_adj`
- `nputool --init --test 1 --traffic cpu_adj`

```
root@dell-diag-os:~# nputool -i -t 1 -T cpu_adj
DMA pool size: 16777216
PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0, Driver BCM88375_B0
sysconf_probe successful
global_sal_config successful
***  1 BCM devices are detected
Diag NPU initialization over
         Test link_status_test for NPU 0 ............. SKIPPED <<<---
        Test snake_traffic_test for NPU 0 ............. Passed
             Test prbs_mac_test for NPU 0 ............. SKIPPED <<<---
             Test prbs_ext_test for NPU 0 ............. SKIPPED <<<---
  Test uplink_link_status_test for NPU 0 ............. SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 ............. SKIPPED <<<---
     Test uplink_prbs_mac_test for NPU 0 ............. SKIPPED <<<---
     Test uplink_prbs_ext_test for NPU 0 ............. SKIPPED <<<---
NPU tests ........................................  Passed
root@dell-diag-os:~#

root@dell-diag-os:~# nputool -init -test  1 -traffic  cpu_adj
DMA pool size: 16777216
PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0, Driver BCM88375_B0
sysconf_probe successful
```

```
global_sal_config successful
***  1 BCM devices are detected
Diag NPU initialization over
         Test link_status_test for NPU 0 ............. SKIPPED <<<---
       Test snake_traffic_test for NPU 0 ............. Passed
            Test prbs_mac_test for NPU 0 ............. SKIPPED <<<---
            Test prbs_ext_test for NPU 0 ............. SKIPPED <<<---
  Test uplink_link_status_test for NPU 0 ............. SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 ............. SKIPPED <<<---
     Test uplink_prbs_mac_test for NPU 0 ............. SKIPPED <<<---
     Test uplink_prbs_ext_test for NPU 0 ............. SKIPPED <<<---
NPU tests ..........................................  Passed
root@dell-diag-os:~#
```

IXIA traffic with external loopback

Tests the traffic sent from IXIA to port-1 and to the front-end ports which are connected with external Loopback optics.

Connect the first port to IXIA and all other ports with QSFP28 Loopback optics.

- `nputool -i -t 1 -T ixia_self -d`
- `nputool --init --test 1 --traffic ixia_self -d`

These commands configure the virtual local area network (VLAN) and after the `BCM.0>` shell displays, send the traffic from IXIA. To verify the counters, run the `show c` command in the BCM shell.

IXIA traffic with adjacent loopback

Tests the traffic sent from IXIA to the front-end ports which are connected with DACs or optics with cables connected top-to-bottom.

Connect the first two ports to IXIA and all the remaining ports with DACs or 40G/100G optics with cables.

- `nputool –i –t 1 –T ixia_adj`
- `nputool --init --test 1 --traffic ixia_adj`

The previous commands configure the VLAN and after the `BCM.0>` shell displays. To verify the counters, run the `show c` command in the BCM shell.

CPU traffic with external loopback for uplink ports (SFP+)

Traffic is sent from the CPU to the SFP+ ports.

Connect all the ports with the SFP+ optics with TX and RX shorted.

- `nputool -i -t 5 -T cpu_self`
- `nputool --init --test 5 --traffic cpu_self`

CPU traffic for uplink ports connected between adjacent ports

Traffic is sent from the CPU internally generated packet to the front-end Dell EMC SFP+ ports which are connected with SFP+ optics using a cable.

Connect the SFP+ ports with the Dell EMC SFP+ optics using cables.

- `nputool -i -t 5 -T cpu_adj`
- `nputool --i --test 5 --traffic cpu_adj`

IXIA traffic with external loopback

Traffic is sent from the CPU internally generated packet to the front-end SFP+ ports which are connected with the Dell EMC SFP+ optics using a cable.

Connect the first port to IXIA and all other ports with Loopback optics.

- `nputool -i -t 5 -T ixia_self -d`
- `nputool --init --test 5 --traffic ixia_self -d`

Configure the VLAN and display the `BCM.0>` shell. To verify the counters, use the `show c` command in the BCM shell.

IXIA traffic with adjacent ports connected to IXIA

Traffic is sent from the CPU internally generated packet to the front-end ports which are connected with DACs or optics using cables connected top-to-bottom.

Connect two ports to IXIA with SFP+ optics and cables.

- `nputool -i -t 5 -T ixia_adj`
- `nputool --init --test 5 --traffic ixia_adj`

Configure the VLAN and display the `BCM.0>` shell. To verify the counters, use the `show c` command in the BCM shell.

PRBS for QSFP ports

Connect ports with Loopback cables and run the PRBS MAC and EXT Loopback tests.

- PRBS MAC level test `nputool -i -t 2` or `nputool --init --test 2`
- PRBS EXT level test `nputool -i -t 3` or `nputool --init --test 3`

For example:

```
root@dell-diag-os:~# nputool --init --test 2
DMA pool size: 16777216 PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0,
  Driver BCM88375_B0 sysconf_probe successful global_sal_config successful ***
  1 BCM devices are detected Diag NPU initialization over
Test link_status_test for NPU 0 ................. SKIPPED <<<---
Test snake_traffic_test for NPU 0 ............... SKIPPED <<<---
Test prbs_mac_test for NPU 0 .................... Passed
Test prbs_ext_test for NPU 0 .................... SKIPPED <<<---
Test uplink_link_status_test for NPU 0 ......... SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 ....... SKIPPED <<<---
Test uplink_prbs_mac_test for NPU 0 ............ SKIPPED <<<---
Test uplink_prbs_ext_test for NPU 0 ............ SKIPPED <<<---
NPU tests ....................................... Passed

root@dell-diag-os:~# nputool --init --test 3
DMA pool size: 16777216 PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0,
  Driver BCM88375_B0 sysconf_probe successful global_sal_config successful ***
  1 BCM devices are detected Diag NPU initialization over
Test link_status_test for NPU 0 ................. SKIPPED <<<---
Test snake_traffic_test for NPU 0 ............... SKIPPED <<<---
Test prbs_mac_test for NPU 0 .................... SKIPPED <<<---
Test prbs_ext_test for NPU 0 .................... Passed
Test uplink_link_status_test for NPU 0 ......... SKIPPED <<<---
Test uplink_snake_traffic_test for NPU 0 ....... SKIPPED <<<---
Test uplink_prbs_mac_test for NPU 0 ............ SKIPPED <<<---
 Test uplink_prbs_ext_test for NPU 0 ............ SKIPPED <<<---
NPU tests ....................................... Passed
```

PRBS for uplink ports

Connect the SFP+ ports with an external Loopback cable.

- PRBS MAC level test `./nputool –i –t 6`
- PRBS EXT level test "`./nputool –i –t 7`

NPU temperature

Show the current NPU temperature.

- `nputool –i –s temp`
- `nputool --init --show temp`

```
root@dell-diag-os:~# nputool -i -s temp
DMA pool size: 16777216
PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0, Driver BCM88375_B0
sysconf_probe successful
global_sal_config successful
***  1 BCM devices are detected
Diag NPU initialization over
NPU 0 Temperature
----------------------------
monitor   current    peak
----------------------------
0         41.8       44.2
1         41.3       44.7
2         36.4       38.8
3         39.8       43.2
----------------------------
Average  39.8, maximum peak 44.7

root@dell-diag-os:~# nputool -init -show  temp
DMA pool size: 16777216
PCI unit 0: Dev 0x8375, Rev 0x11, Chip BCM88375_B0, Driver BCM88375_B0
sysconf_probe successful
global_sal_config successful
***  1 BCM devices are detected
Diag NPU initialization over
NPU 0 Temperature
----------------------------
monitor   current    peak
----------------------------
0         42.3       44.2
1         40.8       44.2
2         35.9       38.8
3         40.8       43.2
----------------------------
Average  39.9, maximum peak 44.2
root@dell-diag-os:~#
```

Debugging

With traffic commands, use the `–d` option, which displays the `BCM.0>` shell. To check counters and if the link is up, use the `ps` and `show c` commands.

nvramtool

To read and write the NVRAM bits, use the `nvramtool`. The BIOS uses the NVRAM bits to control testing. The EDA tools also use the NVRAM bits.

The NVRAM is an area, usually in a battery backed-up device such as an RTC chip. The NVRAM bits do not change across reboots or power cycles. These bits control how devices boot and how the system performs tests. The `nvramtool` controls both the BIOS and EDA for testing. The bits are not common across platforms and are defined in the configuration file. When using this tool, you must write the correct bits because the tool does not know the register details it is writing. The `nvramtool` displays the bit-level detail in the NVRAM registers, depending on how you define it in the configuration file.

Tests

There are no tests of the NVRAM. This tool only controls the bits.

CLI option

```
DellEmc Diag - NVRAM Tool
version 1.5, x.xx.x.x-x
build, 2017/05/23,

Syntax:  nvramtool <option>
  Show this help:=
      nvramtool --h                                          (or)
      nvramtool -h
  Read all or specfic register NVRAM values:=
      nvramtool --read [--reg=<register>]                    (or)
      nvramtool -r [-R <register>]
  Write NVRAM value:=
      nvramtool --write [--reg=<register> --val=<value>]     (or)
      nvramtool -w [-R <register> -V <value>]
  Execute repeatedly command by count:=
      nvramtool --iteration=max/<count> [option1] [option2]...(or)
      nvramtool -I max/<count> [option1] [option2]...

Usage:
      -h, --h           Show the help text
      -r, --read        Read operation
      -w, --write       Write operation
      -I, --iteration=  Iteration command execution
      -R, --reg=        Register
      -V, --val=        Value to be set
```

Output

Read output

```
root@dell-diag-os:~# nvramtool --read
NVRAM Values:
0x00 0x9f 0x00 0xe6 0x03 0x03 0x00 0xea
Test Status Fail Bits : offset 0x50 = 0x0
    7 NVRAM test = 0
    6 SSD test = 0
    5 COLD/SMF Reg check = 0
    4 PCI test = 0
    3 Upper DRAM test = 0
    2 Lower DRAM test = 0
    1 ECC test = 0
    0 SPD test = 0
Test Status Pass Bits : offset 0x51 = 0x9f
    7 NVRAM test = 1
    6 SSD test = 0
    5 CPLD/SMF Reg check = 0
    4 PCI test = 1
    3 Upper DRAM test = 1
    2 Lower DRAM test = 1
    1 ECC test = 1
    0 SPD test = 1
```

```
RMT Control : offset 0x52 = 0x0
 7: 4 Undefined = 0
    3 RMT Test Enable = 0
 2: 0 RMT Test Reboot Count = 0
Status ID Byte : offset 0x53 = 0xe6
POST Control Bits : offset 0x54 = 0x3
    7 Force Cold Boot = 0
    6 POST Extended Upper DRAM test = 0
    5 POST Extended Lower DRAM test = 0
    4 POST Extended tests = 0
    3 Reserved = 0
    2 POST Verbose Mode = 0
    1 POST Stop on Error = 1
    0 POST Enable = 1
EDA Control Bits : offset 0x55 = 0x3
 5: 4 EDA Verbose Level = 0
    3 EDA Extended Tests = 0
    2 EDA Verbose Mode = 0
    1 EDA Stop on Error = 1
    0 EDA Enable = 1
EDA Extra Bits : offset 0x56 = 0x0
Control ID Byte : offset 0x57 = 0xea
root@dell-diag-os:~#
```

Write output

```
./nvramtool --write --reg=0x54 --val=0x1
```

opticstool

To check the presence or absence of optic devices, link status, and to read data from the optic devices' EEPROM, use the `opticstool`.

Tests

There are no tests on the optic devices. You can run a brief report that displays the optic presence or shows simple data, such as the serial number and device type. For more detailed information, use a device report.

