Open Networking Hardware Diagnostic Guide

April 2016

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.**

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Contents

1

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 Command Line Reference Guide*
- *Dell Configuration Guide*
- *Dell Getting Started Guide*
- *Dell Installation Guide*
- *Dell Release Notes*

Installation Instructions for ONIE and the Dell OS

This section describes the different methods to install ONIE and the Dell Networking OS on your system.

ONIE Install Mode Assumes Ownership (Sticky)

NOTE: After installing the NOS/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/Diag-OS is successfully installed again. If you want to boot into ONIE for any reason other than installation, use Rescue mode or Update mode.

Topics:

Installing the DIAG-OS

To install the DIAG-OS, use the following steps.

NOTE: If you have a recovery USB plugged into your system, you must remove it prior to installing the DIAG-OS.

1 Assign a valid IP address to the management interface and confirm you can reach the network.

2 From the ONIE prompt, use following command to install the DIAG-OS.

```
ONIE:/ # onie-nos-install tftp://n.n.n.n/diag-installer-x86_64-dell_<platform>_<processor id>-r0.bin
```

3 After the DIAG-OS installs, the system reboots and displays following menu.

NOTE: By default, the system boots in DIAG-OS mode.

```
GNU GRUB version 2.02~beta2+e4a1fe391
+----------------------------------------+
| EDA-DIAG                               |
|*ONIE                                   |
+----------------------------------------+
Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, `e' to edit the commands
before booting or `c' for a command-line.
```

Installing ONIE and the DIAG OS

The following steps show how to load ONIE and the DIAG-OS on your system.

- Installing ONIE — these instructions use the universal serial bus (USB) method. To boot from a Linux USB, your system must have the BIOS pre-installed.
- Installing the DIAG-OS — Install the DIAG-OS from the ONIE prompt. Ensure that your TFTP server is reachable over your network.
- The ONIE operates using a 115200 baud rate. Ensure that any equipment attached to the serial port can support the required 115200 baud rate.

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

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

ONIE Service Discovery and OS Installation

ONIE attempts to locate the installer through several discovery methods, as shown. To download and run an installer, the ONIE Service Discovery feature uses the first successful method found.

1 Passed from the boot loader.
2 Search locally attached storage devices for one of the ONIE default installer filenames (for example, USB).
3 Exact the URLs from DHCPv4.
4 Inexact the URLs based on the DHCPv4 responses.
5 Query to the IPv6 link-local neighbors using HTTP for an installer.
6 TFTP waterfall — from the DHCPv4 option 66

Examples of the ONIE `ifconfig eth0` Commands

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, 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 prior to installing the DIAG-OS 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 default IP address 192.168.3.10/255.255.255.0.

To display the IP address, use the `ifconfig eth0` command, as shown in the following example.

```
ONIE:/ # ifconfig eth0
eth0 Link encap:Ethernet HWaddr 90:B1:1C:F4:9C:76
 inet addr:n.n.n. Bcast:n.n.n.n Mask:n.n.n.n
 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 in the following example.

```
ONIE:/ # ifconfig eth0 n.n.n.n/n UP

Verify the network connection with ping.
ONIE:/ # ping n.n.n.n
PING n.n.n.n (n.n.n.n): 56 data bytes
64 bytes from n.n.n.n: seq=0 ttl=62 time=1.357 ms
64 bytes from n.n.n.n: seq=1 ttl=62 time=0.577 ms
^C
```

Installing ONIE from the BIOS

There are two options for installing ONIE from the BIOS.

- Media (usb) boot using the ONIE installer USB (using the OCP Procedure)
- Media (usb) boot using the Ubuntu installer USB (using the custom-bootable USB procedure)

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 is optional and 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.
- Dell Networking recommends checking the console (UART-0/1) used on 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`.

Media (USB) Boot using the ONIE Installer USB (the OCP Procedure)

The following procedure prepares a bootable USB using the ONIE `.iso` image. To boot into ONIE Recovery mode, use the bootable USB from the BIOS.

To install ONIE, use the ONIE embed option: http://opencomputeproject.github.io/onie/docs/design-spec/x86_recovery.html#usb-drive-install.

1 Copy the `.iso` file to the current working directory.

```
ONIE:/mnt # tftp -g -r onie-recovery-x86_64-dell_<platform>_<processor ID>-r0.iso  n.n.n.
onie-recovery-x86_64 100% |*********************************| 18432k  0:00:00 ETA
ONIE:/mnt #
```

2 Create a bootable USB using the ONIE `.iso` image.

```
ONIE:/mnt # dd if=onie-recovery-x86_64-dell_<platform>_<processor ID>-r0.iso of=/dev/sdb
bs=10
M
1+1 records in
1+1 records out
18874368 bytes (18.0MB) copied, 0.025707 seconds, 700.2MB/s
ONIE:/mnt #
```

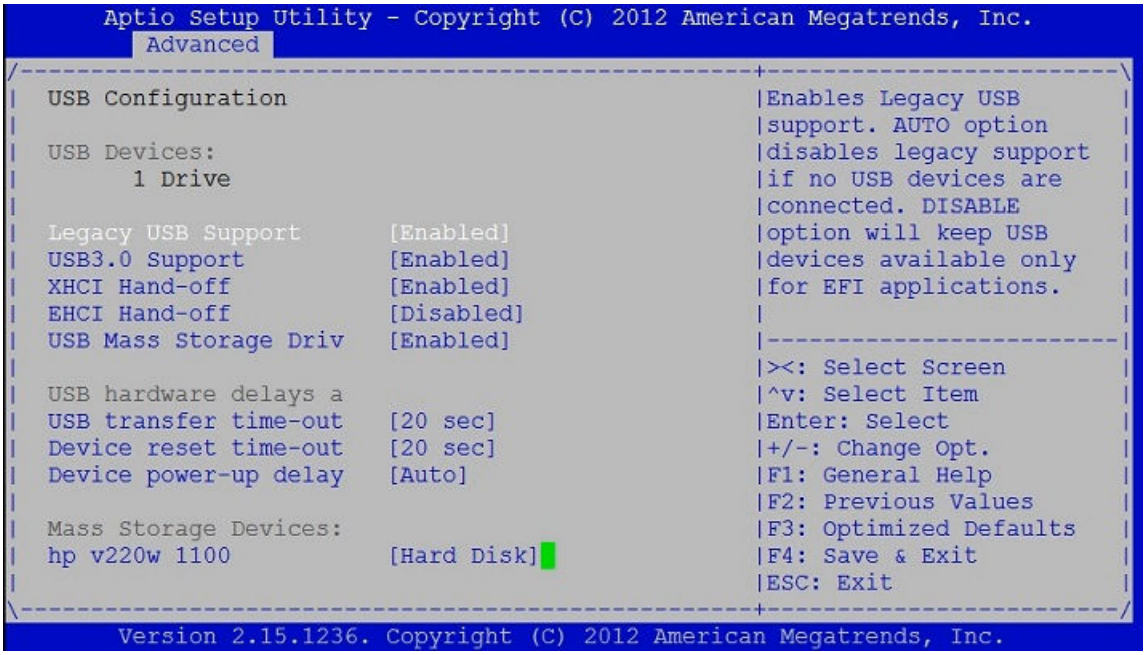
3 Insert your USB device in the target system.

4 Power up the target system and enter the BIOS configuration menu.

5 Set boot option 1 to `USB` using the following path:

`Advanced > USB configuration >Mass Storage Devices: <Name of your USB device> [USB device]`

Figure 2. USB Configuration



6 Set the Boot order to boot from the USB device using the following path:

`Boot > Hard Drive BBS Priorities > Boot Option #1`

7 In the `Boot Option #1` option, select the device that corresponds to your USB device.

8 Select **Save** and exit the BIOS menu.

9 The BIOS boots from the ONIE Recovery USB device. In the Grub menu, select the `ONIE: Embed ONIE` option, as shown.

Figure 3. ONIE: Embed ONIE Option

10 This installs ONIE on the disk and reboots the system to regular ONIE mode. The following shows detailed logs using the `Embed ONIE` option on a Dell Networking S6000 platform:

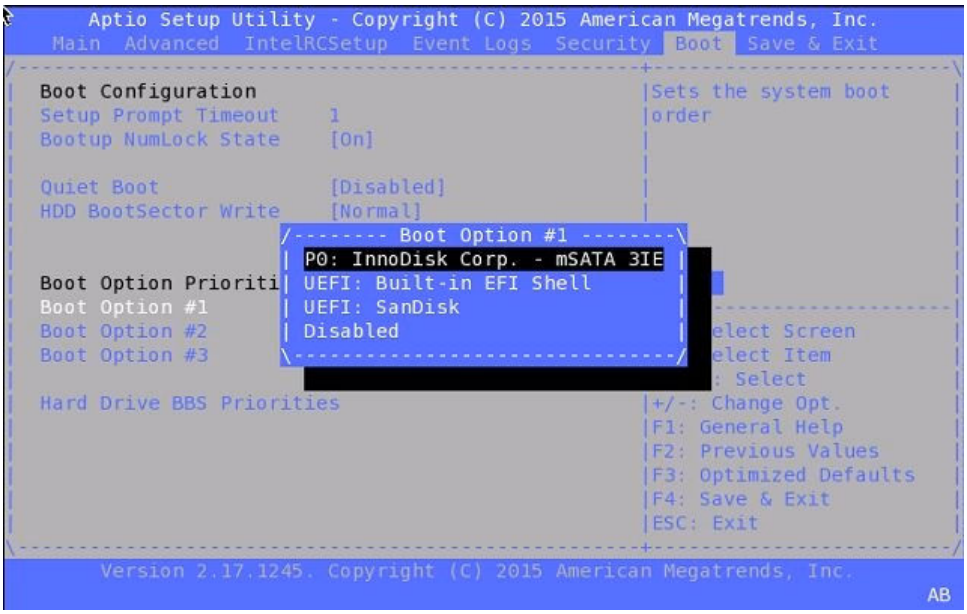
```
Loading vmlinuz......
Loading initrd.xz.................ready.
Linux version 3.2.35-onie+ (lsharma@netlogin-eqx-03) (gcc version 4.7.3 (crosstool-NG 1.19.0
- ONIE-n.n.n.n) ) #1 SMP Wed Jun 24 14:17:18 PDT 2015
Command line: initrd=initrd.xz console=tty0 console=ttyS1,115200n8 boot_env=recovery
boot_reason=embed install_url=file:///lib/onie/onie-updater BOOT_IMAGE=vmlinuz
.
```

```
.
.
.
Please press Enter to activate this console. Info: eth0:  Checking link... up.
Info: Trying DHCPv4 on interface: eth0
DHCPv4 on interface: eth0 failedONIE: Using default IPv4 addr: eth0:
192.168.3.10/255.255.255.0
ONIE: Starting ONIE Service Discovery
Info: Found static url: file:///lib/onie/onie-updater
ONIE: Executing installer: file:///lib/onie/onie-updater
Verifying image checksum ... OK.
Preparing image archive ... OK.
ONIE: Version       : n.n.n.n
ONIE: Architecture  : x86_64
ONIE: Machine       : dell_<platform>_<processor ID>
ONIE: Machine Rev   : 0
ONIE: Config Version: 1
Installing ONIE on: /dev/sda
Rebooting...
discover: ONIE embed mode detected.
Stopping: discover...start-stop-daemon: warning: killing process 283: No such process
 done.
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
sd 4:0:0:0: [sda] Synchronizing SCSI cache
Restarting system.
machine restart



BIOS (Dell, Inc.) Boot Selector
<platform> n.n.n.n 4 IO card / 2 port sfp+ mgmt

Booting Primary BIOS
  SMF Version 0x7: Last POR=0x22, Reset=0x55


POST Configuration
  CPU Signature 406D8
  CPU FamilyID=6, Model=4D, SteppingId=8, Processor=0
  Microcode Revision 125
  Platform ID: 0x10041A47
  PMG_CST_CFG_CTL: 0x40006
  BBL_CR_CTL3: 0x7E2801FF
  Misc EN: 0x840081
  Gen PM Con1: 0x203808
  Therm Status: 0x88530000
  POST Control=0xEA000101, Status=0xE6009F00

BIOS initializations...

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

POST:
  RTC Battery OK at last cold boot
  RTC date  Monday 1/11/2016 13:43:03

POST SPD test .............................. PASS

POST Lower DRAM Memory test
....  Perf cnt (curr,fixed): 0x1DA68F3AA,0x3B4D1FC28

POST Lower DRAM Memory test ................. PASS
```

```
POST Lower DRAM ECC check ..................... PASS



SM Bus1 PHY...done
DxE POST

POST Upper DRAM Memory test
  Short memory cell test
....
POST Upper DRAM Memory test ................... PASS
POST PCI test ................................. PASS
POST NVRAM check .............................. PASS
POST overall test results ..................... PASS
```

11 Change the BIOS back to CFast/mSATA using the procedure shown in Steps 5 through 8.

Figure 4. Configure the BIOS to Boot from CFast/mSATA




```
GNU GRUB version 2.02~beta2+e4a1fe391
+------------------------------------+
|*ONIE: Install OS                   |
| ONIE: Rescue                       |
| ONIE: Uninstall OS                 |
| ONIE: Update ONIE                  |
| ONIE: Embed ONIE                   |
|                                    |
|                                    |
|                                    |
|                                    |
|                                    |
|                                    |
|                                    |
+------------------------------------+
Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, `e' to edit the commands
before booting or `c' for a command-line.
ONIE: OS Install Mode ...
Version   : n.n.n.n
Build Date: 2015-06-24T14:18-0700
Info: Mounting kernel filesystems... done.
Info: Mounting LABEL=ONIE-BOOT on /mnt/onie-boot ...
```

```
Info: Using eth0 MAC address: 4c:76:25:f4:f0:00
Info: eth0:  Checking link... up.
Info: Trying DHCPv4 on interface: eth0
scsi 6:0:0:0: Direct-Access     Kingston DataTraveler 102 1.00 PQ: 0 ANSI: 2
sd 6:0:0:0: [sdb] 3913664 512-byte logical blocks: (2.00 GB/1.86 GiB)
sd 6:0:0:0: [sdb] Write Protect is off
sd 6:0:0:0: [sdb] No Caching mode page present
sd 6:0:0:0: [sdb] Assuming drive cache: write through
sd 6:0:0:0: [sdb] No Caching mode page present
sd 6:0:0:0: [sdb] Assuming drive cache: write through
sd 6:0:0:0: [sdb] No Caching mode page present
sd 6:0:0:0: [sdb] Assuming drive cache: write through
sd 6:0:0:0: [sdb] Attached SCSI removable disk
DHCPv4 on interface: eth0 failedONIE: Using default IPv4 addr: eth0:
192.168.3.10/255.255.255.0
Starting: dropbear ssh daemon... done.
Starting: telnetd... done.
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
DHCPv4 on interface: eth0 failedONIE: Using default IPv4 addr: eth0:
192.168.3.10/255.255.255.0
ONIE: Starting ONIE Service Discovery
Info: Sleeping for 20 seconds

ONIE: Starting ONIE Service Discovery
Info: Sleeping for 20 seconds
4..3..2..1..Info: eth0:  Checking link... up.
Info: Trying DHCPv4 on interface: eth0
DHCPv4 on interface: eth0 failedONIE: Using default IPv4 addr: eth0:
192.168.3.10/255.255.255.0
ONIE: Starting ONIE Service Discovery

To check the install status inspect /var/log/onie.log.
Try this:  tail -f /var/log/onie.log

** Installer Mode Enabled **
ONIE:/ #
ONIE:/ #
```

Media (USB) Boot using the ONIE Installer USB (using a Custom Bootable USB Procedure)

The following procedure makes an ONIE-installable USB using custom USB installable tools. This procedure uses the ONIE `.iso` image (`onie-recovery-x86_64-dell_<target>_<cpu>-r0.iso`).

1 Copy the `.iso` image to the host machine (a laptop or desktop running a Windows OS).
2 Download any software. This allows you to create a bootable USB. (Dell Networking suggests downloading *Unetbootin*.)
3 Insert a blank USB device into the laptop/desktop's USB drive.
4 Run the utility (this creates a bootable USB; for example, *Unetbootin*).
5 Select the USB drive. Also select the ONIE `.iso` file.
6 Run the `bootable USB creation` option.
7 Remove the USB device from the USB drive.
8 Insert the USB device into the target's USB drive.
9 Power cycle the target system and stop at the BIOS prompt.
10 At the `BIOS` option, select the `boot` option as USB.
11 Set the hard disk to `Hard Disk` using the following path:

`Advanced > USB configuration > Mass Storage Devices : <Name of your hard disk> [Hard Disk]`

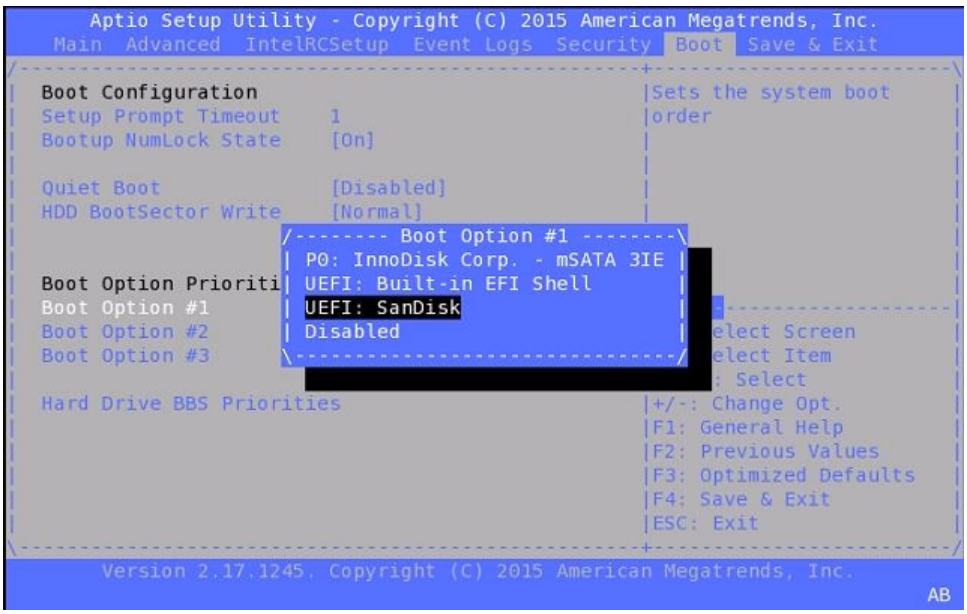
12 Set the Boot order to the boot from the `usb` option using the following path:

`Boot > Hard Drive BBS Priorities > Boot Option #1`

13 In the `Boot Option #1` option, select the device that corresponds to your USB device.

14 Select **Save** and exit the BIOS menu.

Figure 5. Set Boot Option #1 to USB



The BIOS boots from the ONIE Recovery USB.

15 At the Grub menu, select the `ONIE: Embed ONIE` option, as shown:

```
lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqq
k x ONIE Installer x
tqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqu
 x ONIE: Rescue x
 x ONIE: Embed ONIE x
 x
 x
 x
 x
 x
 x
 x mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
Press [Tab] to edit options
```

This installs ONIE on the disk and reboots the system to regular ONIE mode. The following shows detailed logs using the `Embed ONIE` option on a Dell Networking S6000 platform:

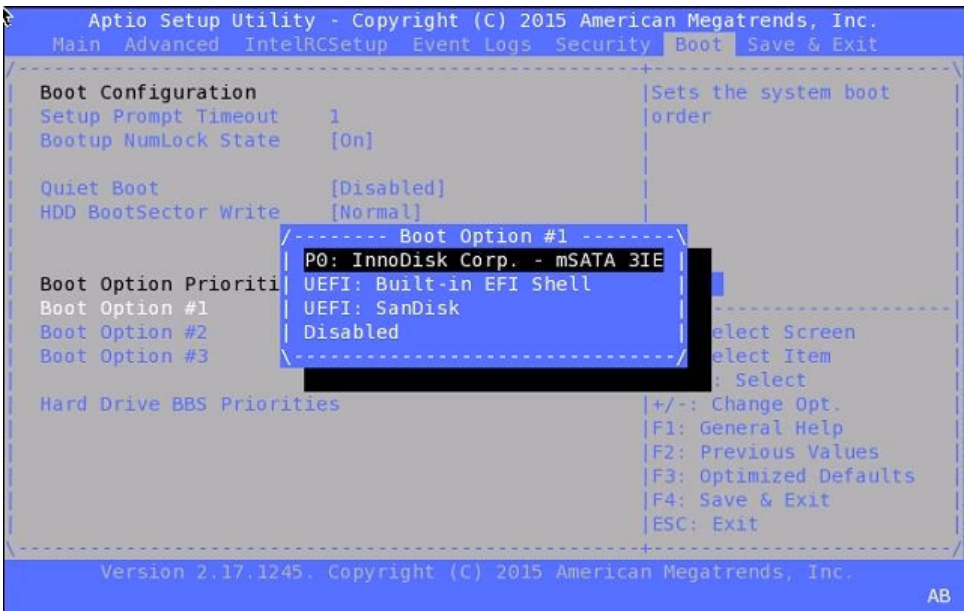
```
Loading vmlinuz......
Loading initrd.xz.................ready.
Linux version 3.2.35-onie+ (lsharma@netlogin-sjc-03) (gcc version 4.7.3 (crosstool-NG 1.19.0
- ONIE-n.n.n.n) ) #1 SMP Wed Mar 18 20:53:53 PDT 2015
Command line: initrd=initrd.xz console=tty0 console=ttyS0,115200n8 boot_env=recovery
boot_reason=embed install_url=file:///lib/onie/onie-updater BOOT_IMAGE=vmlinuz
.
.
.
.
Please press Enter to activate this console. Info: eth0: Checking link... up.
Info: Trying DHCPv4 on interface: eth0
To check the install status inspect /var/log/onie.log.
Try this: tail -f /var/log/onie.log
** ONIE Update Mode Enabled **
```