CLI options

```
DellEmc Diag - Optics Tool
version 1.0, x.xx.x.x-x
build, 2017/05/23,

Syntax: opticstool <option>
 Show the help-text:=
      opticstool --h                                                                    (or)
      opticstool -h
 Show port and optics status:=
      opticstool --show[=brief] [--int=<interface>]                                     (or)
      opticstool -x[=brief] [-I <interface>]
 Execute repeatedly command by count:=
      opticstool --iteration=max/<count> [option1] [option2]...                         (or)
      opticstool -I max/<count> [option1] [option2]...
opticstool --read --int=<interface> [--page=<page #>] [--index=<offset>] [--cnt=<length>](or)
opticstool -r -I <interface> [-p <page #>] [-i <offset>] [-C <length>]
opticstool --write --int=<interface> --page=<page #> --index=<offset> --val=<value>      (or)
opticstool -w -i <interface> -p <page #> -i <offset> -V <value>
Usage:
      -h, --h           Show the help text
```

```
      -x, --show=       Show operation
      -F, --int         Interface ID
      -I, --iteration=  Iteration command execution
      -r, --read        Read operation
      -w, --write       Write operation
```

- `show` —Shows information about the optic devices. With the `brief` option, only the ID and presence displays. Without the `brief` option, more details display, such as the serial number and device type. If you specify an interface, more detail displays about that device by reading the EEPROM.

Output

show=brief output

```
root@dell-diag-os:~# opticstool --show=brief
Show Optics in System (brief)
Port #  Name        Status
------  --------    ------
   1       SFP+ 1   PRESENT
   2       SFP+ 2   PRESENT
   3       SFP+ 3   PRESENT
   4       SFP+ 4   PRESENT
   5       SFP+ 5   PRESENT
   6       SFP+ 6   PRESENT
   7       SFP+ 7   PRESENT
   8       SFP+ 8   PRESENT
   9       SFP+ 9   PRESENT
  10      SFP+ 10   PRESENT
  11      SFP+ 11   PRESENT
  12      SFP+ 12   PRESENT
  13      SFP+ 13   PRESENT
  14      SFP+ 14   PRESENT
  15      SFP+ 15   PRESENT
  16      SFP+ 16   PRESENT
  17      SFP+ 17   PRESENT
  18      SFP+ 18   PRESENT
  19      SFP+ 19   PRESENT
  20      SFP+ 20   PRESENT
  21      SFP+ 21   PRESENT
  22      SFP+ 22   PRESENT
  23      SFP+ 23   PRESENT
  24      SFP+ 24   PRESENT
  25      SFP+ 25   PRESENT
  26      SFP+ 26   PRESENT
  27      SFP+ 27   PRESENT
  28      SFP+ 28   PRESENT
  29      SFP+ 29   PRESENT
  30      SFP+ 30   PRESENT
  31      SFP+ 31   PRESENT
  32      SFP+ 32   PRESENT
  33      SFP+ 33   PRESENT
  34      SFP+ 34   PRESENT
  35      SFP+ 35   PRESENT
  36      SFP+ 36   PRESENT
  37      SFP+ 37   PRESENT
  38      SFP+ 38   PRESENT
  39      SFP+ 39   PRESENT
  40      SFP+ 40   PRESENT
  41     QSFP+ 41   PRESENT
  42     QSFP+ 42   PRESENT
  43    QSFP28 43   PRESENT
  44    QSFP28 44   PRESENT
  45    QSFP28 45   PRESENT
  46    QSFP28 46   PRESENT
  47    QSFP28 47   PRESENT
```

```
  48    QSFP28 48   PRESENT
root@dell-diag-os:~#
```

show output

root@dell-diag-os:~# opticstool --show

```
Show Optics in System
Port #  Name       Status  Type    Part Number      Rev  Serial Number
------  --------   ------  ------- ---------------  ---  --------------
   1       SFP+ 1   PRESENT SFP     616740000          B    CN0C6Y7M41A0
   2       SFP+ 2   PRESENT SFP     616740000          B    CN0C6Y7M41A0
   3       SFP+ 3   PRESENT SFP     616740000          C    CN0C6Y7M01I4
   4       SFP+ 4   PRESENT SFP     616740000          C    CN0C6Y7M01I4
   5       SFP+ 5   PRESENT SFP     616740000          C    CN0C6Y7M490B@
   6       SFP+ 6   PRESENT SFP     616740000          C    CN0C6Y7M490B@
   7       SFP+ 7   PRESENT SFP     616740000          C    CN0C6Y7M490BDD
   8       SFP+ 8   PRESENT SFP     616740000          C    CN0C6Y7M490BDD
   9       SFP+ 9   PRESENT SFP     616740000          C    CN0C6Y7M482HV@
  10      SFP+ 10   PRESENT SFP     616740000          C    CN0C6Y7M482HV@
  11      SFP+ 11   PRESENT SFP     616740000          C    CN0C6Y7M490BEL
  12      SFP+ 12   PRESENT SFP     616740000          C    CN0C6Y7M490BEL
  13      SFP+ 13   PRESENT SFP     616740000          C    CN0C6Y7M490BD
  14      SFP+ 14   PRESENT SFP     616740000          C    CN0C6Y7M490BD
  15      SFP+ 15   PRESENT SFP     616740000          C    CN0C6Y7M490BDD
  16      SFP+ 16   PRESENT SFP     616740000          C    CN0C6Y7M490BDD
  17      SFP+ 17   PRESENT SFP     616740000          C    CN0C6Y7M48A2E@
  18      SFP+ 18   PRESENT SFP     616740000          C    CN0C6Y7M48A2E@
  19      SFP+ 19   PRESENT SFP     616740000          C    CN0C6Y7M482@@@
  20      SFP+ 20   PRESENT SFP     616740000          C    CN0C6Y7M482@@@
  21      SFP+ 21   PRESENT SFP     616740000          C    CN0C6Y7M48C2MP@
  22      SFP+ 22   PRESENT SFP     616740000          C    CN0C6Y7M48C2MP@
  23      SFP+ 23   PRESENT SFP     616740000          C    CN0C6Y7M40A0HB
  24      SFP+ 24   PRESENT SFP     616740000          C    CN0C6Y7M40A0HB
  25      SFP+ 25   PRESENT SFP     616740000          C    CN0C6Y7M41A0BP
  26      SFP+ 26   PRESENT SFP     616740000          C    CN0C6Y7M41A0BP
  27      SFP+ 27   PRESENT SFP     616740000          C    CN0C6Y7M411J
  28      SFP+ 28   PRESENT SFP     616740000          C    CN0C6Y7M411J
  29      SFP+ 29   PRESENT SFP     616740000          C    CN0C6Y7M41A0BR
  30      SFP+ 30   PRESENT SFP     616740000          C    CN0C6Y7M41A0BR
  31      SFP+ 31   PRESENT SFP     616740000          C    CN0C6Y7M40A0HB
  32      SFP+ 32   PRESENT SFP     616740000          C    CN0C6Y7M40A0HB
  33      SFP+ 33   PRESENT SFP     616740000          C    CN0C6Y7M49M4BG5
  34      SFP+ 34   PRESENT SFP     616740000          C    CN0C6Y7M49M4BG5
  35      SFP+ 35   PRESENT SFP     616740000          C    CN0C6Y7M49M4BEJ
  36      SFP+ 36   PRESENT SFP     616740000          C    CN0C6Y7M49M4BEJ
  37      SFP+ 37   PRESENT SFP     599700001          A    APF11370018C9V
  38      SFP+ 38   PRESENT SFP     599700001          A    APF11370018C9V
  39      SFP+ 39   PRESENT SFP     616740000          C    CN0C6Y7M48C2MUP
  40      SFP+ 40   PRESENT SFP     616740000          C    CN0C6Y7M48C2MUP
  41     QSFP+ 41   PRESENT QSFP+    599690001          D    APF11510011VRR
  42     QSFP+ 42   PRESENT QSFP+    AFBR-79E4Z-D-FT1   01   QB382231
  43    QSFP28 43   PRESENT QSFP28   1002971101         1    504020274
  44    QSFP28 44   PRESENT QSFP28   1002971101         1    504020274
  45    QSFP28 45   PRESENT QSFP28   1002971051         1    506220006
  46    QSFP28 46   PRESENT QSFP28   1002971051         1    506220006
  47    QSFP28 47   PRESENT QSFP28   1002971101         1    504120586
  48    QSFP28 48   PRESENT QSFP28   1002971101         1    504120586
root@dell-diag-os:~#
```

show --int=interface # output

root@dell-diag-os:~# opticstool --show --int=48

```
Show Optics in System
=====================================
```

```
 QSFP28 48 Detailed Display
======================================
Link Status
--------------------------------------
Port Status
  Loss of Signal       :
  RX Signal Lock Error :
  PCS Link State       :
  Link Faults          :
  Remote               :
  Local                :
  Idle Error           :
  Illegal Symbol       :
  Error Symbol         :
Present                : Present
Device Data:
[00000000]: 0x11 0x05 0x06 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000010]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ................
[00000020]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000030]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
 || ................
[00000040]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000050]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000060]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x38 0x00
  || ..............8.
[00000070]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000080]: 0x11 0x00 0x23 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ..#.............
[00000090]: 0x00 0x00 0x01 0xa0 0x4d 0x6f 0x6c 0x65 0x78 0x20 0x49 0x6e 0x63 0x2e 0x20 0x20
  || ....Molex Inc.
[000000a0]: 0x20 0x20 0x20 0x20 0x00 0x00 0x09 0x3a 0x31 0x30 0x30 0x32 0x39 0x37 0x31 0x31
  ||     ...:10029711
[000000b0]: 0x30 0x31 0x20 0x20 0x20 0x20 0x20 0x20 0x31 0x20 0x00 0x00 0x00 0x00 0x00 0x4c
  || 01      1 .....L
[000000c0]: 0x00 0x00 0x00 0x00 0x35 0x30 0x34 0x31 0x32 0x30 0x35 0x38 0x36 0x20 0x20 0x20
  || ....504120586
[000000d0]: 0x20 0x20 0x20 0x20 0x31 0x35 0x30 0x32 0x31 0x30 0x20 0x20 0x00 0x00 0x00 0x18
  ||     150210  ....
[000000e0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[000000f0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
Vendor:     Molex Inc.
Part No:    1002971101
Revision:   1
Serial Num: 504120586
ID                     : 0x11
Extended ID            : 0x00
Connector              : 0x23
Specification          : 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
Encoding               : 0x00
BR Nominal             : 0x00
Length (9um) Km        : 0x00
Length (9um) 100m      : 0x00
Length (50um) 10m      : 0x00
Length (62.5um) 10m    : 0x00
Length (copper) 10m    : 0x01
Cable Attenuation      : 0x00 (2.5 Ghz) 0x00 (5.0 Ghz)
CheckCodeBase          : 0x4c (0x4c)
--------------------------------------
Extended ID Fields
--------------------------------------
Options                :
```

```
BR Max                  :
BR Min                  :
Date Code               : 2015-02-10
CheckCodeExt            : 0x18 (0x18)
TX Output Disable       : Not Disabled
----------------------------------------
Diagnostics Information
----------------------------------------
Module Monitoring Values:
Current Temp:       0.000 (Celsius)
Supply Volts:       0.000 (Volts)
Channel Monitoring Values:
Recv:          0.000       0.000      0.000     0.000   (dBm)
Bias:          0.000       0.000      0.000     0.000   (mA)
root@dell-diag-os:~#
```

pcitool

To scan and access devices on the PCI bus, use the `pcitool`. The `pcitool` checks for missing devices and that the present devices are the proper type.

The `pcitool` scans the PCI bus for present devices and displays them and the BAR information it decodes. The tool does not handle endianess.