```
ONIE-RECOVERY:/ #
ONIE-RECOVERY:/ #
ONIE-RECOVERY:/ # DHCPv4 on interface: eth0 failedONIE: Using default IPv4 addr: eth0:
192.168.3.10/255.255.255.0
ONIE: Starting ONIE Service Discovery
Info: Found static url: file:///lib/onie/onie-updater
ONIE: Executing installer: file:///lib/onie/onie-updater
Verifying image checksum ... OK.
Preparing image archive ... OK.
ONIE: Version : n.n.n.n
ONIE: Architecture : x86_64
ONIE: Machine : dell_<platform>_<platform>
ONIE: Machine Rev : 0
ONIE: Config Version: 1
Installing ONIE on: /dev/sda
Rebooting...
umount: can't remount rootfs read-only
The system is going down NOW!
Sent SIGTERM to all processes
Sent SIGKILL tosd 0:0:0:0: [sda] Synchronizing SCSI cache
Restarting system.
machine restart
BIOS (Dell Inc) Boot Selector
<platform> (SI) n.n.n.n (32-port TE/FG)
POST Configuration
CPU Signature 30669
CPU FamilyID=6, Model=36, SteppingId=9, Processor=0
Microcode Revision 10b
POST Control=0xea000303, Status=0xe6009f00
MSRs:
Platform ID: f09885d047
PMG_CST_CFG_CTL: 263006
BBL_CR_CTL3: 7e00010f
Perf Ctrl & status: 63d, 63d104706000648
Perf cnt (curr/fixed): 1b5cd9ea/48f7b0a0
Clk Flex Max: 0
Misc EN: 60840080
Therm Status: 88400000 (offset=0x0)
MC0 Ctl: 0
MC0 Status: 0
BIOS initializations...
CPGC Memtest for rank 0 ..................... PASS
CPGC Memtest for rank 1 ..................... PASS
POST:
RTC Battery ok at last cold boot (0xb)
RTC date Saturday 3/26/2015 21:20:46
POST SPD test ............................... PASS
POST Lower DRAM Memory test
SpeedStep enabled, Processor Bus Ratio=10, Vid=4b
Short memory cell test
Perf cnt (curr/fixed): 24afb008/24b115a8
POST Lower DRAM Memory test ................. PASS
POST Lower DRAM ECC check ................... PASS
DxE POST
POST Upper DRAM Memory test
SpeedStep enabled, Processor Bus Ratio=10, Vid=4b
Short memory cell test
Perf cnt (curr/fixed): b903308/b9034a8
POST Upper DRAM Memory test ................. PASS
POST Upper DRAM ECC check ................... PASS
POST PCIe test .............................. PASS
POST NVRAM check ............................ PASS
POST overall test results ................... PASS
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
BIOS Date: 07/09/2014 16:30:33 Ver: 0ACAH015
Press <DEL> or <F2> to enter setup.
GNU GRUB version 2.02~beta2+e4a1fe391
+----------------------------------+
|*ONIE: Install OS                 |
```

```
| ONIE: Rescue                       |
| ONIE: Uninstall OS                 |
| ONIE: Update ONIE                  |
| ONIE: Embed ONIE                   |
|                                    |
|                                    |
|                                    |
|                                    |
|                                    |
|                                    |
|                                    |
+------------------------------------+
Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, `e' to edit the commands
before booting or `c' for a command-line.
ONIE: OS Install Mode ...
Version : 3.20.1.3
Build Date: 2015-03-18T20:55-0700
Info: Mounting kernel filesystems... done.
Info: Mounting LABEL=ONIE-BOOT on /mnt/onie-boot ...
Info: Using eth0 MAC address: 90:b1:1c:f4:ab:ed
Info: eth0: Checking link... up.
Info: Trying DHCPv4 on interface: eth0
DHCPv4 on interface: eth0 failedONIE: Using default IPv4 addr: eth0:
192.168.3.10/255.255.255.0
Starting: dropbear ssh daemon... done.
Starting: telnetd... done.
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
To check the install status inspect /var/log/onie.log.
Try this: tail -f /var/log/onie.log
** Installer Mode Enabled **
ONIE:/ # onie-discovery-stop
Stopping: discover... done.
```

16 Change the BIOS from the boot device to the mSATA.

Figure 6. Changing From Boot to the mSATA



DHCP/TFTP Server Installation

The following procedure installs the DHCP/TFTP server on a Linux machine.

This procedure uses *dnsmasq*.

NOTE: To configure the DHCP/TFTP server, you can use any Linux-based host machine. Before you begin, be sure that you have the root access on your system.

1 Install *dnsmasq* on your Linux machine.

```
apt-get can be used to install dnsmasq.
apt-get install dnsmasq
```

Alternatively, you can download the debian package of *dnsmasq* and install it. You can download *dnsmasq deb* from http://packages.ubuntu.com/uk/trusty/all/dnsmasq/download.

2 Install the debian package using *dpkg*.

```
dpkg -i dnsmasq_2.68-1_all.deb
```

3 Configure the IP address of network i/f of your Linux machine so that it matches the range of IP addresses set in the *dnsmasq conf* file.

```
ifconfig eth0 192.168.1.50/24
```

4 Restart *dnsmasq*.

```
service dnsmasq restart
```

Or

```
service dnsmasq stop
service dnsmasq start 15
```

If you see a port-specific error when you start *dnsmasq*; for example:

```
Port 53 already in use.
```

find the process ID of the process using the specific port (in this example, Port 53) and stop the port. Start *dnsmasq* again and check that it starts correctly.

The DHCP/TFTP server is now ready for the ONIE target.

3

ONIE Overview

This chapter describes system diagnostics and troubleshooting. 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 http://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 or U-boot 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.

Topics:

Boot Processes

After the BIOS or U-Boot, POST runs to verify the devices required to boot to open network installation environment (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.

Capturing Support Data from ONIE

To capture support data from ONIE, use the following commands.

1 Capture support data to the screen.

```
ONIE:/ # dmesg
```

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

```
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`

Changing the Default Grub Boot Entry

To view or set the default Grub boot entry, use the following command.

The `onie-boot-mode` command has two options `–l` (the default) and `–o` to view or set the default Boot mode. 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 is:

- Lists the current default entry. This is the default.

Viewing the 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.

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

Example of the `onie-syseeprom` command.

```
ONIE:/ # onie-syseeprom
TlvInfo Header:
   Id String:    TlvInfo
   Version:      1
   Total Length: 161
TLV Name             Code Len Value
-------------------- ---- --- -----
Manufacture Date     0x25  19 08/03/2015 01:40:35
Serial Number        0x23  20 CN0WKFYN7793157U0002
Product Name         0x21   8 <platform>
Device Version       0x26   1 0
Label Revision       0x27   3 X01
Manufacturer         0x2B   5 77931
Country Code         0x2C   2 CN
Vendor Extension     0xFD   1  0x00
MAC Addresses        0x2A   2 384
Vendor Name          0x2D   4 DELL
Diag Version         0x2E   5 01.10
Part Number          0x22   6 0GTX3X
Service Tag          0x2F   7 19HTG02
Base MAC Address     0x24   6 4C:76:25:F4:F0:00
Platform Name        0x28  26 x86_64-dell_<platform>_c2538-r0
ONIE Version         0x29   8 n.n.n.n
CRC-32               0xFE   4 0xD7A4DFB2
Checksum is valid.
ONIE:/ #
```

Example of the `onie-sysinfo –a` command.

```
ONIE:/ # onie-sysinfo -a
CN0WKFYN7793157U0002 0GTX3X 4C:76:25:F4:F0:00 n.n.n.n 674 dell_<platform>_c2538 0 x86_64-
dell_<platform>_c2538-r0 x86_64 1 gpt 2015-08-20T16:57-0700
ONIE:/ #
```

4

Dell DIAG OS

The following describes the Dell diagnostics. These instructions apply to systems for which the ONIE diagnostics are not available.

Topics:

Downloading the Diagnostic Package

To download the diagnostic package on your system, follow these steps.

You must load or update the DIAG-OS (diag installer image) using the `onie-nos-install` command in ONIE Install or ONIE-Rescue mode. 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, you must remove it prior to installing the DIAG-OS using the `onie-nos-install` command.

NOTE: Before you begin, go to http://www.dell.com/support and download the diagnostic package. You will need your Dell support access account to download the 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 10.10.10.10/8
ONIE:/ # ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 4C:76:25:F4:F0:00
          inet addr:10.10.10.10  Bcast:10.255.255.255  Mask:255.0.0.0
          inet6 addr: fe80::4e76:25ff:fef4:f000/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:87 errors:0 dropped:0 overruns:0 frame:0
          TX packets:51 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:20042 (19.5 KiB)  TX bytes:9548 (9.3 KiB)
          Memory:dff40000-dff60000

ONIE:/ #
```

3 Upgrade the DIAG Installer. Again, boot to ONIE Rescue mode and install the `onie diag installer`.

Example of Removing the Existing DIAG OS and Installing a New Version

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.

```
------------------------------------------------------------
```

This command needs to be executed if diag-os needs to run in installer mode with diag-os already installed on the system

```
ONIE:/ # touch /tmp/diag_os_install_mode
ONIE:/ #
ONIE:/ #
ONIE:/ #
ONIE:/ # onie-nos-install tftp://n.n.n.n/sm/<platform>/diag-installer-x86_64-dell_
<platform>_<processor ID>-r0.bin
discover: installer mode detected.
Stopping: discover... done.
Info: Fetching tftp://n.n.n.n/sm/<platform>/diag-installer-x86_64-dell_<platform>_<processor
ID>-r0.bin ...
sm/<platform>/diag-instal 100% |*******************************|   167M  0:00:00 ETA
ONIE: Executing installer: tftp://n.n.n.n/sm/<platform>/diag-installer-x86_64-
dell_<platform>_<processor ID>-r0.bin
Ignoring Verifying image checksum ... OK.
cur_dir / archive_path /installer tmp_dir /tmp/tmp.AvXUTZ
Preparing image archive ...sed -e '1,/^exit_marker$/d' /installer | tar xf - OK.
DiagOS Installer: platform: x86_64-dell_<platform>_<processor ID>-r0
 Found EDA-DIAG partition at (/dev/sda3)
 File /tmp/diag_os_install_mode exists, forcing install mode
Diag OS Installer Mode : INSTALL
INSTALL mode : would remove existing partitions and create fresh...

Deleting existing partition(EDA-DIAG)  on /dev/sda
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.

Next available partition is /dev/sda3
Creating new partition /dev/sda3 as EDA-DIAG, size 1024 MB ...
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.

volume label EDA-DIAG on device /dev/sda3
mke2fs 1.42.8 (20-Jun-2013)
Filesystem label=EDA-DIAG
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
65536 inodes, 262144 blocks
13107 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=268435456
8 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
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


Preparing /dev/sda3 EDA-DIAG for rootfs install
Preparing Diag-OS file system : dev /dev/sda3 mnt dir  /boot
untaring into /boot
Success: Support tarball created: /boot/onie-support.tar.bz2

Updating Grub Cfg /dev/sda3 EDA-DIAG
Diag OS grub config update : dev /dev/sda3 mnt dir  /boot
boot-dir /boot and blk_dev is  /dev/sda3
Installing for i386-pc platform.
```

```
Installation finished. No error reported.

 ONIE ver 3 supports 50_onie_grub...
 Generating onie and diag-os grub config using 50_onie_grub
grub cfg /tmp/tmp.aZBTn0 and ngos_mnt /boot
Removing /tmp/tmp.AvXUTZ
Rebooting...
ONIE:/ # discover: installer mode detected.
Stopping: discover...start-stop-daemon: warning: killing process 279: No such process
 done.
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



BIOS (Dell, Inc.) Boot Selector
<platform> n.n.n.n 32 port 100G / 2 port sfp+ mgmt

Booting Backup BIOS
  SMF Version 0xE: Last POR=0x0, Reset=0x55


POST Configuration
  CPU Signature 406D8
  CPU FamilyID=6, Model=4D, SteppingId=8, Processor=0
  Microcode Revision 125
  Platform ID: 0x10041A4E
  PMG_CST_CFG_CTL: 0x40006
  BBL_CR_CTL3: 0x7E2801FF
  Misc EN: 0x840081
  Gen PM Con1: 0x203808
  Therm Status: 0x884E0000
  POST Control=0xEA00010B, Status=0xE6009F00

BIOS initializations...

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

POST:
  RTC Battery OK at last cold boot
  RTC date  Thursday 9/17/2015 19:04:51

POST SPD test ............................... PASS

POST Lower DRAM Memory test
....  Perf cnt (curr,fixed): 0x1DA5A3316,0x3B4B47B00

POST Lower DRAM Memory test ................. PASS
POST Lower DRAM ECC check ................... PASS




SM Bus1 PHY...done
DxE POST

POST Upper DRAM Memory test
  Short memory cell test
....
POST Upper DRAM Memory test ................. PASS
```

```
POST PCI test ............................. PASS
POST NVRAM check .......................... PASS
POST overall test results ................. PASS

NVRAM: 00 9F 00 E6   0B 01 00 EA



                                                                    A2


Version 2.17.1245. Copyright (C) 2015 American Megatrends, Inc.
BIOS Date: 08/28/2015 16:17:45 Ver: 0ACBZ028
Press <DEL> or <F2> to enter setup.