The `pcitool` reads the configuration file and then iterates across all devices in the configuration file. It checks the vendor/product ID to see that the correct device is at the correct address. The tool does not compare all the configuration space. The tool reads all 256 bytes of the configuration file.

Tests

The `pcitool` reads from the configuration file the devices it expects to find and reports any devices that it cannot find or if the device is not correct. The tool supports second-source parts; therefore, they are not flagged as false errors. If a mismatch occurs, the device lists with the expected value and the read value. Populate the configuration file with `-u` numbers so the device can quickly identify the failing device.

CLI options

```
DellEmc Diag - PCI Tool
version 1.5, x.xx.x.x-x
build, 2017/05/23,

Usage:
To scan all PCI drivers and optionally show all config data :=
  pcitool --scan[=all]
(or)
  pcitool -S[=all]
To test using default PCI config-file :=
  pcitool --test
(or)
  pcitool -t
Show confic data for specific bus:dev.func:=
  pcitool --show {--bus=<bus># --dev=<dev># --func=<func>#}
(or)
  pcitool -x {-B <bus># -D <dev># -F <func>#}
Read 8-bit config register for bus:dev.func:=
  pcitool --read {--bus=<bus># --dev=<dev># --func=<func># --offset=<offset> --count=<count>}
(or)
  pcitool -r {-B <bus># -D <dev># -F <func># -O <offset> -C <count>}
Write 8-bit config register for bus:dev.func:=
  pcitool --write {--bus=<bus># --dev=<dev># --func=<func># --offset=<offset> --val=<value>}
```

```
(or)
  pcitool -w {-B <bus># -D <dev># -F <func># -O <offset> -V <value>}
Execute repeatedly command by count:=
  pcitool --iteration=max/<count> [option1] [option2]...
(or)
  pcitool -I max/<count> [option1] [option2]...

Syntax: pcitool <option>
   -h, --h            Show the help text
   -S, --scan         Scan operation
   -t, --test         Test using the pre-programmed configuration or use supplied config
   -x, --show         Show operation
   -r, --read         Read operation
   -w, --write        Write operation
   -I, --iteration=   Iteration command execution
   -B, --bus=         To specify the i2c bus   e.g.: /dev/i2c-<bus number>
   -D, --dev=         Device
   -F, --func=        Func
   -O, --offset=      Set the Offset
   -C, --count=       Count
   -V, --val=         Value to be set
```

Output

scan output

root@dell-diag-os:~# pcitool --scan

```
Acquiring PCI device name database
Device#01:  bus:dev.fn 00:00.0 - ID=0x1f0c8086, Intel Atom Processor SoC Transaction Router
Device#02:  bus:dev.fn 00:01.0 - ID=0x1f108086, Intel Atom Processor PCIe Root Port 1
Device#03:  bus:dev.fn 00:02.0 - ID=0x1f118086, Intel Atom Processor PCIe Root Port 2
Device#04:  bus:dev.fn 00:03.0 - ID=0x1f128086, Intel Atom Processor PCIe Root Port 3
Device#05:  bus:dev.fn 00:04.0 - ID=0x1f138086, Intel Atom Processor PCIe Root Port 4
Device#06:  bus:dev.fn 00:0e.0 - ID=0x1f148086, Intel Atom Processor C2000 RAS
Device#07:  bus:dev.fn 00:0f.0 - ID=0x1f168086, Intel Atom Processor C2000 RCEC
Device#08:  bus:dev.fn 00:13.0 - ID=0x1f158086, Intel Atom processor C2000 SMBus 2.0
Device#09:  bus:dev.fn 00:14.0 - ID=0x1f418086, Intel Ethernet Connection I354
Device#10:  bus:dev.fn 00:14.1 - ID=0x1f418086, Intel Ethernet Connection I354
Device#11:  bus:dev.fn 00:14.2 - ID=0x1f418086, Intel Ethernet Connection I354
Device#12:  bus:dev.fn 00:16.0 - ID=0x1f2c8086, Intel USB Enhanced Host Controller
Device#13:  bus:dev.fn 00:17.0 - ID=0x1f228086, Intel AHCI SATA2 Controller
Device#14:  bus:dev.fn 00:18.0 - ID=0x1f328086, Intel AHCI SATA3 Controller
Device#15:  bus:dev.fn 00:1f.0 - ID=0x1f388086, Intel ISA bridge
Device#16:  bus:dev.fn 00:1f.3 - ID=0x1f3c8086, Intel PCU SMBus
Device#17:  bus:dev.fn 01:00.0 - ID=0x837514e4, Broadcom Network Processor BCM88375
Device#18:  bus:dev.fn 01:00.1 - ID=0x837514e4, Broadcom Network Processor BCM88375
root@dell-diag-os:~#
```

test output

root@dell-diag-os:~# pcitool --test

```
Testing PCI devices:
+ Checking PCI 00:00.0, ID=1f0c8086 ................. Passed
+ Checking PCI 00:01.0, ID=1f108086 ................. Passed
+ Checking PCI 00:02.0, ID=1f118086 ................. Passed
+ Checking PCI 00:03.0, ID=1f128086 ................. Passed
+ Checking PCI 00:0e.0, ID=1f148086 ................. Passed
+ Checking PCI 00:0f.0, ID=1f168086 ................. Passed
+ Checking PCI 00:13.0, ID=1f158086 ................. Passed
+ Checking PCI 00:14.0, ID=1f418086 ................. Passed
+ Checking PCI 00:14.1, ID=1f418086 ................. Passed
```

```
+ Checking PCI 00:14.2, ID=1f418086 ................. Passed
+ Checking PCI 00:16.0, ID=1f2c8086 ................. Passed
+ Checking PCI 00:17.0, ID=1f228086 ................. Passed
+ Checking PCI 00:18.0, ID=1f328086 ................. Passed
+ Checking PCI 00:1f.0, ID=1f388086 ................. Passed
+ Checking PCI 00:1f.3, ID=1f3c8086 ................. Passed
+ Checking PCI 01:00.0, ID=837514e4 ................. Passed
+ Checking PCI 01:00.1, ID=837514e4 ................. Passed
PCI devices: Overall test results --------------- >>> Passed
root@dell-diag-os:~#
```

show output

```
root@dell-diag-os:/etc/dn/diag# pcitool --show --bus=0 --dev=4 --func=0bus
bus:dev.fn 00:04.3
[00000000]: 0x00 0x00 0x00 0x00 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000010]: 0x40 0x0e 0x40 0x00 0x00 0x00 0x00 0x00 0xe5 0xe2 0xdd 0x5b 0x47 0x7f 0x00 0x00
  || @.@........[G...
[00000020]: 0xff 0xff 0xff 0xff 0x00 0x00 0x00 0x00 0x0c 0x00 0xad 0xfb 0x00 0x00 0x00 0x00
  || ................
[00000030]: 0xf0 0x30 0x5f 0x02 0x00 0x00 0x00 0x00 0x10 0x30 0x5f 0x02 0x00 0x00 0x00 0x00
  || .0_......0_.....
[00000040]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x40 0x0e 0x40 0x00 0x00 0x00 0x00 0x00
  || ........@.@.....
[00000050]: 0x80 0xa0 0xa9 0x91 0xff 0x7f 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000060]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x35 0x37 0x86 0x5b 0x47 0x7f 0x00 0x00
  || ........57.[G...
[00000070]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x20 0x9f 0xa9 0x91 0xff 0x7f 0x00 0x00
  || ........ .......
[00000080]: 0x40 0x0e 0x40 0x00 0x00 0x00 0x00 0x00 0xe4 0x1b 0x40 0x00 0x00 0x00 0x00 0x00
  || @.@........@.....
[00000090]: 0x04 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x5c 0x9f 0xa9 0x91 0xff 0x7f 0x00 0x00
  || ........\.......
[000000a0]: 0xda 0x4e 0x40 0x00 0x00 0x00 0x00 0x00 0x20 0xbe 0xa9 0x91 0x00 0x7f 0x00 0x00
  || .N@..... .......
[000000b0]: 0xa0 0x9f 0xa9 0x91 0x00 0x00 0x00 0x00 0x10 0x30 0x5f 0x02 0x00 0x00 0x00 0x00
  || .........0_.....
[000000c0]: 0x30 0x34 0x2e 0x30 0x00 0x74 0x65 0x73 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || 04.0.tes........
[000000d0]: 0x2f 0x70 0x72 0x6f 0x63 0x2f 0x62 0x75 0x73 0x2f 0x70 0x63 0x69 0x2f 0x30 0x30
  || /proc/bus/pci/00
[000000e0]: 0x2f 0x30 0x34 0x2e 0x30 0x00 0x00 0x00 0x80 0xa0 0xa9 0x91 0xff 0x7f 0x00 0x00
  || /04.0...........
[000000f0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
  Base Address 0: Memory at 0x00400e40.
  Base Address 1: Memory at 0x00000000.
  Base Address 2: I/O at 0x5bdde2e0.
  Base Address 3: I/O at 0x00007f40.
  Base Address 4: I/O at 0xfffffff0.
  Base Address 5: Memory at 0x00000000.
  CardBus CIS pointer 0xfbad000c (BAR 3), address 7f47.
root@dell-diag-os:/etc/dn/diag# pcitool --show --bus=0 --dev=4 --func=0
bus:dev.fn 00:04.0
[00000000]: 0x86 0x80 0x13 0x1f 0x07 0x04 0x10 0x00 0x02 0x00 0x04 0x06 0x10 0x00 0x01 0x00
  || ................
[00000010]: 0x04 0x00 0xf6 0xdf 0x00 0x00 0x00 0x00 0x00 0x04 0x04 0x00 0xf0 0x00 0x00 0x20
  || ................
[00000020]: 0xf0 0xff 0x00 0x00 0xf1 0xff 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000030]: 0x00 0x00 0x00 0x00 0x40 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x07 0x01 0x10 0x00
  || ....@...........
[00000040]: 0x10 0x80 0x42 0x01 0x21 0x80 0x00 0x00 0x0f 0x20 0x00 0x00 0x42 0x48 0x79 0x04
  || ..B.!.... ..BHy.
```

```
[00000050]: 0x40 0x00 0x01 0x10 0x00 0xfd 0x18 0x00 0xc0 0x03 0x00 0x00 0x08 0x00 0x00 0x00
  || @...............
[00000060]: 0x00 0x00 0x00 0x00 0xb7 0x03 0x00 0x00 0x00 0x00 0x00 0x00 0x06 0x00 0x00 0x00
  || ................
[00000070]: 0x02 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[00000080]: 0x01 0x88 0x03 0xc8 0x00 0x00 0x00 0x00 0x0d 0x90 0x00 0x00 0x86 0x80 0x86 0x80
  || ................
[00000090]: 0x05 0x00 0x01 0x01 0x0c 0xf0 0xe0 0xfe 0xa1 0x41 0x00 0x00 0x00 0x00 0x00 0x00
  || .........A......
[000000a0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[000000b0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
[000000c0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x01 0x00 0x00 0x00
  || ................
[000000d0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x80 0x00 0x00 0x00 0x00
  || ................
[000000e0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x01 0x00 0x00 0x00 0x00 0x00
  || ................
[000000f0]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x03 0x00 0x00 0x00 0x00 0x00 0x00 0x00
  || ................
  Base Address 0: Memory at 0xdff60000.
  Base Address 1: Memory at 0x00000000.
  Base Address 2: Memory at 0x00040400.
  Base Address 3: Memory at 0x200000f0.
  Base Address 4: Memory at 0x0000fff0.
  Base Address 5: I/O at 0x0001fff0.
  Address 0 at 0xdff60000, 64 bit
  Address 2 at 0x00040400, 32 bit
  Address 3 at 0x200000f0, 32 bit
  Address 4 at 0x0000fff0, 32 bit
  Extended capabilities, first structure at offset 0x40.
  Extended PCI capability type 16 at 0x40, next 128.
  Extended PCI capability type 1 at 0x80, next 136.
   Power management entry ver. 3: Capabilities c803, Ctrl 0000, Event 0000.
   Power state D0.
  Extended PCI capability type 13 at 0x88, next 144.
  Extended PCI capability type 5 at 0x90, next 0.
root@dell-diag-os:/etc/dn/diag#
```

phytool

The phytool allows setting the management phy for management port for speed, duplex auto negotiation, and Loopback; as well as reading the MAC and MAC EEPROM in the phy.

Tests

CLI options

```
DellEmc Diag - PHY Tool
version 1.1, x.xx.x.x-x
build, 2017/05/23,

Syntax: phytool <option>
  Show the help-text:=
       phytool --h                                                (or)
       phytool -h
  Read the mac address of the interface:=
       phytool --read-mac                                         (or)
       phytool -R
  Write the value to the specified offset:=
```

```
      phytool --write --offset=<offset> --val=<val>                (or)
      phytool -w -o <offset> -V <val>
  Dump the eeprom contents:=
      phytool --eeprom-dump                                       (or)
      phytool -x
  Dump the register contents:=
      phytool --reg-dump                                          (or)
      phytool -d
  Phy loopback test:=
      phytool --lb-test[=no of packets]                           (or)
      phytool -l[=no of packets]
  Execute repeatedly command by count:=
      phytool --iteration=max/<count> [option1] [option2]...      (or)
      phytool -I max/<count> [option1] [option2]...
  Set the interface with parameters:=
      phytool --set-intf --speed=<speed> --duplex=<mode> --autoneg (or)
      phytool -s -S <speed> -D <mode> -A
  Show the interface settings:=
      phytool --show-intf                                         (or)
      phytool -a
  Usage:=
      -h, --h              Show the help text
      -I, --iteration=     Iteration command execution
      -R, --read-mac       Read the MAC of the interface
      -w, --write          Write operation
      -o, --offset         Set the Offset
      -V, --val            Value to be set
      -x, --eeprom-dump    Dump the eeprom contents
      -d, --reg-dump       Dump the register contents
      -l, --lb-test=       Phy loopback test
      -s, --set-intf       Set the interface with parameters
      -S, --speed=         Speed
      -D, --duplex=        Duplex mode
      -A, --autoneg=       Auto-negotiation
      -a, --show-intf      Show the interface settings
```

Output

root@dellemc-diag-os:/etc/dn/diag# phytool --read-mac

```
34:17:eb:07:7c:00
```

root@dellemc-diag-os:/etc/dn/diag# phytool --eeprom-dump

```
Offset      Values
------      ------
0x0000:     34 17 eb 07 7c 00 00 08 ff ff 05 10 ff ff ff ff
0x0010:     18 00 00 00 2f 40 41 1f 86 80 41 1f 86 80 80 ba
0x0020:     ff ff ff ff 80 5c 47 00 00 00 40 00 00 4c ab 03
0x0030:     00 00 00 70 0e 1a 26 44 a3 07 42 1f 01 02 02 06
0x0040:     0c 00 47 21 00 00 ff ff ac 44 f6 00 44 1f 08 09
0x0050:     40 04 3c 00 00 00 04 14 00 00 00 00 00 10 ff ff
0x0060:     00 01 00 40 32 13 13 40 00 01 00 40 ff ff b0 03
0x0070:     00 01 00 40 00 01 00 40 d9 09 bc 03 ff ff b5 7e
0x0080:     ff ff ff ff a5 0b 00 80 ff ff ff ff ff ff ff ff
.....
```

root@dellemc-diag-os:/etc/dn/diag# phytool --reg-dump

```
0x00000: CTRL (Device control register)          0x08100241
       Invert Loss-Of-Signal:                    no
       Receive flow control:                     enabled
       Transmit flow control:                    disabled
       VLAN mode:                                disabled
       Set link up:                              1
       D3COLD WakeUp capability advertisement:   enabled
       Auto speed detect:                        disabled
       Speed select:                             1000Mb/s
       Force speed:                              no
```

```
       Force duplex:                            no
0x00008: STATUS (Device status register)        0x00282383
       Duplex:                                  full
       Link up:                                 link config
       Transmission:                            on
       DMA clock gating:                        disabled
       TBI mode:                                disabled
       Link speed:                              1000Mb/s
       Bus type:                                PCI Express
...
```

root@dellemc-diag-os:/etc/dn/diag# phytool --lb-test=100

```
TEST PASSED

NOTE: The loopback test and set-intf will terminate the ethernet driver.  You need to reboot to
restart the driver cleanly.
[1]+  Terminated    setsid /bin/kni -c 0x3 -n 2 -- -p 1 --config="(0,0,1)" >> /dev/null
```

root@dellemc-diag-os:~# phytool --set-intf --speed=1000

```
[2]+  Done                    dhclient -q eth0
```

root@dellemc-diag-os:~# .....done

```
Port 0 Link Up - speed 1000 Mbps - full-duplex
```

root@dellemc-diag-os:~# root@dellemc-diag-os:~# phytool --show-intf

```
Settings for eth0:
        Supported ports: [ TP ]
        Supported link modes:   10baseT/Half 10baseT/Full
                                100baseT/Half 100baseT/Full
                                1000baseT/Full
        Supported pause frame use: Symmetric
        Supports auto-negotiation: Yes
        Advertised link modes:  10baseT/Half 10baseT/Full
                                100baseT/Half 100baseT/Full
                                1000baseT/Full
        Advertised pause frame use: No
        Advertised auto-negotiation: Yes
        Speed: 1000Mb/s
        Duplex: Full
        Port: Twisted Pair
        PHYAD: 3
        Transceiver: internal
        Auto-negotiation: on
        MDI-X: off (auto)
        Supports Wake-on: pumbg
        Wake-on: g
        Current message level: 0x00000007 (7)
                               drv probe link
        Link detected: yes
```

pltool

To test functionality of the CPLD and FPGA devices on the boards during startup, use the `pltool`.

The `pltool` also checks for the correct firmware loads. The tool uses the CLI to list the devices and their registers, and allows you to read and write registers in the device. The read functionality prints the details to the bit level and also any bit groupings and their meanings. The tool uses the SDI interface to get a list of devices and registers in the system, and then uses SDI to access the devices.

Tests

The `pltool` tests specified registers that SDI identifies in the testable bits of the register. The tool reads the register using SDI interfaces and compares the testable bits from those bits the SDI database provides. If a mismatch occurs, an error is displayed.

CLI options

```
root@dellemc-diag-os:~# pltool
DellEmc Diag - Programable Logic Tool
version x.x, x.xx.x.x-x
build, yyyy/mm/dd,

Syntax: pltool <option>
  Show this help text:=
    pltool --h                                                                    (or)
    pltool -h
  Test (RW) the scratchpad registers:=
    pltool --test                                                                 (or)
    pltool -t
  Test default & writable registers:=
    pltool --test --default                                                       (or)
  Test Port interrupt:=
    pltool --test --interrupt                                                     (or)
    pltool -t -i
  Test Reset:=
    pltool --test --reset                                                         (or)
    pltool -t -s
  Test Low Power mode:=
    pltool --test --lowpower                                                      (or)
    pltool -t -p
  List devices and registers:=
    pltool --list [--lstype=<devicetype>]                                         (or)
    pl  Execute repeatedly command by count:=
    pltool --iteration=max/<count> [option1] [option2]...                         (or)
    pltool -I max/<count> [option1] [option2]...
  Read the specified register of the device:=
    pltool --read --devname=<devicename> --dev=<deviceaddr> --reg=<register> (or)
    pltool -r -n <devicename> -D <deviceaddr> -R <register>
  Write at the specified register of the device:=
    pltool --write --devname=<devicename> --dev=<deviceaddr> --reg=<register> --val=<value> (or)
    pltool -w -n <devicename> -D <deviceaddr> -R <register> -V <value>
  Dump all of the registers in a device or all devices and thei rcurrent values:=
    pltool --dump [--devname=<devicename>] [--dev=<deviceaddr>]                   (or)
    pltool -d [-n <devicename>] [-D <deviceaddr>]

Usage:=
 -h, --h                 Show the help text
 -t, --test              Test using the pre-programmed configuration or use supplied config
 -F, --default           Test option to test default registers
 -i, --interrupt         Test option to test Interrupt
 -s, --reset             Reset Test option
 -p, --lowpower          Low Power Test option
 -l, --list              List operation
 -T, --lstype            Device type
 -L, --listdevicenames   List Device name
 -r, --read              Read operation
 -w, --write             Write operation
 -I, --iteration=        Iteration command execution
 -n, --devname=          Device name
 -D, --dev=              Device
                         (should be assigned 0 for lpc access)
 -R, --reg=              Register
 -V, --val=              Value to be set
 -d, --dump              Dump the values in the registers of a device
```

Output

List output

```
root@dell-diag-os:~# pltool --list
CPLD1 0 cpld lpc 0 (U5)
   0x100 CPLD_VERSION bits:8 RO val:0 mask:0xff test:0 ver:0x0
      7:4 MAJOR_VER RO 0
      3:0 MINOR_VER RO 0
   0x101 BOARD_TYPE bits:8 RO val:0xff mask:0xff test:0 ver:0x0
      7:0 BOARD_TYPE RO 0x1
          3 <platform> Board
   0x102 SW_SCRATCH bits:8 RW val:0xde mask:0xff test:1 ver:0x0
      7:0 SW_SCRATCH RW 0xde
   0x103 CPLD_ID bits:8 RO val:0xff mask:0xff test:0 ver:0x0
      7:0 CPLD_ID RO 0x1
   0x10f BOARD_REV bits:8 RO val:0xff mask:0xff test:0 ver:0x0
      7:0 BOARD_REV RO 0
   0x110 CPLD_SEP_RST0 bits:8 RO val:0xff mask:0xff test:0 ver:0x0
         7 Reset Extender CPLD 4 RW 0x1
          0 Reset
          1 Not Reset
         6 Reset Extender CPLD 3 RW 0x1
          0 Reset
          1 Not Reset
         5 Reset Extender CPLD 2 RW 0x1
          0 Reset
          1 Not Reset
         4 PCA9548_RST7 RW 0x1
          0 Reset
          1 Not Reset
         3 PCA9548_RST6 RW 0x1
          0 Reset
          1 Not Reset
         2 PCA9548_RST5 RW 0x1
          0 Reset
          1 Not Reset
         1 PCA9548_RST4 RW 0x1
          0 Reset
          1 Not Reset
```

Listdevicenames output

Based from the output of `--devicenames`, you can decide if you must use the `--devname= option` in the read or write functions. You can access `CPLD1` being at `deviceaddress 0`, using the register value for the register you want, such as:

```
root@dell-diag-os:~# pltool -listdevicenames
0x0 : CPLD1
0x3e : CPLD2
0x3e : CPLD3
0x3e : CPLD4
0x0 : SMF_FPGA
```

Read output

```
root@dell-diag-os:~# pltool --read --devname=CPLD4 --dev=0x3e --reg=0x2
SW_SCRATCH : offset 0x02 = 0xde
```

```
 7: 0 SW_SCRATCH = de
root@dell-diag-os:~#
```

Write output

```
root@dell-diag-os:~# pltool --write  --devname=CPLD4 --dev=0x3e --reg=0x2 --val=0xff
```

Test output

```
root@dell-diag-os:~# pltool --test
Testing Programmable Devices:
PL Tool test:
 CPLD1 ..................... Passed
 CPLD2: SW_SCRATCH..... Passed
 CPLD3: SW_SCRATCH..... Passed
 CPLD4: SW_SCRATCH..... Passed
 SMF_FPGA ..... Passed
PL Tool: Overall test results ---- >>> Passed
```

psutool

The `psutool` determines which PSUs are in the system, checks the Power Good setting, and reads the field replaceable unit (FRU) information. It does not look at the PSU fans and airflow direction of the fans.