  Booting `EDA-DIAG'

Loading DIAG-OS ...
[    1.238906] dummy-irq: no IRQ given.  Use irq=N
[   11.398168] esas2r: driver will not be loaded because no ATTO esas2r devices were found
[   11.426895] mtdoops: mtd device (mtddev=name/number) must be supplied
[   12.441271] fmc_write_eeprom fake-design-for-testing-f001: fmc_write_eeprom: no busid
passed, refusing all cards
[   12.452859] intel_rapl: driver does not support CPU family 6 model 77
[FAILED] Failed to start Create Volatile Files and Directories.
See 'systemctl status systemd-tmpfiles-setup.service' for details.
[  OK  ] Started Copy rules generated while the root was ro.
         Starting Update UTMP about System Boot/Shutdown...
[  OK  ] Started Trigger Flushing of Journal to Persistent Storage.
[  OK  ] Started Update UTMP about System Boot/Shutdown.
[  OK  ] Found device /dev/ttyS1.
[  OK  ] Started LSB: Raise network interfaces..
[  OK  ] Reached target Network.
[  OK  ] Reached target System Initialization.
[  OK  ] Reached target Timers.
[  OK  ] Reached target Basic System.
         Starting OpenBSD Secure Shell server...
[  OK  ] Started OpenBSD Secure Shell server.
         Starting Regular background program processing daemon...
[  OK  ] Started Regular background program processing daemon.
         Starting /etc/rc.local Compatibility...
         Starting getty on tty2-tty6 if dbus and logind are not available...
         Starting System Logging Service...
         Starting Permit User Sessions...
[  OK  ] Started /etc/rc.local Compatibility.
[  OK  ] Started Permit User Sessions.
[  OK  ] Started System Logging Service.
         Starting Getty on tty2...
[  OK  ] Started Getty on tty2.
         Starting Getty on tty1...
[  OK  ] Started Getty on tty1.
         Starting Serial Getty on ttyS1...
[  OK  ] Started Serial Getty on ttyS1.
         Starting Getty on tty3...
[  OK  ] Started Getty on tty3.
         Starting Getty on tty4...
[  OK  ] Started Getty on tty4.
         Starting Getty on tty5...
[  OK  ] Started Getty on tty5.
         Starting Getty on tty6...
[  OK  ] Started Getty on tty6.
[  OK  ] Started getty on tty2-tty6 if dbus and logind are not available.
[  OK  ] Reached target Login Prompts.
[  OK  ] Reached target Multi-User System.
```

```
[  OK  ] Reached target Graphical Interface.
         Starting Update UTMP about System Runlevel Changes...
[  OK  ] Started Update UTMP about System Runlevel Changes.

Debian GNU/Linux 8 dell-diag-os.com ttyS1

dell-diag-os login: root
Password:
Linux dell-diag-os.com 3.15.10 #1 SMP Fri Sep 4 15:34:15 PDT 2015 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_VER_1.0
Build date/time Fri Sep  4 15:36:50 PDT 2015
Build server    netlogin-eqx-02
Build by        rparker
Kernel Info:
Linux 3.15.10 #1 SMP Fri Sep 4 15:34:15 PDT 2015 x86_64 GNU/Linux
Debian GNU/Linux 8 \n \l

root@dell-diag-os:~#
root@dell-diag-os:~#
root@dell-diag-os:~#
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 Login as `root`.
   c Install the EDA-DIAG tools package.
   d Run `/opt/ngos/bin/edatool`.

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

Using the Dell Diagnostic Test Suite

To run the Dell diagnostic test suite, use the following command after the system boots up.

To run the Dell diagnostic test suite, select the `EDA-DIAG` option.

NOTE: Use the up and down arrow keys to select which entry is highlighted. 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 (*) 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                   |
|                            |
```

```
|                                |
|                                |
```

Viewing the Dell DIAGs Versions

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

```
root@dell-diag-os:~# dpkg -l | grep dn-diags
||/ Name                 Version  Architecture  Description
+++-==============-====================-==================
ii  dn-diags-<platform> 1.10     amd64       Dell Networking Diagnostics
```

Viewing the CPLD Versions

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

- Enter the `cpldupgradetool` command to view the CPLD information.

```
Viewing the CPLD Versions
root@dell-diag-os:/opt/ngos/bin# ./cpldupgradetool --cpldver
=========================
CPLD 1 VERSION
=========================
0x3

=========================
CPLD 2 VERSION
=========================
0x02

=========================
CPLD 3 VERSION
=========================
0x02

=========================
CPLD 4 VERSION
=========================
0x02
```

Installing or Upgrading DIAG Tools in the Dell DIAGs OS

To install or upgrade the DIAGs in the Dell DIAGs OS, use the `dpkg -i dn-diags-<platform>-DiagOS-1.10.deb` command.

```
root@dell-diag-os:~# dpkg -i dn-diags-<platform>-DiagOS-1.10.deb
Selecting previously unselected package dn-diags-<platform>.deb.
(Reading database ... 20462 files and directories currently installed.)
Preparing to unpack dn-diags-<platform>-DiagOS-1.10.deb ...
Unpacking dn-diags-<platform>.deb (1.10) ...
Setting up dn-diags-<platform>.deb (1.10) ...
```

Restoring the Factory Defaults

If you need to restore your system factory defaults, reboot the system to ONIE: Uninstall OS mode.

If it is not possible to do this with the operating system you installed, reboot the system from the Grub menu and select `ONIE: Rescue`. ONIE Rescue bypasses the installed operating system 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 operating system 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.

Use the up and down arrow keys to select which entry is highlighted. 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 (*) 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                 |
 |                                  |
 |                                  |
 |                                  |
 +----------------------------------+
```

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

3 You can also use the `onie-uninstaller` command to return to the default ONIE settings.

```
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
```

Restore the Factory Defaults

The following section describes the different methods to restore the Open Networking factory defaults on the different Open Networking platforms.

5

Dell DiagOS Tools

This guide helps you use the Dell diagnostics operating system (DiagOS). The DiagOS is an environment that provides a suite of tools that you can use to help diagnose issues seen on the system, or to run a general health check to make sure the hardware is operating properly.

Diagnostic Tools

The DiagOS 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 DiagOS, 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. You must 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 Installation Guide for your system at http://www.dell.com/support.

Topics:

cpldupgradetool

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

Tests

There are no defined tests with `cpldupgradetool`.

CLI Options

```
root@dell-diag-os:~# cpldupgradetool
Dell Diag - CPLD Upgrade Tool
version 1.1, 1.10
build, 2016/03/09,

Syntax: cpldupgradetool <option>
  --h := Print the CPLD Upgrade Tool Usage
  --cpldver := Print the CPLD versions
  --write [--index=-1] [--image=file]:= Program a new CPLD image into CPLD's by specified index
```

- `h` — Allows you to print CPLD upgrade tool information.
- `ver` — Allows you to print the CPLD version information.
- `write FILEPATH` — Allows you to configure a new CPLD image.

Ouput

```
root@dell-diag-os:/opt/ngos/bin# ./cpldupgradetool --h
Dell Diag - CPLD Upgrade Tool
version 1.1, 1.10
build, 2014/11/10,

Usage: ./cpldupgradetool  <option>
--h := Print the CPLD Upgrade Tool Usage
--ver := Print the CPLD 1/2/3/4 versions
--write FILEPATH := Program a new CPLD image into CPLD 1, CPLD 2, CPLD 3 and CPLD 4
root@dell-diag-os:/opt/ngos/bin#

root@dell-diag-os:/opt/ngos/bin# ./cpldupgradetool --cpldver
==========================
CPLD 1 VERSION
==========================
0x3

==========================
CPLD 2 VERSION
==========================
0x02

==========================
CPLD 3 VERSION
==========================
0x02

==========================
CPLD 4 VERSION
==========================
0x02

root@dell-diag-os:/opt/ngos/bin# ./cpldupgradetool --write final.vme
File final.vme exists!!
```

```
Valid CPLD Binary file size 0.998490MB
Writing CPLD Binary File: final.vme ......
****************************************
--------------------------------------
P A S S E D!
--------------------------------------
****************************************
```

Configuration File Format

```
Configuration File Format
There is no configuration file associated with the cpldupgradetool
```

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@dell-diag-os:~# ./cputool
Dell Diag - Cpu Tool
version 1.1, 1.10
build, 2015/07/06,
Syntax: ./cputool <option>
--h := show this help
--cpuid=(--option) := use cpuid tool to display cpu info (option not mandatory or issue cpuid --
help for options)
--x86info=(--option) := use x86info to show cpu info (option not mandatory or issue x86info --
help for options)
--readmsr <--cpu=cpuNumber> <--reg=regOffset> := read cpu register
--writemsr <--cpu=cpu number> <--reg=reg offset> <--val=value> := Write cpu register
--readlpc <--reg=reg> <--size=size> := read the specified register in lpc bus
--writelpc <--reg=reg> <--val=value> <--size=size> := write at the specified register in lpc bus
```

- `cpuid` — Displays information about the CPU, for example, the processor name and number, codename, real-time measurement of each core's internal frequency, memory frequency, and cache levels.
- `x86info` — Displays a range of information about the CPUs present in a x86 system.
- `readmsr` — Uses the `rdmsr` utility to read the CPU's specific MSR.
- `writemsr` — Uses the `wrmsr` utility to write to the CPU's specific MSR. Use this option carefully because it can change the state of the CPU.
- `readlpc` — Uses the DiagOS `lpctool` to read devices connected to the LPC bus of the CPU.
- `writelpc` — Uses the DiagOS `lpctool` to write devices connected to the LPC bus of the CPU.

Output

```
root@dell-diag-os:~# ./cputool -h
usage: cpuid [options...]

Dump detailed information about the CPU(s) gathered from the CPUID instruction,
and also determine the exact model of CPU(s).
options:
```

```
-1, --one-cpu display information only for the current CPU
-f FILE, --file=FILE read raw hex information (-r output) from FILE instead
of from executions of the cpuid instruction
-h, -H, --help display this help information
-i, --inst use the CPUID instruction: The information it provides
is reliable. It is not necessary to be root.
(This option is the default.)
-k, --kernel use the CPUID kernel module: The information does not
seem to be reliable on all combinations of CPU type
and kernel version. Typically, it is necessary to be
root.
-r, --raw display raw hex information with no decoding
-v, --version display cpuid version

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:~# ./cputool --readmsr --cpu=0 --reg=0xce
c0080001800

root@dell-diag-os:~# ./cputool --readlpc --reg=0x102
Size of read or write is set to be a byte
Value at lpc register 0x102 : 0xde

root@dell-diag-os:~# ./cputool --writelpc --reg=0x102 --val=0xab
Size of read or write is set to be a byte
Value 0xab written at lpc register 0x102
root@dell-diag-os:~# ./cputool --readlpc --reg=0x102
Size of read or write is set to be a byte
Value at lpc register 0x102 : 0xab
```

Configuration File Format

There is no configuration file associated with the `cputool`.

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

```
Dell Diag - Eeprom Tool
version 1.5, 3.xx.4.2
build, 2016/03/22,
```

```
Syntax: eepromtool <option>
--help := Display usage
--list := List the understood TLV codes and names.
--listdevices := List all eeprom devices.
--psueepromdump := Dump the PSU eeprom.
--faneepromdump := Dump the FAN eeprom.
--eeprom=eepromtype --fileprogram=<filepath> := Program eeprom from flat file.
--eeprom=eepromtype --show := Show the EEPROM data.
--eeprom=eepromtype --erase := Reset the EEPROM data.
--eeprom=eepromtype --test := Verify the MAC address in system-eeprom and mac-eeprom.
--eeprom=eepromtype --get <code> := Look up a TLV by code and write the value to stdout.
--eeprom=eepromtype --set <code>=<value>,<code>=<value>... := Set a TLV code to a value.
```

- `list` — Lists all types and type code for an EEPROM.
- `listdevices` — Lists all the EEPROMs available for the particular platform.
- `psueepromdump` — Does not use TLV logic. This option is valid only when you use SMF logic to read the PSU contents.
- `faneepromdump` — Allows you to dump the fan eeprom.
- `eeprom` — This option is provided every time you access the EEPROM.
- `show` — Shows the types and values of the EEPROM you specify.
- `erase` — Erases the contents of the EEPROM. Only the CRC value is available after erasing the EEPROM contents.
- `test` — Allows you to verify the MAC address in the system-eeprom and the mac-eeprom.
- `get` — Retrieves a particular value in the specified EEPROM.
- `set` — Sets the values for the specified EEPROM.

Output

```
root@dell-diag-os:/opt/ngos/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/ngos/bin# eepromtool --listdevices
CPUEEPROM1
CPUEEPROM2
CPUEEPROM3
CPUEEPROM4
CPUEEPROM5
CPUEEPROM6
CPUEEPROM7
CPUEEPROM8
FAN1EEPROM
FAN2EEPROM
FAN3EEPROM
FAN4EEPROM
FAN5EEPROM
SwitchEEPROM
root@dell-diag-os:/opt/ngos/bin# eepromtool --psueepromdump
************PSU1_CountryCode*************
Registers 0x24a - 0x24b
CH
```

```
************PSU1_DellPartNumber*************
Registers 0x24c - 0x251
0XTVK2
************PSU1_MfgID*************
Registers 0x252 - 0x256
0XTVK
************PSU1_MfgDate*************
Registers 0x257 - 0x25e
150102
************PSU1_SerialNo*************
Registers 0x25f - 0x262
CN17
************PSU1_ServiceTag*************
Registers 0x263 - 0x269
************PSU1_LabelRevision*************
Registers 0x26a - 0x26c
A00
************PSU2_CountryCode*************
Registers 0x283 - 0x284
CH
************PSU2_DellPartNumber*************
Registers 0x285 - 0x28a
0XTVK2
************PSU2_MfgID*************
Registers 0x28b - 0x28f
0XTVK
************PSU2_MfgDate*************
Registers 0x290 - 0x297
150102
************PSU2_SerialNo*************
Registers 0x298 - 0x29b
CN17
************PSU2_ServiceTag*************
Registers 0x29c - 0x2a2
************PSU2_LabelRevision*************
Registers 0x2a3 - 0x2a5
A00
root@dell-diag-os:/opt/ngos/bin#
root@dell-diag-os:/opt/ngos/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/ngos/bin#
root@dell-diag-os:/opt/ngos/bin# eepromtool --eeprom=cpueeprom2 --get 0x21
cpu2
root@dell-diag-os:/opt/ngos/bin#
root@dell-diag-os:/opt/ngos/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/ngos/bin#
root@dell-diag-os:/opt/ngos/bin# eepromtool --eeprom=cpueeprom1 --erase
Programming passed.
EEPROM does not contain data in a valid TlvInfo format.
root@dell-diag-os:/opt/ngos/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/ngos/bin#
```

Configuration File Format

The `eeprom` devices are listed under the corresponding `i2c` bus number. Whenever you add a new EEPROM to the bus number, the number of devices in each bus number updates. Each `eeprom` field is separated by the '|' character. The order of the fields are:

1. Name of the EEPROM. Provides the same name at the `eeprom` option in the `eepromtool`.
2. The bus to which the EEPROM connects.
3. The `i2c` path of the EEPROM. If a MUX present, the MUX address, offset, and value are separated by colons.
4. The `i2c` address of the EEPROM.
5. Specifies if the device is a 16–bit address access.
6. Byte count to read or write.
7. Specifies the format of the data in the eeprom as `tlv` or `flat`.
8. Write protect register, if applicable.
9. Write protect register mask.
10. Bus Return to Normal - Any bus configurations needed to return the bus to a valid setting. If you need any MUX settings, they are listed as `address : register : mask : value`. Each successive MUX setting is separated with a `:,:`.

```
CONTROL_CONFIG | 1
#Control Config | method | <Mux Selection> | <Address> | <Register> | <Take Control> | <Release
Control>
I2C Device Flag | lpc | - | 0 | 0x04D8 | 0x210 | 0x211 | 0x212 | 0x213 | 0x55 | 0xAA | 0x5A |
0xA5
Eeprom devices with tlv format found on bus #0: 0
Eeprom devices with tlv format found on bus #1: 7
IDEEPROM    |/dev/i2c-1|0x70:0x0:0x1|0x53|0x00|1|tlv|/dev/i2c-1|0x31|0x3|4|1|/dev/i2c-1
0x70:1:0xff:1|-
FAN1EEPROM  |/dev/i2c-1|0x70:0x0:0x2|0x51|0x00|1|tlv|/dev/i2c-1|0x32|0x15|0|1|/dev/i2c-1
0x70:1:0xff:1|-
FAN2EEPROM  |/dev/i2c-1|0x70:0x0:0x2|0x52|0x00|1|tlv|/dev/i2c-1|0x32|0x15|1|1|/dev/i2c-1
0x70:1:0xff:1|-
FAN3EEPROM  |/dev/i2c-1|0x70:0x0:0x8|0x53|0x00|1|tlv|/dev/i2c-1|0x32|0x15|2|1|/dev/i2c-1
0x70:1:0xff:1|-
FAN4EEPROM  |/dev/i2c-1|0x70:0x0:0x8|0x54|0x00|1|tlv|/dev/i2c-1|0x32|0x15|3|1|/dev/i2c-1
0x70:1:0xff:1|-
PSU1EEPROM  |/dev/i2c-1|0x70:0x0:0x10|0x51|0x00|1|flat|-|-|-
PSU2EEPROM  |/dev/i2c-1|0x70:0x0:0x10|0x50|0x00|1|flat|-|-|-
Eeprom devices with tlv format found on bus #2: 0
======
# Flat Format for EEPROM
0x23 |-| 0xc4 | 20 | Serial Number
0x22 |-| 0xd8 | 6  | Part Number
0x27 |-| 0xde | 3  | Label Revision
0x00 |-| 0xe1 | 7  | Fan Airflow
0x00 |-| 0xe8 | 5  | Power Source
0x00 |-| 0xed | 4  | Power Wattage
0x00 |-| 0xf1 | 1  | Num Fans
0x00 |-| 0xf2 | 5  | Fan Speed
```

NOTE: (Optional) For systems that use the SmartFusion chip, the `eepromtool` also has two companion configuration files — `default_mailbox_eeprom.cfg` which holds information for the `--psueepromdump` command, and `default_fan_mailbox_eeprom.cfg` which holds information for the `--faneepromdump` command.

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 are passed as hexadecimal values with or without the preceding `0x`. Fans display from `1` to `Max System Fans`.

CLI Options

```
Dell Diag - Fan Controller Tool
version 1.5, 1.10
build, 2015/07/06

Syntax: fantool <option>
  --h := show this help
--test [--fan=fan] [--lpc] := test using the Fan Controller config file
  --init := Initialize the fans to the default state
--get --fan=<fan | all> [--lpc] := gets the speed of the specified fan or all fans in RPM
--set --fan=<fan | all>  [--lpc] := sets the speed of the specified fan or all fans in RPM
  := sets the fan(s) to the speed
--lpc := test by reading or modifying SmartFusion registers. When this flag is used, it must be
clubbed with one of above flags
```

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 : 4
Number of fans per tray : 1
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 3523 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 3545 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 3545 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 3504 RPM
Fan Controller Test LPC..................................... Passed
root@dell-diag-os:~# fantool --get --lpc
Fan 1 speed is 3536 RPM
Fan 2 speed is 3552 RPM
Fan 3 speed is 3552 RPM
Fan 4 speed is 3507 RPM
root@dell-diag-os:~# fantool --get --fan=2 --lpc
Fan 2 speed is 3552 RPM
```

Configuration File Format

This section shows if the fans are controlled by an LPC device such as a field programmable gate array (FPGA).

```
D - Data Description
  # - The zero based number for this fan
  Descriotion - The Readable fan description
  Presence Bit Mask
  Register Offset
  Status Bit Mask
  Airflow Bitmask
  Speed Register Offset
  Speed Register Size
R - Register description
  Offset of Register
  Size in bytes
  Register Name
```

The section is MUX information when accessing the LPC and the timeout value.

```
=====
=====
#D | id | Device | Presence bit Mask | Status Register Offset | Status bit Mask | Air Flow
bitmask | Speed register offset
```

```
#R | NAME | Offset | Size in bytes
LPC-INTERFACE
D | 0 | Fan 1| 0x01 | 0x115 | 0x01 | 0x01 | 0xF3 | 2
…
D | 9 | Fan 10| 0x10| 0x114 | 0x02 | 0x10 | 0x105 | 2
R | 0xF0 | 1 |Fan Tray Count Register
R | 0xF1 | 1 |Fan Count Per Fan Tray Register
R | 0xF2 | 1 |Max Fan Speed Set Register
R | 0x113 | 1 |Fan Tray Presence Register
R | 0x116 | 1 |Fan Tray Air Flow Register
=====
/dev/i2c-2 0x70:0:0xff:0x9:,:0x74:1:0xff:0xa
```

flashrom

To update or erase the BIOS flash memory, the `smbiostool` uses `flashrom`.

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 lines 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

```
./gpiotool - GPIO Tool
version 2.0
admin, 2014-10-01, bamboo-build-num
Syntax: ./gpiotool <option>
--h := show this help
--list := list available gpio chips and pins
--set [--chip=chip] --pin=pin# --val=value := set GPIO pin
--get [--chip=chip] --pin=pin# := get GPIO pin value
```

- `list` — lists all the GPIO pins.
- `set` — sets the value of the GPIO pin.
- `get` — returns the value of the GPIO pin.

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
```

get Output

```
root@amazon:/opt/ngos/bin# ./gpiotool --get --pin=1
GPIO pin # 1 is 1
```

set Output

```
root@amazon:/opt/ngos/bin# ./gpiotool --set --pin=1 --val=1
```

Configuration File Format

GPIOs are separated into groups within the configuration file, such as Core GPIOs and Suspend GPIOs (if they use different power wells for sleep operations).

Any line starting with a # is a comment. ===== is the separator between groups.

A group starts with a header using | separators and:

- # of bits defined in the GPIO interface (This is the hardware definition, not the number of bits being defined in the config file.)
- A name for the bit group, such as Core GPIO or SUS GPIO.
- Group Type — CORE.
- Any bus used to access the GPIO. This is for the CPLD-based or FPGA-based GPIOs.
- The address to use to access the GPIO. This is for the CPLD-based or FPGA-based GPIOs.
- All of the GPIOs are zero-based in a group. The 0 map is the offset to access `/sys/class/gpio/gpio#` in the sysfs.

Each bit is then defined on its own line separated with | and includes the bit number, name, direction, active level, and default value.