Tests

The `psutool` looks for the presence of the PSU and if the PSU is present, it checks the Power Good setting in the CPLD. It does not read directly from the PSU but reads the CPLD information instead. If the PSU is present and it does not receive a Power Good signal, it does not know if the power plug is not installed or if the PSU is not operating correctly, so it displays a failure.

CLI options

```
DellEmc Diag - Power Supply Tool
version 1.4, x.xx.x.x-x
build, 2017/05/23,

Syntax: psutool <option>
 Show the Help-text:=
        psutool --h                                                              (or)
        psutool -h
 Test using the default config file:=
        psutool --test [--supply=<power_supply>]                                 (or)
        psutool -t [-S <power_supply>]
 Read the register on the Power Supply:=
        psutool --read --supply=<power_supply> --reg=<register>                  (or)
        psutool -r -S <power_supply> -r <register>
 Write the value into the Power Supply Register:=
        psutool --write --supply=<power_supply> --reg=<register> --val=<value> (or)
        psutool -w <power_supply> -R <register> -V <value>
 Verify PSU by reading SMF registers:=
        psutool --lpc                                                            (or)
        psutool -q
 Execute repeatedly command by count:=
        psutool --iteration=max/<count> [option1] [option2]...                   (or)
        psutool -I max/<count> [option1] [option2]...
```

```
Usage:=
   -h, --h          Show the help text
   -t, --test       Test using the pre-programmed configuration or use supplied config
   -S, --supply=    Power supply
   -r, --read       Read operation
   -w, --write      Write operation
   -R, --register=  Register
   -V, --value=     Value to be set
   -I, --iteration= Iteration command execution
   -q, --lpc        Verify PSU by reading SMF registers.
                    This option must be used along with test flag
```

test option

```
root@dell-diag-os:~# psutool --test --lpc
Power Supply Test all
Getting details of Power Supply 1 using LPC interface
Power Supply 1 is Present
Power Supply 1 Input Type AC
Power Supply 1 Input Voltage(VIN) : 203.250000 V
Power Supply 1 Output Voltage(VOUT) : 12.210000 V
Power Supply 1 Input Current(IIN) : 0.610000 A
Power Supply 1 Output Current(IOUT) : 9.150000 A
Power Supply 1 Input Power(PIN) : 124.000000 W
Power Supply 1 Output Power(POUT) : 111.700000 W
Power Supply 1 Temperature : 30.000000 C
Power Supply 1 Fan Present
Power Supply 1 Fan Status is Normal
Power Supply 1 Fan Airflow Type is F2B
Power Supply 1 Fan Speed(RPM) : 9072
Getting details of Power Supply 2 using LPC interface
Power Supply 2 is Present
Power Supply 2 Input Type AC
Power Supply 2 Output Voltage Low
Power Supply 2 Input Voltage(VIN) : 0.000000 V
Power Supply 2 Output Voltage(VOUT) : 0.000000 V
Power Supply 2 Input Current(IIN) : 0.000000 A
Power Supply 2 Output Current(IOUT) : 0.000000 A
Power Supply 2 Input Power(PIN) : 0.000000 W
Power Supply 2 Output Power(POUT) : 0.000000 W
Power Supply 2 Temperature : 6553.100098 C
Power Supply 2 Fan Present
Power Supply 2 Fan Status is Normal
Power Supply 2 Fan Airflow Type is F2B
Power Supply 2 Fan Speed(RPM) : 9120
Power Supply Test ..................................... Passed
root@dell-diag-os:~#
```

rtctool

The rtctool allows setting and testing of the real time clock (RTC) in the system.

Tests

CLI options

```
DellEmc Diag - RTC Tool
version 1.1, x.xx.x.x-x
build, 2017/05/23,
```

```
Syntax: rtctool <option>
   Show the help-text:=
       rtctool --help                          (or)
       rtctool -h
   Read the current RTC:=
       rtctool --readrtc                       (or)
       rtctool -r
   Test RTC device with user interrupt:=
       rtctool --testuie                       (or)
       rtctool -u
   Test RTC device with alarm interrupt:=
       rtctool --testaie                       (or)
       rtctool -a
   Test RTC device with periodic interrupt:=
       rtctool --testpie                       (or)
       rtctool -p
   Test the RTC device:=
       rtctool --test                          (or)
       rtctool -t
   Set rtc to new time (input all params in same order):=
       rtctool --setrtc --year=<year>, --mon=<month> --day=<day> --hour=<hour> --min=<min> --
sec=<sec> --tz=<offset>
                        (or)
       rtctool -s -y <year> -m <month> -D <day> -H <hour> -M <min> -S <sec> -Z <offset>
   Execute repeatedly command by count:=
       rtctool --iteration=max/<count> [option1] [option2]... (or)
       rtctool -I max/<count> [option1] [option2]...

Usage:=
       -h, --help          Show the help text
       -r, --readrtc       Read operation
       -s, --setrtc        Set operation
       -u, --testuie       Test RTC device with user interrupt
       -a, --testaie       Test RTC device with alarm interrupt
       -p, --testpie       Test RTC device with periodic interrupt
       -I, --iteration=    Iteration command execution
       -y, --year=         Year
       -m, --month=        Month
       -D, --day=          Day
       -H, --hour=         Hour
       -M, --min=          Minute
       -S, --sec=          Second
       -Z, --offset=       +12.0 to -12.0 timezone offset
```

smartctl

`smartctl` controls the self-monitoring, analysis, and reporting technology (SMART) system built into most ATA/SATA and SCSI/SAS hard drives and solid-state drives. The purpose of SMART is to monitor the reliability of the hard drive and predict drive failures, and to carry out different types of drive self-tests.

smarttool

This optional tool is only available on systems using a SmartFusion chip. The SMF controls the PSU, LED control, fan monitoring, and temperature control of the switch.

Use the `smarttool` to get and set the SmartFusion Active regions and version, and to reprogram the SmartFusion FPGA.

SmartFusion (SMF) had two upgradable parts — Microcontroller subsystem (MSS) and field programmable gate array (FPGA), as shown. The online upgrade MSS images are in `*.bin` files. The online upgrade of FPGA image is in a `*.dat` file. The external upgrade of both MSS and FPGA is a `*.pdb` file.

There are three regions in the MSS: G — Golden, A — Primary, and B — Secondary. In principle, you cannot upgrade the region G and the bootloader. Golden is the default bootable region. If both regions A and B become corrupt, the region G image is used for booting. If A becomes corrupt, select region B and boot from region B.

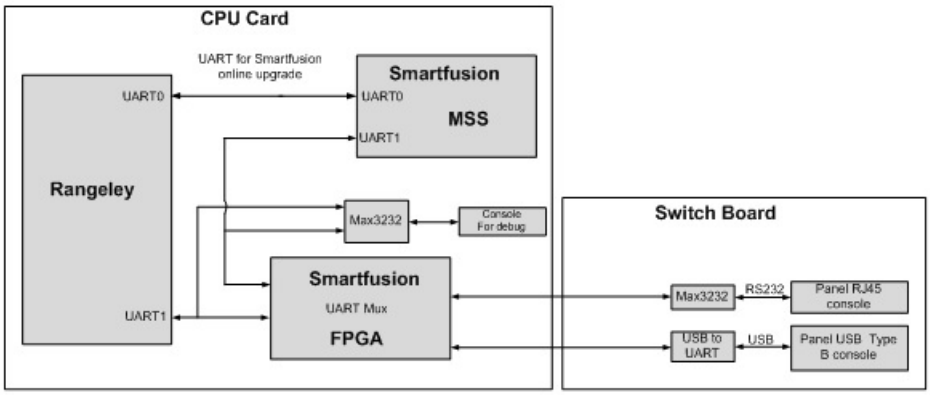

Figure 5. smarttool upgradable MSS and FPGA

SMF upgrade binaries

- *<platform>*_SMF_MSS_v1.3.1_A_region.bin
- *<platform>*_SMF_MSS_v1.3.1_B_region.bin
- *<platform>*_SMF_MSS_v1.3.1_G_region.bin
- *<platform>*_SMF_Logic_v0.3.dat

CLI options

```
root@dell-diag-os:/opt/dellemc/diag/bin# smarttool
ERROR: main[100]: ERROR: Usage: smarttool <command> <UART dev> [<filename>|<REGION>]

-------------------------------------------------------
Usage:
smarttool <command> [<UART dev>] [<filename>|<REGION>]

 <command>    - Command string (Refer below for supported commands)
 <UART dev>   - UART device name (say, "/dev/tty00")
 <filename>   - Specify image file path for upgrade
 <REGION>     - Specify image region.
                (G, A, B for MSS regions, g, a for FPGA region)

 Following commands are supported:
             -um - Upgrade MSS image
             -uf - Upgrade FPGA image
            -gmr - Get MSS running image region
            -gfr - Get FPGA running image region
            -gmv - Get MSS running image version
            -smr - Select MSS running image region
            -sfr - Select FPGA running image region
           -help - Dispay help
-------------------------------------------------------
```

SMF MSS upgrade

You can upgrade SMF MSS using the following steps:

To find out what region is running, use the `gmr` option.

- If MSS is running in region A, use the region B image to upgrade the MSS.
- If MSS is running in region B, use the region A image to upgrade the MSS.
- If MSS is running in region G, use the region A image to upgrade the MSS.

```
Upgrade mss A-region when mss is running in G-region:
    ./smarttool -um /dev/ttyS0 <platform>_SMF_MSS_v1.41_A_region.bin
Upgrade mss B-region when mss is running in A-region:
     ./smarttool -um /dev/ttyS0 <platform>_SMF_MSS_v1.41_B_region.bin
 Upgrade mss A-region when mss is running in B-region:
    ./smarttool -um /dev/ <platform>_SMF_MSS_v1.41_A_region.bin
```

1 Copy all the binaries needed for the upgrade into a local directory.

```
Z9100/v1.41/* .g-os:/opt/ngos/bin/SMF1_41# scp ajogow@10.11.8.12:/tftpboot/ajogow/Z
Password:
Z9100_SMF_logic_v0.E.dat                    100%  852KB 852.5KB/s   00:00
Z9100_SMF_MSS_v1.41_A_region.bin            100%  131KB 130.6KB/s   00:00
Z9100_SMF_MSS_v1.41_B_region.bin            100%  131KB 130.6KB/s   00:00
Z9100_SMF_MSS_v1.41_G_region.bin            100%  131KB 130.6KB/s   00:00
Z9100_SMF_MSS_v1.41_logic_v0.E.pdb          100%  412KB 412.1KB/s   00:00
Z9100_SMF_MSS_V1.41_logic_V0.E_Release_Notes. 100%  128KB 128.0KB/s   00:00
root@dell-diag-os:/opt/ngos/bin/SMF1_41#
```

Figure 6. Copy all needed binaries

2 Check the MSS region using the `smarttool -gmr /dev/ttyS0` command.

```
root@dell-diag-os:/opt/ngos/bin# ./smarttool -gmr /dev/ttyS0
smartUartOpen[64]: UART dev - /dev/ttyS0 opened
smartUartInit[168]: UART initialization for Smartfusion communication done!
smartUartHandShake[950]: Initiating handshake ...
smartUartHandShake[982]: String 'SmF' Sent
smartUartHandShake[987]: 'h' Sent
smartUartHandShake[992]: 'a' Received
smartUartHandShake[995]: 'n' Sent
smartUartHandShake[1005]: 'd' Received
smartUartHandShake[1008]: 's' Sent
smartUartHandShake[1018]: 'h' Received
smartUartHandShake[1021]: 'a' Sent
smartUartHandShake[1031]: 'k' Received
smartUartHandShake[1034]: 'e' Sent
smartUartHandShake[1046]: 'k' Received
smartUartHandShake[1051]: Handshake is fine !!!
smartGetImageRegion[303]: Sending get MSS region Action code ....
smartGetImageRegion[340]: MSS image running region is - G
smartUartClose[95]: UART dev closed
```

Figure 7. Check MSS region

3 Check the MSS version using `smarttool -gmv /dev/ttyS0` command.

```
root@dell-diag-os:/opt/ngos/bin# ./smarttool -gmv /dev/ttyS0
smartUartOpen[64]: UART dev - /dev/ttyS0 opened
smartUartInit[168]: UART initialization for Smartfusion communication done!
smartUartHandShake[950]: Initiating handshake ...
smartUartHandShake[982]: String 'SmF' Sent
smartUartHandShake[987]: 'h' Sent
smartUartHandShake[992]: 'a' Received
smartUartHandShake[995]: 'n' Sent
smartUartHandShake[1005]: 'd' Received
smartUartHandShake[1008]: 's' Sent
smartUartHandShake[1018]: 'h' Received
smartUartHandShake[1021]: 'a' Sent
smartUartHandShake[1031]: 'k' Received
smartUartHandShake[1034]: 'e' Sent
smartUartHandShake[1046]: 'k' Received
smartUartHandShake[1051]: Handshake is fine !!!
smartGetImageVersion[411]: Sending get MSS version Action code ....
smartGetImageVersion[436]: MSS image version is - V1.31

smartUartClose[95]: UART dev closed
root@dell-diag-os:/opt/ngos/bin#
```

Figure 8. Check MSS version

4 Because the MSS is running in region G in this example, use the region A image to upgrade your device: `smarttool -um /dev/ttyS0 <Path_to_the_image>/<platform>_SMF_MSS_v1.41_A_region.bin`. The device automatically reboots after the upgrade.

```
Z9100_SMF_MSS_v1.41_A_region.bin ./smarttool_1024bytes -um /dev/ttyS0 ./SMF1_41/
smartUartOpen[64]: UART dev - /dev/ttyS0 opened
smartUartInit[168]: UART initialization for Smartfusion communication done!
smartUartHandShake[950]: Initiating handshake ...
smartUartHandShake[982]: String 'SmF' Sent
smartUartHandShake[987]: 'h' Sent
smartUartHandShake[992]: 'a' Received
smartUartHandShake[995]: 'n' Sent
smartUartHandShake[1005]: 'd' Received
smartUartHandShake[1008]: 's' Sent
smartUartHandShake[1018]: 'h' Received
smartUartHandShake[1021]: 'a' Sent
smartUartHandShake[1031]: 'k' Received
smartUartHandShake[1034]: 'e' Sent
smartUartHandShake[1046]: 'k' Received
smartUartHandShake[1051]: Handshake is fine !!!
smartUpgradeImage[596]: Sending MSS upgrade Action code ....
smartUpgradeImage[621]: Upgrade selection mode done ...
getImageSize[875]: Image size = 0x20a64 bytes
smartUpgradeImage[642]: Sent and acknowledged image size, byte-3. sent-[0x0], recvd-[0x0]
smartUpgradeImage[642]: Sent and acknowledged image size, byte-2. sent-[0x2], recvd-[0x2]
smartUpgradeImage[642]: Sent and acknowledged image size, byte-1. sent-[0xa], recvd-[0xa]
smartUpgradeImage[642]: Sent and acknowledged image size, byte-0. sent-[0x64], recvd-[0x64]
smartUpgradeImage[644]: Sent image size successfully ....
smartUpgradeImage[649]: Erasing  eNVM ....
smartUpgradeImage[669]: SMART erase verification done! Proceeding image data transfer ...
smartUpgradeImage[672]: Image path selected is ./SMF1_41/Z9100_SMF_MSS_v1.41_A_region.bin
transferImage[723]: Initiating image transfer (Take minutes, Be patient)...
transferImage[821]: Reached end of image, address - 133732
transferImage[827]: End of image transfer
transferImage[837]: 8 bit Checksum value calculated by SMART is 0x17
transferImage[838]: 8 bit Checksum value calculated by CPU is 0x17
smartUpgradeImage[684]: Waiting for FPGA/eNVM to be programmed ...
[  ÿ


BIOS (Dell, Inc.) Boot Selector
```

Figure 9. Upgrade region A

5 Ensure that MSS has upgraded successfully by using the `smarttool -gmv /dev/ttyS0` command after the system reboots.

```
root@dell-diag-os:/opt/ngos/bin# ./smarttool_1024bytes -gmv /dev/ttyS0
smartUartOpen[64]: UART dev - /dev/ttyS0 opened
smartUartInit[168]: UART initialization for Smartfusion communication done!
smartUartHandShake[950]: Initiating handshake ...
smartUartHandShake[982]: String 'SmF' Sent
smartUartHandShake[987]: 'h' Sent
smartUartHandShake[992]: 'a' Received
smartUartHandShake[995]: 'n' Sent
smartUartHandShake[1005]: 'd' Received
smartUartHandShake[1008]: 's' Sent
smartUartHandShake[1018]: 'h' Received
smartUartHandShake[1021]: 'a' Sent
smartUartHandShake[1031]: 'k' Received
smartUartHandShake[1034]: 'e' Sent
smartUartHandShake[1046]: 'k' Received
smartUartHandShake[1051]: Handshake is fine !!!
smartGetImageVersion[411]: Sending get MSS version Action code ....
smartGetImageVersion[436]: MSS image version is - V1.41

smartUartClose[95]: UART dev closed
root@dell-diag-os:/opt/ngos/bin#
```

Figure 10. Check MSS upgrade

Upgrading SMF FPGA

To upgrade your system using the FPGA method, follow these steps.

1 Copy all the binaries needed for upgrade into a local directory.

```
Z9100/v1.41/* .g-os:/opt/ngos/bin/SMF1_41# scp ajogow@10.11.8.12:/tftpboot/ajogow/Z
Password:
Z9100_SMF_logic_v0.E.dat                      100%  852KB 852.5KB/s   00:00
Z9100_SMF_MSS_v1.41_A_region.bin              100%  131KB 130.6KB/s   00:00
Z9100_SMF_MSS_v1.41_B_region.bin              100%  131KB 130.6KB/s   00:00
Z9100_SMF_MSS_v1.41_G_region.bin              100%  131KB 130.6KB/s   00:00
Z9100_SMF_MSS_v1.41_logic_v0.E.pdb            100%  412KB 412.1KB/s   00:00
Z9100_SMF_MSS_V1.41_logic_V0.E_Release_Notes. 100%  128KB 128.0KB/s   00:00
root@dell-diag-os:/opt/ngos/bin/SMF1_41#
```

Figure 11. Copy needed binaries

2 Check the FPGA region using `smarttool -gfr /dev/ttyS0` command.

```
root@dell-diag-os:/opt/ngos/bin# ./smarttool_1024bytes -gfr /dev/ttyS0
smartUartOpen[64]: UART dev - /dev/ttyS0 opened
smartUartInit[168]: UART initialization for Smartfusion communication done!
smartUartHandShake[950]: Initiating handshake ...
smartUartHandShake[982]: String 'SmF' Sent
smartUartHandShake[987]: 'h' Sent
smartUartHandShake[992]: 'a' Received
smartUartHandShake[995]: 'n' Sent
smartUartHandShake[1005]: 'd' Received
smartUartHandShake[1008]: 's' Sent
smartUartHandShake[1018]: 'h' Received
smartUartHandShake[1021]: 'a' Sent
smartUartHandShake[1031]: 'k' Received
smartUartHandShake[1034]: 'e' Sent
smartUartHandShake[1046]: 'k' Received
smartUartHandShake[1051]: Handshake is fine !!!
smartGetImageRegion[308]: Sending get FPGA region Action code ....
smartGetImageRegion[358]: FPGA image running region is - g
smartUartClose[95]: UART dev closed
root@dell-diag-os:/opt/ngos/bin#
```

Figure 12. Check FPGA region

3 Get the current version of the FPGA using the `lpctool` utility. Get the FPGA running image version through the `./lpctool --read --addr=0x200 --size=b` registers at the LPC tool.

Table 1. SmartFusion FPGA registers

Offset	Name	Description
0x200	SMF_VER	SmartFusion FPGA version register

```
root@dell-diag-os:/opt/ngos/bin# ./lpctool --read --addr=0x200 --size=b
Byte Port 0x200 : 0xe
root@dell-diag-os:/opt/ngos/bin#
```

Figure 13. Get current FPGA version

4 Upgrade the FPGA in smartFusion using the `# ./smarttool -uf /dev/ttyS0 <path_to_the_image>/<platform>_SMF_logic_v0.E.dat` command. To upgrade to region A, you must be in region G. The device automatically reboots after the upgrade.

```
Z9100_SMF_logic_v0.E.dat   /bin# ./smarttool_1024bytes -uf /dev/ttyS0 ./SMF1_41/
smartUartOpen[64]: UART dev - /dev/ttyS0 opened
smartUartInit[168]: UART initialization for Smartfusion communication done!
smartUartHandShake[950]: Initiating handshake ...
smartUartHandShake[982]: String 'SmF' Sent
smartUartHandShake[987]: 'h' Sent
smartUartHandShake[992]: 'a' Received
smartUartHandShake[995]: 'n' Sent
smartUartHandShake[1005]: 'd' Received
smartUartHandShake[1008]: 's' Sent
smartUartHandShake[1018]: 'h' Received
smartUartHandShake[1021]: 'a' Sent
smartUartHandShake[1031]: 'k' Received
smartUartHandShake[1034]: 'e' Sent
smartUartHandShake[1046]: 'k' Received
smartUartHandShake[1051]: Handshake is fine !!!
smartUpgradeImage[601]: Sending FPGA upgrade Action code ....
smartUpgradeImage[621]: Upgrade selection mode done ...
getImageSize[875]: Image size = 0xd51d4 bytes
smartUpgradeImage[642]: Sent and acknowledged image size, byte-3. sent-[0x0], recvd-[0x0]
smartUpgradeImage[642]: Sent and acknowledged image size, byte-2. sent-[0xd], recvd-[0xd]
smartUpgradeImage[642]: Sent and acknowledged image size, byte-1. sent-[0x51], recvd-[0x51]
smartUpgradeImage[642]: Sent and acknowledged image size, byte-0. sent-[0xd4], recvd-[0xd4]
smartUpgradeImage[644]: Sent image size successfully ....
smartUpgradeImage[654]: Erasing SPI flash ....
smartUpgradeImage[669]: SMART erase verification done! Proceeding image data transfer ...
smartUpgradeImage[672]: Image path selected is ./SMF1_41/Z9100_SMF_logic_v0.E.dat
transferImage[723]: Initiating image transfer (Take minutes, Be patient)...
transferImage[821]: Reached end of image, address - 872916
transferImage[827]: End of image transfer
transferImage[837]: 8 bit Checksum value calculated by SMART is 0xaa
transferImage[838]: 8 bit Checksum value calculated by CPU is 0xaa
smartUpgradeImage[684]: Waiting for FPGA/eNVM to be programmed ...



BIOS (Dell, Inc.) Boot Selector
Z9100 3.23.0.4 32 port 100G / 2 port sfp+ mgmt
```

Figure 14. Upgrade FPGA

5 Verify that the FPGA is upgraded using the `lpctool` utility. Get the FPGA running image version through the `./lpctool --read --addr=0x200 --size=b` registers of the LPC tool.

smbiostool

The `smbiostool` displays information about the BIOS and also reprograms the BIOS flash.