```
#bits | Name | intf | bus | addr | 0-map
31 | Core Gpio | CORE | - | - | 0
# Bit | Name | Direction | Value
15 | WDT to MMC | OUT | LOW | 0
=====
#bits | Name | intf | bus | addr | 0-map
28 | SUS Gpio | CORE | - | - | 31
# Bit | Name | Direction | Value
0 | MMC Interrupt | IN | LOW | 0
```

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

```
Dell Diag - I2C Tool
version 1.5, 1.10
build, 2014/11/10,
Syntax: ./i2ctool <option>
  --h := show this help
  --scan [--bus=buspath] := scan the I2C devices. Optional: --bus=/dev/i2c-<bus number>
  --test [--config=config_file] := test using the pre-programmed configuration or use supplied
config
  --read --bus=buspath --addr=address --reg=reg --count=count --width=#8,16 --
display_size=#1,2,4 of bytes
  --read --bus=buspath --addr=address --reg16=register --count=count --display_size=#1,2,4 of
bytes: For 16bit addressing
  --write --bus=buspath --addr=address --reg=register --width=#8,16 --val=value
  --write --bus=buspath --addr=address --reg16=register --val=value.For 16bit addressing
```

- scan — Scans all the i2c busses and reports all the devices found in an 8x16 array.
- test — Uses the devices the configuration file lists and verifies that they are readable on the busses.
- read — Reads a register offset, or count of bytes starting at a register offset, and return the values. The register width is either 8-bit or 16-bit.
- write — Writes a single value at the specified register offset. The register width is either 8-bit or 16-bit.

Output

NOTE: The i2ctool does not automatically scan multiple MUXed segments. Prior to 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:/opt/ngos/bin# ./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: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
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: -- -- -- -- -- -- -- -- 18 -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- 2e --
30: 30 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
```

```
50: 50 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
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 #1: 5
  0x18 0x2e 0x30 0x50 0x69
I2C devices found on bus #2: 10
  0x3e 0x50 0x51 0x52 0x53 0x54 0x55 0x56
  0x57 0x70
```

test Output

```
root@dell-diag-os:/opt/ngos/bin#
PASS OUTPUT
==========

root@dell-diag-os:~# i2ctool --test
Testing I2C devices:

Checking I2C devices on bus 0:

+ Checking Clock GEN             0x69  ..... Passed

+ Checking DDR3 VREF Tuning      0x2e  ..... Passed

+ Checking SPD0                  0x50  ..... Passed

Checking I2C devices on bus 1:

+ Checking CPU Board I2C Mux     0x70  ..... Passed

+ Checking CPU Board EEPROM1     0x50  ..... Passed

+ Checking CPU Board EEPROM2     0x51  ..... Passed

+ Checking CPU Board EEPROM3     0x52  ..... Passed

+ Checking CPU Board EEPROM4     0x53  ..... Passed

+ Checking CPU Board EEPROM5     0x54  ..... Passed

+ Checking CPU Board EEPROM6     0x55  ..... Passed

+ Checking CPU Board EEPROM7     0x56  ..... Passed

+ Checking CPU Board EEPROM8     0x57  ..... Passed

+ Checking Switch Brd EEPROM     0x50  ..... Passed

+ Checking Switch Brd CPLD       0x3e  ..... Passed

+ Checking SFP1 EEPROM           0x50  ..... Passed

+ Checking SFP2 EEPROM           0x50  ..... Passed

+ Checking IOM_1 CPLD            0x3e  ..... Passed

+ Checking IOM_1 EEPROM          0x50  ..... Passed

+ Checking IOM_1 QSFP1                 0x50  ..... Passed
```

```
+ Checking IOM_1 QSFP2                0x50  ..... Passed
+ Checking IOM_1 QSFP3                0x50  ..... Passed
+ Checking IOM_1 QSFP4                0x50  ..... Passed
+ Checking IOM_1 QSFP5                0x50  ..... Passed
+ Checking IOM_1 QSFP6                0x50  ..... Passed
+ Checking IOM_1 QSFP7                0x50  ..... Passed
+ Checking IOM_1 QSFP8                0x50  ..... Passed
+ Checking IOM_1 QSFP9                0x50  ..... Passed
+ Checking IOM_1 QSFP10               0x50  ..... Passed
+ Checking IOM_1 QSFP11               0x50  ..... Passed
+ Checking IOM_1 QSFP12               0x50  ..... Passed
+ Checking IOM_1 QSFP13               0x50  ..... Passed
+ Checking IOM_1 QSFP14               0x50  ..... Passed
+ Checking IOM_1 QSFP15               0x50  ..... Passed
+ Checking IOM_1 QSFP16               0x50  ..... Passed
+ Checking IOM_2 CPLD           0x3e  ..... Passed
+ Checking IOM_2 EEPROM         0x50  ..... Passed
+ Checking IOM_2 QSFP1                0x50  ..... Passed
+ Checking IOM_2 QSFP2                0x50  ..... Passed
+ Checking IOM_2 QSFP3                0x50  ..... Passed
+ Checking IOM_2 QSFP4                0x50  ..... Passed
+ Checking IOM_2 QSFP5                0x50  ..... Passed
+ Checking IOM_2 QSFP6                0x50  ..... Passed
+ Checking IOM_2 QSFP7                0x50  ..... Passed
+ Checking IOM_2 QSFP8                0x50  ..... Passed
+ Checking IOM_3 CPLD           0x3e  ..... Passed
+ Checking IOM_3 EEPROM         0x50  ..... Passed
+ Checking IOM_3 QSFP1                0x50  ..... Passed
+ Checking IOM_3 QSFP2                0x50  ..... Passed
+ Checking IOM_3 QSFP3                0x50  ..... Passed
+ Checking IOM_3 QSFP4                0x50  ..... Passed
+ Checking IOM_3 QSFP5                0x50  ..... Passed
+ Checking IOM_3 QSFP6                0x50  ..... Passed
+ Checking IOM_3 QSFP7                0x50  ..... Passed
+ Checking IOM_3 QSFP8                0x50  ..... Passed
I2C Devices: Overall test results ---------------------- >>> Passed
```

```
Testing I2C devices:
Checking I2C devices on bus 1:
+ Checking Clock GEN 0x69 ..... Passed
+ Checking DDR3 VREF Tuning 0x2e ..... Passed
+ Checking SPD0 0x50 ..... Passed
+ Checking SPD1 0x52
Error reading at offset 0x00
  ..... FAILED <<<---
Checking I2C devices on bus 2:
+ Checking CPU Board I2C Mux 0x70 ..... Passed
+ Checking CPU Board EEPROM1 0x50 ..... Passed
+ Checking CPU Board EEPROM2 0x51 ..... Passed
+ Checking CPU Board EEPROM3 0x52 ..... Passed
+ Checking CPU Board EEPROM4 0x53 ..... Passed
+ Checking CPU Board EEPROM5 0x54 ..... Passed
+ Checking CPU Board EEPROM6 0x55 ..... Passed
+ Checking CPU Board EEPROM7 0x56 ..... Passed
+ Checking CPU Board EEPROM8 0x57 ..... Passed
+ Checking CPU Board TMP SENS 0x48 .... Passed
+ Checking PSU1 0x58 ..... Passed
+ Checking PSU2 0x58 ..... Passed
+ Checking FAN1 EEPROM 0x50 ..... Passed
.
.
I2C Devices: Overall test results ---- >>> FAILED <<<---
```

read Output

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

Configuration File Format

The configuration file format for the `i2c` busses is strict. Dell recommends using `i2ctool --create` to create a boilerplate configuration file and editing the boilerplate configuration file rather than creating it from scratch.

The configuration file lists each bus from 0 to 4 and the devices. The number of devices MUST match the number of entries or the `i2ctool` stops functioning. If you edit out a device or add a device, you must adjust the number of devices found.

Each device is listed on its own line for that bus in comma separated format:

```
Name
mux bus
mux level 1 setting in the format of address:value
mux level 2 setting in the format of address:value
device address
Register we can read from
byte count
```

For example:

```
I2C devices found on bus #0: 0
I2C devices found on bus #1: 4
Clock GEN ,/dev/i2c-1, - ,0x69,0x00,1
DDR3 VREF Tuning ,/dev/i2c-1, - ,0x2e,0x00,1
SPD0     ,/dev/i2c-1, - ,0x50,0x00,1
SPD1     ,/dev/i2c-1, - ,0x52,0x00,1
I2C devices found on bus #2: 31
CPU Board I2C Mux ,/dev/i2c-2, - ,0x70,0x00,1
CPU Board EEPROM1 ,/dev/i2c-2,0x70:0x0:0x8,0x50,0x00,1
CPU Board EEPROM2 ,/dev/i2c-2,0x70:0x0:0x8,0x51,0x00,1
CPU Board EEPROM3 ,/dev/i2c-2,0x70:0x0:0x8,0x52,0x00,1
CPU Board EEPROM4 ,/dev/i2c-2,0x70:0x0:0x8,0x53,0x00,1
CPU Board EEPROM5 ,/dev/i2c-2,0x70:0x0:0x8,0x54,0x00,1
CPU Board EEPROM6 ,/dev/i2c-2,0x70:0x0:0x8,0x55,0x00,1
CPU Board EEPROM7 ,/dev/i2c-2,0x70:0x0:0x8,0x56,0x00,1
CPU Board EEPROM8 ,/dev/i2c-2,0x70:0x0:0x8,0x57,0x00,1
CPU Board TMP SENS ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x0:0x0,0x48,0x00,1
PSU1 ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x1:0x1,0x58,0x00,1
PSU2 ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x2:0x2,0x58,0x00,1
FAN1 EEPROM ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x4:0x4,0x50,0x00,1
FAN2 EEPROM ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x8:0x8,0x50,0x00,1
FAN3 EEPROM ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x10:0x10,0x50,0x00,1
FAN4 EEPROM ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x20:0x20,0x50,0x00,1
Front Panel GE TMP ,/dev/i2c-2,0x70:0x0:0x9:0x74:0x1:0xb:0x73:0x0:0x0:0x72:0x40:0x40,0x4a,0x00,1
3.2.9 Ledtool
```

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

Use the `ledtool --test` command to test the LEDs.

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

CLI Options

```
root@dell-diag-os:~# ledtool
Dell Diag - Led Tool
version 1.0, 1.10
build, 2016/01/04,

Syntax: ledtool <option>
             --h := show this help
             --list := list leds
```

```
            --get [--led=led] := get the state of all leds or the specified led
            --set <--led=led> [--instance=instance] <--state=state | --val=value> := set the
specified led to the state for color and blink
            --test [--config=config_file] := test using the test config file
```

A list of the LEDs and their states follow the `help` output.