NOTE: The `smbiostool` is not available for all platforms. For some platforms, this tool is replaced with the `updatetool`.

CLI options

```
DellEmc Diag - SMBIOS Tool
version 1.2, x.xx.x.x-x
build, 2017/05/23,

Usage:=
```

```
       smbiostool --h                              (or)
       smbiostool -h
  Print the BIOS version:=
       smbiostool --biosversion                    (or)
       smbiostool -b
  Check whether the SPI flash was detected:=
       smbiostool --biosflashdetect                (or)
       smbiostool -f
  Take a backup of the Current running BIOS:=
       smbiostool --biosread <FILEPATH>            (or)
       smbiostool -r
  Update the bios:=
       smbiostool --biosupdate <FILEPATH>          (or)
       smbiostool -u <FILEPATH>
  Dump the DMI table:=
       smbiostool --biosdumpall                    (or)
       smbiostool -d
  Check whether the SPI flash was detected:=
       smbiostool --biosdumpfields <*options*>     (or)
       smbiostool -S <*options*>
  <*options*> for biosdumpfiels:=
     -q                  Less verbose output
     -s                  Only display the value of the given DMI string
     -t                  TYPE  Only display the entries of given type
     -u                  Do not decode the entries
     --dump-bin <FILE>   Dump the DMI data to a binary file
     --from-dump <FILE>  Read the DMI data from a binary file
     -V                  Display the version of dmidecode binary
```

Output

```
root@dell-diag-os:~# smbiostool --biosversion
x.xx.x.x_MRC48
root@dell-diag-os:~#

root@dell-diag-os:~# smbiostool --biosflashdetect
dmidecode -s system-version flashrom -V -p internal > /tmp/flhdet.txtFound Flash chip!!!
Found Winbond flash chip "W25Q128.V" (16384 kB, SPI) at physical address 0xff000000.

--biosupporteddevices is a list of devices supported by flashrom for reprogramming

--biosdumpall is the dump of the dmidecode data
--biosdumpfields [SUBOPT] allows you to dump specified fields using the options

The --bioserase and --bioswrite options have been rolled into a --biosupdate option.
```

storagetool

The `storagetool` tests mounted storage media.

The tool searches for any device in `/dev/hd*`, `sda`, `sdb`, or `sdc` and tests using them. The tests are file-copy tests to the device in the mounted file system. The files are written, compared and removed, leaving the file system as it was before the test. You can run more tests using the `bonnie++ tool` and the tool reads SMART data from the device using the `smart` option.

Tests

The standard test creates a `directory` on the file system, opens a file for write, copies the file, compares the files, and reports errors. The test repeats 10 times. After the test completes successfully, `storagetool` removes all the test files.

CLI options

```
DellEmc Diag - Storage Tool
version 1.1, x.xx.x.x-x
build, 2017/05/23,

Syntax: storagetool <option>
 Show the help-text:=
         storagetool --h                          (or)
         storagetool -h
 Mount usb device when inserted (mandatory):=
         storagetool --mountusb                   (or)
         storagetool -m
 Unmount usb device before removed (mandatory):=
         storagetool --unmountusb                 (or)
         storagetool -u
 List devices:=
         storagetool --list                       (or)
         storagetool -l
 Test devices(empty for all):=
         storagetool --test [--dev=<device>]      (or)
         storagetool -t [-D <device>
 Get the smart status for a device
         storagetool --smart --dev=<device>       (or)
         storagetool -S -D <device>
 Execute repeatedly command by count:=
         storagetool --iteration=max/<count> [option1] [option2]...(or)
         storagetool -I max/<count> [option1] [option2]...
 Run the bonnie tools on the filesystems:=
         storagetool --bonnie                     (or)
         storagetool -B

Usage:
   -h, --h           Show the help text
   -m, --mountusb    Mount usb device when inserted (mandatory)
   -u, --unmountusb  Unmount usb device when inserted (mandatory)
   -l, --list        List all storage devices
   -S, --smart       Smart Status
   -D, --dev=        Device
   -T, --test        Test using the pre-programmed configuration or use supplied config
   -I, --iteration=  Iteration command execution
   -B, --bonnie      Run the bonnie tools on the filesystems
```

Output

list output

```
root@dell-diag-os:~# storagetool --list
Mounted Filesystem Devices:
/dev/sda3 / ext4
root@dell-diag-os:~#
```

test output

```
root@dell-diag-os:~# storagetool --test --dev=/dev/sda3
Testing Storage Devices ..................... Passed
root@dell-diag-os:~#
```

smart output

```
root@dell-diag-os:~# storagetool --smart --dev=/dev/sda3
smartctl 6.2 2013-07-26 r3841 [x86_64-linux-3.15.10] (local build)
Copyright (C) 2002-13, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF INFORMATION SECTION ===
Device Model:     InnoDisk Corp. - mSATA 3IE
Serial Number:    20160119AA144700000F
Firmware Version: S141002c
User Capacity:    32,017,047,552 bytes [32.0 GB]
Sector Size:      512 bytes logical/physical
Rotation Rate:    Solid State Device
Device is:        Not in smartctl database [for details use: -P showall]
ATA Version is:   ACS-2 (minor revision not indicated)
SATA Version is:  SATA 3.0, 6.0 Gb/s (current: 6.0 Gb/s)
Local Time is:    Mon Jan  1 20:45:44 2001 UTC
SMART support is: Available - device has SMART capability.
SMART support is: Enabled

=== START OF ENABLE/DISABLE COMMANDS SECTION ===
SMART Enabled.

=== START OF READ SMART DATA SECTION ===
SMART overall-health self-assessment test result: PASSED

General SMART Values:
Offline data collection status:  (0x00) Offline data collection activity
                                        was never started.
                                        Auto Offline Data Collection: Disabled.
Total time to complete Offline
data collection:                (   32) seconds.
Offline data collection
capabilities:                    (0x00)         Offline data collection not supported.
SMART capabilities:            (0x0003) Saves SMART data before entering
                                        power-saving mode.
                                        Supports SMART auto save timer.
Error logging capability:        (0x00) Error logging NOT supported.
                                        General Purpose Logging supported.
SCT capabilities:              (0x0039) SCT Status supported.
                                        SCT Error Recovery Control supported.
                                        SCT Feature Control supported.
                                        SCT Data Table supported.

SMART Attributes Data Structure revision number: 16
Vendor Specific SMART Attributes with Thresholds:
ID# ATTRIBUTE_NAME          FLAG     VALUE WORST THRESH TYPE      UPDATED  WHEN_FAILED RAW_VALUE
  1 Raw_Read_Error_Rate     0x0000   000   000   000    Old_age   Offline      -       0
  2 Throughput_Performance  0x0000   000   000   000    Old_age   Offline      -       0
  3 Spin_Up_Time            0x0000   000   000   000    Old_age   Offline      -       0
  5 Reallocated_Sector_Ct   0x0002   100   100   000    Old_age   Always       -       0
  7 Unknown_SSD_Attribute   0x0000   000   000   000    Old_age   Offline      -       0
  8 Unknown_SSD_Attribute   0x0000   000   000   000    Old_age   Offline      -       0
  9 Power_On_Hours          0x0002   100   100   000    Old_age   Always       -       3289
 10 Unknown_SSD_Attribute   0x0000   000   000   000    Old_age   Offline      -       0
 12 Power_Cycle_Count       0x0002   100   100   000    Old_age   Always       -       205
168 Unknown_Attribute       0x0000   000   000   000    Old_age   Offline      -       0
169 Unknown_Attribute       0x0000   000   000   000    Old_age   Offline      -       0
175 Program_Fail_Count_Chip 0x0000   000   000   000    Old_age   Offline      -       0
192 Power-Off_Retract_Count 0x0000   000   000   000    Old_age   Offline      -       0
  1 Raw_Read_Error_Rate     0x0000   000   000   000    Old_age   Offline      -
2199023255552
197 Current_Pending_Sector  0x0000   000   000   000    Old_age   Offline      -       0
240 Unknown_SSD_Attribute   0x0000   000   000   000    Old_age   Offline      -       0
225 Unknown_SSD_Attribute   0x0000   000   000   000    Old_age   Offline      -       0
```

```
170 Unknown_Attribute       0x0003   100   100   ---    Pre-fail  Always       -       1966080
173 Unknown_Attribute       0x0002   100   100   ---    Old_age   Always       -       7602213
229 Unknown_Attribute       0x0002   100   100   ---    Old_age   Always       -
88470212370072
236 Unknown_Attribute       0x0002   100   100   ---    Old_age   Always       -       0
235 Unknown_Attribute       0x0002   100   000   ---    Old_age   Always       -       0
176 Erase_Fail_Count_Chip   0x0000   100   000   ---    Old_age   Offline      -       0

Read SMART Log Directory failed: scsi error aborted command

Read SMART Error Log failed: scsi error aborted command

Read SMART Self-test Log failed: scsi error aborted command

Selective Self-tests/Logging not supported

root@dell-diag-os:~#
```

bonnie output

```
root@dell-diag-os:~# storagetool --bonnie --dev=/dev/sda3
Using uid:0, gid:0.
Writing with putc()...done
Writing intelligently...done
Rewriting...done
Reading with getc()...done
Reading intelligently...done
start 'em...done...done...done...
Create files in sequential order...done.
Stat files in sequential order...done.
Delete files in sequential order...done.
Create files in random order...done.
Stat files in random order...done.
Delete files in random order...done.
Version  1.03       ------Sequential Output------ --Sequential Input- --Random-
                    -Per Chr- --Block-- -Rewrite- -Per Chr- --Block-- --Seeks--
Machine        Size K/sec %CP K/sec %CP K/sec %CP K/sec %CP K/sec %CP  /sec %CP
dell-diag-os   250M 27664  96 245045  62 +++++ +++ 31064 100 +++++ +++ +++++ +++
                    ------Sequential Create------ --------Random Create--------
                    -Create-- --Read--- -Delete-- -Create-- --Read--- -Delete--
               files  /sec %CP  /sec %CP  /sec %CP  /sec %CP  /sec %CP  /sec %CP
                  32 32494  97 +++++ +++ 31198  66 31739  92 +++++ +++ 26511  56
dell-diag-os,250M,27664,96,245045,62,+++++,+++,31064,100,+++++,+++,+++++,+++,32,32494,97,+++++,+
++,31198,66,31739,92,+++++,+++,26511,56
```

smartctl

To get a usage summary, use the `smartctl -h` command.

```
root@dell-diag-os:/opt/dellemc/diag/bin# smartctl -h
smartctl 6.2 2013-07-26 r3841 [x86_64-linux-3.15.10] (local build)
Copyright (C) 2002-13, Bruce Allen, Christian Franke, www.smartmontools.org

Usage: smartctl [options] device

============================================ SHOW INFORMATION OPTIONS =====

  -h, --help, --usage
         Display this help and exit

  -V, --version, --copyright, --license
         Print license, copyright, and version information and exit
```

```
  -i, --info
         Show identity information for device

  --identify[=[w][nvb]]
         Show words and bits from IDENTIFY DEVICE data                (ATA)

  -g NAME, --get=NAME
        Get device setting: all, aam, apm, lookahead, security, wcache, rcache, wcreorder

  -a, --all
         Show all SMART information for device

  -x, --xall
         Show all information for device

  --scan
         Scan for devices

  --scan-open
         Scan for devices and try to open each device

=================================== SMARTCTL RUN-TIME BEHAVIOR OPTIONS =====

  -q TYPE, --quietmode=TYPE                                            (ATA)
         Set smartctl quiet mode to one of: errorsonly, silent, noserial

  -d TYPE, --device=TYPE
         Specify device type to one of: ata, scsi, sat[,auto][,N][+TYPE], usbcypress[,X],
usbjmicron[,p][,x][,N], usbsunplus, marvell, areca,N/E, 3ware,N, hpt,L/M/N, megaraid,N,
cciss,N, auto, test

  -T TYPE, --tolerance=TYPE                                            (ATA)
         Tolerance: normal, conservative, permissive, verypermissive

  -b TYPE, --badsum=TYPE                                               (ATA)
         Set action on bad checksum to one of: warn, exit, ignore

  -r TYPE, --report=TYPE
         Report transactions (see man page)

  -n MODE, --nocheck=MODE                                              (ATA)
         No check if: never, sleep, standby, idle (see man page)

============================== DEVICE FEATURE ENABLE/DISABLE COMMANDS =====

  -s VALUE, --smart=VALUE
        Enable/disable SMART on device (on/off)

  -o VALUE, --offlineauto=VALUE                                        (ATA)
        Enable/disable automatic offline testing on device (on/off)

  -S VALUE, --saveauto=VALUE                                           (ATA)
        Enable/disable Attribute autosave on device (on/off)

  -s NAME[,VALUE], --set=NAME[,VALUE]
        Enable/disable/change device setting: aam,[N|off], apm,[N|off],
        lookahead,[on|off], security-freeze, standby,[N|off|now],
        wcache,[on|off], rcache,[on|off], wcreorder,[on|off]

======================================== READ AND DISPLAY DATA OPTIONS =====

  -H, --health
        Show device SMART health status

  -c, --capabilities                                                   (ATA)
        Show device SMART capabilities

  -A, --attributes
        Show device SMART vendor-specific Attributes and values
```

```
  -f FORMAT, --format=FORMAT                                          (ATA)
        Set output format for attributes: old, brief, hex[,id|val]

  -l TYPE, --log=TYPE
        Show device log. TYPE: error, selftest, selective, directory[,g|s],
                               xerror[,N][,error], xselftest[,N][,selftest],
                               background, sasphy[,reset], sataphy[,reset],
                               scttemp[sts,hist], scttempint,N[,p],
                               scterc[,N,M], devstat[,N], ssd,
                               gplog,N[,RANGE], smartlog,N[,RANGE]

  -v N,OPTION , --vendorattribute=N,OPTION                            (ATA)
        Set display OPTION for vendor Attribute N (see man page)

  -F TYPE, --firmwarebug=TYPE                                         (ATA)
        Use firmware bug workaround:
        none, nologdir, samsung, samsung2, samsung3, xerrorlba, swapid

  -P TYPE, --presets=TYPE                                             (ATA)
        Drive-specific presets: use, ignore, show, showall

  -B [+]FILE, --drivedb=[+]FILE                                       (ATA)
        Read and replace [add] drive database from FILE
        [default is +/usr/etc/smart_drivedb.h
         and then    /usr/share/smartmontools/drivedb.h]

=========================================== DEVICE SELF-TEST OPTIONS =====

  -t TEST, --test=TEST
        Run test. TEST: offline, short, long, conveyance, force, vendor,N,
                        select,M-N, pending,N, afterselect,[on|off]

  -C, --captive
        Do test in captive mode (along with -t)

  -X, --abort
        Abort any non-captive test on device

================================================= SMARTCTL EXAMPLES =====

  smartctl --all /dev/hda                    (Prints all SMART information)

  smartctl --smart=on --offlineauto=on --saveauto=on /dev/hda
                                              (Enables SMART on first disk)

  smartctl --test=long /dev/hda          (Executes extended disk self-test)

  smartctl --attributes --log=selftest --qu
MODE, --nocheck=MODE (ATA) No check if: never, sleep, standby, idle (see man page)
============== DEVICE FEATURE ENABLE/DISABLE COMMANDS =====
```

bonnie++

`bonnie++` is a test suite for storage devices that runs more comprehensive tests than the standard file system tests using the `storagetool`. You can run `bonnie++` outside of the `storagetool`, but for logging purposes, use `bonnie++` within `storagetool`.

```
root@dell-diag-os:/opt/dellemc/diag/bin# bonnie++
You must use the "-u" switch when running as root.
usage: bonnie++ [-d scratch-dir] [-s size(Mb)[:chunk-size(b)]]
                [-n number-to-stat[:max-size[:min-size][:num-directories]]]
                [-m machine-name]
                [-r ram-size-in-Mb]
                [-x number-of-tests] [-u uid-to-use:gid-to-use] [-g gid-to-use]
                [-q] [-f] [-b] [-p processes | -y]
```

```
Version: 1.03
root@dell-diag-os:/opt/dellemc/diag/bin#
```

temptool

The `temptool` reads from the temperature devices and reports back the temperatures.

The temperature sensors on the board are commonly connected through `i2c` busses. The configuration files specify the type of the device, the sensor name, the instance in that device, its location on the board, and the thresholds for reporting low, normal, and critical temperatures. To gather the information from the devices and report the values, the `temptool` uses the `i2ctool`.

Tests

The tool retrieves the data from the devices and validates that the temperatures are within the acceptable range.

CLI options

NOTE: Before using any commands, you must set the MUX settings to select the bus segments the temperature sensors are on.

```
DellEmc Diag - Temperature Tool
version 1.4, x.xx.x.x-x
build, 2017/05/23,

Syntax: temptool <option>
  Show the help-text:=
       temptool --h                                          (or)
       temptool -h
  Test the pre-programmed configuration:=
       temptool --test --config=<config_file> [--lpc]        (or)
       temptool -t -f <config_file> [-l]
  Execute repeatedly command by count:=
       temptool --iteration=max/<count> [option1] [option2]...(or)
       temptool -I max/<count> [option1] [option2]...
  Show the current temperature-device values:=
       temptool --show --config=<config_file> [--lpc]        (or)
       temptool -x -f <config_file> [-l]

Usage:=
 -h, --h          Show the help text
 -t, --test       Test using the pre-programmed configuration or use supplied config
 -x, --show       Show operation
 -f, --config=    To specify the location of the config file e.g. /etc/dn/diag/<file_name>
 -I, --iteration= Iteration command execution
 -q, --lpc        Use LPC interface for reading temperature
                  LPC option MUST be used with show/test flags
```

- `test` — Tests the sensors to make sure they are within the acceptable range.
- `show` — Shows the current temperature values.

Output

test output

```
root@dell-diag-os:/opt/dellemc/diag/bin# temptool --test --lpc
Testing Temp sensor  devices:
Temperature Sensor 1 ..................... Passed
Temperature Sensor 2 ..................... Passed
```

```
Temperature Sensor 3 ..................... Passed
Temperature Sensor 4 ..................... Passed
Temperature Sensor 5 ..................... Passed
Temperature Sensor 6 ..................... Passed
Temperature Sensor 7 ..................... Passed
Temperature Sensor 8 ..................... Passed
Temperature Sensor 9 ..................... Passed
Temp Sensors: Overall test results ----- >>> Passed
root@dell-diag-os:/opt/dellemc/diag/bin#
```

root@dell-diag-os:/opt/dellemc/diag/bin# temptool --show --lpc

```
Temperature Sensor 1 temperature value is 30.3 C
Temperature Sensor 2 temperature value is 23.1 C
Temperature Sensor 3 temperature value is 22.2 C
Temperature Sensor 4 temperature value is 26.0 C
Temperature Sensor 5 temperature value is 21.8 C
Temperature Sensor 6 temperature value is 22.0 C
Temperature Sensor 7 temperature value is 23.5 C
Temperature Sensor 8 temperature value is 31.0 C
Temperature Sensor 9 temperature value is 42.0 C
root@dell-diag-os:/opt/dellemc/diag/bin#
```

updatetool

The `updatetool` shows the CPLD, FPGA, BMC, and BIOS versions used to upgrade the CPLD, FPGA, BMC, and BIOS.

NOTE: For older platforms, such as the S4100-ON Series, `updatetool` is not available. Instead use `cpldupgradetool`.

Tests

There are no defined tests with `updatetool`.

CLI options

```
Syntax: ./updatetool <option>
Print the Help-Text:=
 updatetool --h                              (or)
 updatetool -h
Tool Version:=
 updatetool --version                        (or)
 updatetool -v
Device function list:=
 updatetool --dev=<CPLD|FPGA|MAIN-BMC|BIOS|ALL> [--index=IOM Slot] --list (or)
 updatetool -D <devname | ALL> [-i IOM Slot] -l
Device Region:=
 updatetool --dev=<MAIN-BMC|BIOS> --set_region=<primary|backup> (or)
 updatetool -D <devname> -S <region>
 updatetool --dev=<BMC|BIOS> --get_region (or)
 updatetool -D <devname> -G
Device Version:=
 updatetool --dev=<CPLD|FPGA|MAIN-BMC|BIOS|ALL> [--index=IOM Slot] --device_version (or)
 updatetool -D <devname | ALL> [-i IOM Slot] -V
Update the Device:=
 updatetool --dev=<CPLD|FPGA|MAIN-BMC|BIOS> [--index=IOM Slot] --update --file=<filename> (or)
 updatetool -D <devname> [-i IOM Slot] -U -e filename
Read the Device:=
 updatetool --dev=<CPLD|FPGA|MAIN-BMC|BIOS> [--index=IOM SLOT] --read -file=<filename>
 updatetool -D <devname> [-i IOM SLOT] -r -e filename
Device Flash Info:=
 updatetool --dev=<CPLD|FPGA|MAIN-BMC|BIOS> [--index=IOM SLOT] --flash_info
 updatetool -D <devname> [-i IOM SLOT] -F
```

```
Usage:=
 -h, --h              Show the help text
 -v, --version        Display version
 -l, --list           list device function
 -N, --nvram          save nvram
 -S, --set_region     set device region
 -G, --get_region     get device region
 -D, --dev            device name
 -i, --index          device Index
 -V, --device_version show device version
 -r, --read=          Read operation
 -e, --file=          device file
 -f, --config=        To specify the location of the config file e.g. /etc/dn/diag/<file_name>
 -u, --update         update device
 -F, --flash_info=    show flash info
```

Output

```
root@dellemc-diag-od~#updatetool --device_version --dev=CPU_CPLD
CPU_CPLD version:
System CPLD Version : offset 0x00 = 0xc
7: 4 Major Revision = 0
3: 0 Minor Revision = c
Scratch Register : offset 0x01 = 0x0
```

Diagnostic package

The diagnostic applications, libraries, and configurations are packaged in a debian package called `dn-diags-{PLATFORM}-{PACKAGE_VERSION}.deb`.

Executables are placed in `/opt/dellemc/diag/bin`, libraries are placed in `/opt/dellemc/diag/lib`, and configurations are placed in `/etc/dn/diag`. To install the package on the switch, use the `dpkg --install <package_name>` command.

6

Dell EMC support

The Dell EMC support site provides documents and tools to help you effectively use Dell EMC equipment and mitigate network outages. Through the support site you can obtain technical information, access software upgrades and patches, download available management software, and manage your open cases. The Dell EMC support site provides integrated, secure access to these services.

To access the Dell EMC support site, go to www.dell.com/support/. To display information in your language, scroll down to the bottom of the web page and select your country from the drop-down menu.

- To obtain product-specific information, enter the 7-character service tag, known as a luggage tag, or 11-digit express service code of your switch and click **Submit**.
- To view the chassis service tag or express service code, pull out the tag or enter the `show chassis` command from the CLI.
- To receive more technical support, click **Contact Us**. On the Contact Information web page, click **Technical Support**.

To access switch documentation, go to www.dell.com/manuals/.

To search for drivers and downloads, go to www.dell.com/drivers/.

To participate in Dell EMC community blogs and forums, go to www.dell.com/community.