- `list` — Provides a list of all the LEDs and their settings.
- `test` — Testing LEDs is not supported.
- `get` — Displays the state of the specified LED, or all the LEDs if the parameter is empty.
- `set` — Sets the state of an LED. If you have multiple instances of an LED, such as fans, specify which instance of that entity you want to set. `Value` is only valid for stack numbers or other seven-segment LED displays.

```
Plat-Stack
States: green off
Power
States: green amber flashing-amber off
Fan
States: green flashing-amber off
Beacon
States: flashing-blue off
Stack-val
States: val
OP-Mode-IOM1
States: normal-mode test-mode
FrontEnd-Amber-IOM1
States: off flashing-amber amber flashing-amber
FrontEnd-Green-IOM1
States: off flashing-green green flashing-green
Module-StatusLed-IOM1
States: green flashing-green amber flashing-amber
Module-BeaconLed-IOM1
States: off flashing-blue
OP-Mode-IOM2
States: normal-mode test-mode
FrontEnd-Amber-IOM2
States: off flashing-amber amber flashing-amber
FrontEnd-Green-IOM2
States: off flashing-green green flashing-green
Module-StatusLed-IOM2
States: green flashing-green amber flashing-amber
Module-BeaconLed-IOM2
States: off flashing-blue
OP-Mode-IOM3
States: normal-mode test-mode
FrontEnd-Amber-IOM3
States: off flashing-amber amber flashing-amber
FrontEnd-Green-IOM3
States: off flashing-green green flashing-green
Module-StatusLed-IOM3
States: green flashing-green amber flashing-amber
Module-BeaconLed-IOM3
States: off flashing-blue
OP-Mode-IOM4
States: normal-mode test-mode
FrontEnd-Amber-IOM4
States: off flashing-amber amber flashing-amber
FrontEnd-Green-IOM4
States: off flashing-green green flashing-green
Module-StatusLed-IOM4
States: green flashing-green amber flashing-amber
Module-BeaconLed-IOM4
States: off flashing-blue
```

Output

list Output

```
root@dell-diag-os:~# ledtool --list
    Platform Stacking Led  : options
        green off
    Power Led  : options
        green amber flashing-amber off
    Fan Led  : options
        green flashing-amber off
    Beacon LED  : options
        flashing-blue off
    7-Digit Stack Led  : options
        val
    IOM1 PortLED Mode  : options
        normal-mode test-mode
    IOM1 FrontEnd AmberLed  : options
        off flashing-amber amber flashing-amber
    IOM1 FrontEnd GreenLed  : options
        off flashing-green green flashing-green
    IOM1 Module StatusLed  : options
        green flashing-green amber flashing-amber
    IOM1 Module BeaconLed  : options
        off flashing-blue
    IOM2 PortLED Mode  : options
        normal-mode test-mode
    IOM2 FrontEnd AmberLed  : options
        off flashing-amber amber flashing-amber
    IOM2 FrontEnd GreenLed  : options
        off flashing-green green flashing-green
    IOM2 Module StatusLed  : options
        green flashing-green amber flashing-amber
    IOM2 Module BeaconLed  : options
        off flashing-blue
    IOM3 PortLED Mode  : options
        normal-mode test-mode
    IOM3 FrontEnd AmberLed  : options
        off flashing-amber amber flashing-amber
    IOM3 FrontEnd GreenLed  : options
        off flashing-green green flashing-green
    IOM3 Module StatusLed  : options
        green flashing-green amber flashing-amber
    IOM3 Module BeaconLed  : options
        off flashing-blue
    IOM4 PortLED Mode  : options
        normal-mode test-mode
    IOM4 FrontEnd AmberLed  : options
        off flashing-amber amber flashing-amber
    IOM4 FrontEnd GreenLed  : options
        off flashing-green green flashing-green
    IOM4 Module StatusLed  : options
        green flashing-green amber flashing-amber
    IOM4 Module BeaconLed  : options
        off flashing-blue
```

get Output

```
root@dell-diag-os:~# ledtool --get
    Platform Stacking Led : off
    Power Led : green
    Fan Led : green
```

```
    Beacon LED : off
    7-Digit Stack Led : Value 0xff
    IOM1 PortLED Mode : normal-mode
    IOM1 FrontEnd AmberLed : off
    IOM1 FrontEnd GreenLed : off
    IOM1 Module StatusLed : flashing-green
    IOM1 Module BeaconLed : off
    IOM2 PortLED Mode : normal-mode
    IOM2 FrontEnd AmberLed : off
    IOM2 FrontEnd GreenLed : off
    IOM2 Module StatusLed : flashing-green
    IOM2 Module BeaconLed : off
    IOM3 PortLED Mode : normal-mode
    IOM3 FrontEnd AmberLed : off
    IOM3 FrontEnd GreenLed : off
    IOM3 Module StatusLed : flashing-green
    IOM3 Module BeaconLed : off
    IOM4 PortLED Mode : normal-mode
    IOM4 FrontEnd AmberLed : off
    IOM4 FrontEnd GreenLed : off
    IOM4 Module StatusLed : flashing-green
    IOM4 Module BeaconLed : off
```

set Output

```
root@dell-diag-os:~# ledtool --set --led=Fan --state=off
root@dell-diag-os:~# ledtool --get
    Platform Stacking Led : off
    Power Led : green
    Fan Led : green
    Beacon LED : flashing-blue
    7-Digit Stack Led : Value 0xff
    IOM1 PortLED Mode : normal-mode
    IOM1 FrontEnd AmberLed : off
    IOM1 FrontEnd GreenLed : off
    IOM1 Module StatusLed : flashing-green
    IOM1 Module BeaconLed : off
    IOM2 PortLED Mode : normal-mode
    IOM2 FrontEnd AmberLed : off
    IOM2 FrontEnd GreenLed : off
    IOM2 Module StatusLed : flashing-green
    IOM2 Module BeaconLed : off
    IOM3 PortLED Mode : normal-mode
    IOM3 FrontEnd AmberLed : off
    IOM3 FrontEnd GreenLed : off
    IOM3 Module StatusLed : flashing-green
    IOM3 Module BeaconLed : off
    IOM4 PortLED Mode : normal-mode
    IOM4 FrontEnd AmberLed : off
    IOM4 FrontEnd GreenLed : off
    IOM4 Module StatusLed : flashing-green
    IOM4 Module BeaconLed : off

root@dell-diag-os:~# ledtool --set --state=off
root@dell-diag-os:~# ledtool --get
    Platform Stacking Led : off
    Power Led : off
    Fan Led : off
    Beacon LED : off
    7-Digit Stack Led : Value 0xff
    IOM1 PortLED Mode : normal-mode
    IOM1 FrontEnd AmberLed : off
    IOM1 FrontEnd GreenLed : off
    IOM1 Module StatusLed : flashing-green
    IOM1 Module BeaconLed : off
    IOM2 PortLED Mode : normal-mode
    IOM2 FrontEnd AmberLed : off
    IOM2 FrontEnd GreenLed : off
    IOM2 Module StatusLed : flashing-green
```

```
    IOM2 Module BeaconLed : off
    IOM3 PortLED Mode : normal-mode
    IOM3 FrontEnd AmberLed : off
    IOM3 FrontEnd GreenLed : off
    IOM3 Module StatusLed : flashing-green
    IOM3 Module BeaconLed : off
    IOM4 PortLED Mode : normal-mode
    IOM4 FrontEnd AmberLed : off
    IOM4 FrontEnd GreenLed : off
    IOM4 Module StatusLed : flashing-green
    IOM4 Module BeaconLed : off
```

Configuration File Format

```
CONTROL_CONFIG | 2
#Control Config | method | <Mux Selection> | <Address> | <Register> | <Take Control> | <Release
Control>
I2C Device Flag | lpc | - | 0 | 0x04D8 | 0x210 | 0x211 | 0x212 | 0x213 | 0x55 | 0xAA | 0x5A |
0xA5
Led Control Flag | lpc | - | 0 | 0x04Dc | 0x210 | 0x211 | 0x212 | 0x213 | 0x55 | 0xAA | 0x55 |
0xAA


The ledtool config file is in a more xml style format
Each entity is specified in a [ entity ] tag format and closed with a [ \entity ] tag
Each entity is the listed the following in a '|' seperated list:
  Name of the Led - this si the name that is printed in dany access to the led. the entity is
the name used to access the led
  bus to access the led - this can be lpc, mem or /dev/i2c-bus number
  address - Address of the access to control the led
  Register - the register to access to control the led
```

Next is a display of the state entities for this LED display. The state can be colors, on or off, or even color-blinks. The state entity is also specified by XML-style tags on separate lines. The data displays in a | separated list as:

- Number of instances — For normal LEDs, the instance is 1, but for fans, the instance can be more than 1.
- Bit ranges — The bit number or the range of bits from low:high contiguous bits. If you need spread bits, use multiple settings within the state tag.
- Value — The value to write to this bit or set of bits.

```
[Power]
  Power Led | lpc | 0x020a | 0x0
[off]
  1 | 6:5 | 2
[/off]
[green]
  1 | 6:5 | 0
[/green]
[yellow]
  1 | 6:5 | 1
[/yellow]
[/Power]
```

lpctool

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

The `lpctool` allow 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 DiagOS tools use `lpctool` to read LPC-connected registers.

CLI Options

```
Dell Diag - LPC Tool
version 1.0
```

```
admin, 2014-10-01, bamboo-build-num
Syntax: %s <option>
  --h := show this help
--read --addr=address --count=bytes [--size=b,w or l]
  := read the specified address
--write --addr=address --val=data0,data1, ... ,dataN [--size=b,w or l]
  := write at the specified address
```

- `read` — Reads the address on the LPC bus.
- `write` — Writes to the device on the LPC bus.

Output

read Output

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

write Output

```
root@dell-diag-os:/opt/ngos/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 busses. 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 is done 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 prior to overwriting.
- `Data Walking 0` — Walks a 0 bit 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 finished, 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 finished, 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 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

```
./memtool - Memory Tool
version 2.0
admin, 2014-10-01, bamboo-build-num
Syntax: ./memtool <option>
  --h := show this help
  --list := list all of the memory regions
  --version := Display the version of the memtool
  --info --region=# := display configuration info of device
  --test [--region=#] [--testlist=test0,test1... ] := test all memory or specified memory region
  --read --region=# --addr=address --count=bytes := read the specified physical address
  --write --region=# --addr=address --val=data0,data1, ... ,dataN := write at the specified
physical address
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
```

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 known by SDI. 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 is a lengthy test to cause multiple ejections of data from the cache and testing the caches.

  In Verbosity 0, only the pass/fail message prints for all of 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-1) 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
```

info Output

```
root@dell-diag-os:/opt/ngos/bin# memtool --info
==== SPD Data ====
Density 4096 MB,  Rows: 0, Cols: 0
Bus Width: 64 bits, ECC: yes
Manufacturer: Fairchild
Part Number : NLQ1G7235107C-D12T
[00000000]: 0x92 0x12 0x0b 0x08 0x04 0x21 0x02 0x09 0x0b 0x52 0x01 0x08 0x0a 0x00 0xfc 0x00
|| .....!...R......
[00000010]: 0x69 0x78 0x69 0x30 0x69 0x11 0x18 0x81 0x60 0x09 0x3c 0x3c 0x00 0xf0 0x83 0x01  ||
ixi0i...`.<<....
[00000020]: 0x80 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 0x0f 0x11 0x1f 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 0x83 0x16 0x01 0x14 0x26 0x26 0xc5 0x00 0x49 0xb3 0x69
|| .........&&..I.i
[00000080]: 0x4e 0x4c 0x51 0x31 0x47 0x37 0x32 0x33 0x35 0x31 0x30 0x37 0x43 0x2d 0x44 0x31  ||
NLQ1G7235107C-D1
[00000090]: 0x32 0x54 0x48 0x41 0x80 0xad 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00  ||
2THA............
[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
|| ...............
```

test Output

```
root@dell-diag-os:/opt/ngos/bin# ./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:/opt/ngos/bin#
```

read Output

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

root@dell-diag-os:~# memtool --read --addr=200
[00000200]: 0x50  || P
```

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 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 slows down the tests.

Data Flow

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

Configuration File Format

The configuration file for the `memtool` is a list of memory segments separated by a `====` divider. Each entry describes the memory in a system that is accessible. This allows you to review memory in RAMs, FPGAs, and RAM in a memory-mapped PCI BAR. Each parameter is on a separate line and consists of:

- `Name` — The name of the memory region.
- `Start Address` — The address that the memory starts with. If this is system memory, use a '-' to request the system to get a location from the OS Heap.
- `Size` — The size of the memory. If this is system memory, use a '-' to request the system to get a location from the OS Heap
- `Access Mode` — How you access the memory; through (b)yte, (h)alfword, or (w)ord.
- `Increment` — The byte address increment for each successive memory location.
- `Ecc` — checks if ECC is available.
- `Max Chunk` — Memory is tested in chunks in which the available memory is divided into. This is the maximum size of a chunk.
- `Max Cache` — The size of the cache (not currently used). Ensures that caches are fully tested.
- `Cache Line` — The size of a cache line (not currently used).
- `Iterations` — How many times to run the tests on this region.
- `Tests` — lists the tests to perform. Tests are specified in a comma-separated list.

Available tests are:

- `ALL_TESTS` — All the following tests, except for `DATA_CACHE`, which must be run separately.
- `ADDRESS_READ` — Read test of the address lines.
- `ADDRESS_WRITE` — Write test of the address lines.
- `ADDRESS_WALKING1` — Walking a 1 through the address lines within the memory space.
- `ADDRESS_WALKING0` — Walking a 0 through the address lines within the memory space.
- `DATA_READ` — Read test of the data lines.
- `DATA_WRITE` — Write test of the data lines.
- `DATA_WALKING1` — Walking a 1 through the data lines.
- `DATA_WALKING0` — Walking a 0 through the data lines.
- `DATA_SLIDING1` — Sliding a 1 through the data lines.
- `DATA_SLIDING0` — Sliding a 0 through the data lines.
- `DATA_PATTERN` — Writing and reading patterns from the memory.
- `DATA_CACHE` — Exercises the RAM by completing cache evictions by rotating a very large array, usually cache-line size square, of the values in memory multiple times.
- `SPD Device` — Not used.
- `SPD Access` — Bus to use to access the SPD.
- `SPD Address` — The address of the SPD chip (in hex) on the bus, if applicable.
- `SPD Registers` — The valid registers of the SPD chip listed as `start,end`.

```
SystemRam
Start Address:-
Size:-
Access Mode:w
Increment:4
Ecc:1
Max Chunk:2800
Max Cache:0
Cache Line:0
Iterations:1
Tests:ALL_TESTS
SPD Device:SPD
```

```
SPD Access:/dev/i2c-2
SPD Address:50
SPD Registers:0,ff
```

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.

```
root@dell-diag-os:/opt/ngos/bin# nputool -h
Dell Diag ---- NPU Tool
version 1.0, 1.10
build, 2014/11/10

Usage: ./nputool [options]
  -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
  -v, --version := Display version
root@dell-diag-os:/opt/ngos/bin#
```

nputool version

```
root@dell-diag-os:/opt/ngos/bin# nputool -v
Dell Diag nputool - version 1.0 sdk-6.4.6 package 1.10 2015/07/13
root@dell-diag-os:/opt/ngos/bin# nputool --version
Dell Diag nputool - version 1.0 sdk-6.4.6 package 1.10 2015/07/13
root@dell-diag-os:/opt/ngos/bin#
```

Port Link Status Test

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

```
root@dell-diag-os:/opt/ngos/bin# nputool -i -t 0
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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:/opt/ngos/bin# nputool --init --test 0
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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:/opt/ngos/bin#
```

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/ngos/bin# nputool -i -t 1 -T cpu_self
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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:/opt/ngos/bin#
root@dell-diag-os:/opt/ngos/bin# nputool --init --test 1 --traffic cpu_self
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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@amazon:/opt/ngos/bin# ./nputool -i -t 1 -T cpu_adj
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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:/opt/ngos/bin#
root@amazon:/opt/ngos/bin# ./nputool --init -test 1 --traffic cpu_adj
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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
```

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 above 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 SFP+ ports which are connected with SFP+ optics using a cable.

Connect the SFP+ ports with the Dell 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 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:/opt/ngos/bin# nputool -i -t 2
DMA pool size: 67108864
```

```
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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:/opt/ngos/bin#
root@dell-diag-os:/opt/ngos/bin# nputool -i -t 3
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
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
root@dell-diag-os:/opt/ngos/bin#
```

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:/opt/ngos/bin# nputool -i -s temp
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
Diag NPU initialization over
NPU 0 Temperature
-------------------------
monitor current peak
-------------------------
0       40.4    42.8
1       40.4    42.8
2       40.4    42.3
3       38.4    42.3
4       40.8    43.8
5       40.8    42.8
6       38.9    42.3
```

```
7       38.4    41.3
-------------------------
Average 39.8, maximum peak 43.8
root@dell-diag-os:/opt/ngos/bin#
root@dell-diag-os:/opt/ngos/bin# nputool --init --show temp
DMA pool size: 67108864
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
*** 1 BCM devices are detected
Current mode is now ESW
Diag NPU initialization over
NPU 0 Temperature
-------------------------
monitor current peak
-------------------------
0       40.4    42.8
1       40.4    42.8
2       39.9    42.3
3       39.9    42.3
4       41.8    43.3
5       39.9    42.8
6       38.4    41.8
7       38.9    40.8
-------------------------
Average 39.9, maximum peak 43.3
root@dell-diag-os:/opt/ngos/bin#
```

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 that the BIOS uses to control testing and the bits for the EDA tools, use the `nvramtool`.

The NVRAM is an area, usually in a battery backed-up device such as an RTC chip, that allows the writing of bits which do not change across reboots or power cycles. These bits are used to control how devices boot and how the tests are performed. 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 details of the registers it is writing. The `nvramtool` can display 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

```
Dell Diag - NVRAM Tool
version 2.0
admin, 2014-10-01, bamboo-build-num
Syntax: ./nvramtool <option>
  --h := show this help
  --read [--reg=reg] := read all nvram values or at the reg location in nvram
  --write <--reg=reg> <--val=value> := write nvram value
```

- `read` — Reads the register or registers in the NVRAM.
- `write` — Writes a value to the register or registers in the NVRAM.

Output

read Output

```
root@dell-diag-os:~# nvramtool --read
NVRAM Values:
0x00 0x9f 0x00 0xe6 0x03 0x01 0x00 0xea

Test Status Fail Bits : offset 0x50 = 0x0
    7 NVRAM test = 0
    6 CFast test = 0
    5 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 CFast test = 0
    5 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 Loop 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 = 0x1
5: 4 EDA Verbose Level = 0
    3 EDA Extended Tests = 0
    2 EDA Verbose Mode = 0
    1 EDA Stop on Error = 0
    0 EDA Enable = 1

EDA Extra Bits : offset 0x56 = 0x0

Control ID Byte : offset 0x57 = 0xea
```

write Output

```
./nvramtool --write --reg=0x64 --val=0x1
```

Configuration File Format

The `nvramtool` configuration file uses the device description format and is the same format as the `pltool` configuration file.

```
# C - CHIP (Master | Slave -  Cpld or FPGA), Address, Name, Access
# R - Register, Offset, Mask, Name, RW , Default Val
# B - Bit(s), bitnum(s), Name, RW, Default Val
# I - Information on the bits
=====
C | NVRAM | 0x72 | RTC Extended Memory | io | 0 | - | - | 0x00 | 0x0
R | 0x50 | 8 | 0xFF | Test Status Fail Bits | RO | 0x0 | 0 | 0x0
B |  7 | NVRAM test | RO | 0x0
B |  6 | CFast test | RO | 0x0
B |  5 | Reg check | RO | 0x0
B |  4 | PCI test | RO | 0x0
B |  3 | Upper DRAM test | RO | 0x0
B |  2 | Lower DRAM test | RO | 0x0
B |  1 | ECC test | RO | 0x0
B |  0 | SPD test | RO | 0x0
R | 0x51 | 8 | 0xFF | Test Status Pass Bits | RO | 0x0 | 0 | 0x0
B |  7 | NVRAM test | RO | 0x0
B |  6 | CFast test | RO | 0x0
B |  5 | Reg check | RO | 0x0
B |  4 | PCI test | RO | 0x0
B |  3 | Upper DRAM test | RO | 0x0
B |  2 | Lower DRAM test | RO | 0x0
B |  1 | ECC test | RO | 0x0
B |  0 | SPD test | RO | 0x0
…
```

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

```
Dell Diag - Optics Tool
version 2.0
admin, 2014-10-01, bamboo-build-num
Syntax: ./opticstool <option>
  --h := show this help
  --show[=brief] [--int=interface]:= shows ports and optics status
```

- `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:/etc/dn/diag# opticstool --show=brief
Show Optics in System (brief)
Port #  Name       Status
------  --------   ------
   1     QSFP28 1   PRESENT
   2     QSFP28 2   PRESENT
…
```

show Output

```
root@dell-diag-os:/etc/dn/diag# opticstool --show
Show Optics in System
Port #  Name       Status  Type    Part Number      Rev  Serial Number
------  --------   ------  ------- ---------------  ---  ---------------
   1     QSFP28 1   PRESENT QSFP28  EL-13-08002-001   01   28-0197
   2     QSFP28 2   PRESENT QSFP28  EL-13-08002-001   01   28-0319
…
```

show --int=interface # Output

```
root@dell-diag-os:/etc/dn/diag# opticstool --show --int=1
Show Optics in System

=======================================
QSFP28 1 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]: 0x0d 0x00 0x06 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
|| ................
[00000010]: 0x00 0x00 0x00 0x00 0x00 0x00 0x13 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
|| ................
...
[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:     TIMBERCON
```

```
Part No:    EL-13-08002-001
Revision:   01
Serial Num: 28-0197

ID                      : 0x11
Extended ID             : 0x00
Connector               : 0x23
Specification           : 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
Encoding                : 0x00
BR Nominal              : 0xfa
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           : 0xd9 (0xd9)
----------------------------------------
Extended ID Fields
----------------------------------------
Options                 :
BR Max                  :
BR Min                  :
Date Code               : 2014-09-29
CheckCodeExt            : 0x0e (0x0e)
TX Output Disable       : Not Disabled

----------------------------------------
Diagnostics Information
----------------------------------------
Module Monitoring Values:
Current Temp:      19.000 (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)
```

Configuration File Format

The configuration file for the `opticstool` is:

- Optics ID — The ID of the optics port.
- Name — The printable name of the optics device (you must name the SFPs “SFP” and the QSFPs “QSFP”).

Then four entries describe how to read if a device is present, how to select the MUX for accessing the device, how to reset or unreset the device, and how to read data from the device.

- `Present`:
  - Bus to use to access presence indicators
  - Address of the device that indicates presence
  - Register of the device that indicates presence
  - Bit(s) in the register that indicates presence (supports single bit and low:high range)
  - Value of the bits that indicates presence
  - MUX settings to access the device
- `Select` — Hardware gating.
  - Bus to use to access presence indicators
  - Address of the device that indicates presence
  - Register of the device that indicates presence
  - Bit(s) in the register that indicates presence (supports single bit and low:high range)
  - Value of the bits that indicates presence

  - MUX settings to access the device
- `Reset` — Hardware reset of the device.
  - Bus to use to access presence indicators
  - Address of the device that indicates presence
  - Register of the device that indicates presence
  - Bit(s) in the register that indicates presence (supports single bit and low:high range)
  - Value of the bits that indicates presence
  - MUX settings to access the device
- `Data`:
  - Bus to use to access the device
  - Address of device on the bus
  - MUX settings to access the device

```
# portnum|Name
# Present|dev|addr|reg|bit(s)|p_val|pres Mux type|mux addr|mux reg|mux setting
# Select|mux bus|addr|reg|val|slect mux|s_mux addr|s_mux reg|s_mux val
# Data|device bus|device addr|device mux type|mux addr|mux reg|mux setting|mux2 ...
49 | SFP 49
Present | lpc | 0x00 | 0x243 | 0 | 0 | - 0x00:0x0:0x0:0x0
Select | - | 0x00 | 0x00 |0 | 0 | - 0x00:0x0:0x0:0x0
Reset | - | 0x00 | 0x00 |0 | 0 | - 0x00:0x0:0x0:0x0
Data | /dev/i2c-3 | 0x50 | /dev/i2c-3 0x73:0x0:0xf:0x40:,:0x71:0x0:0xf:0x10:,:0x72:0x0:0xf:0x0
```

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

```
Dell Diag - PCI Tool
version 2.0
admin, 2014-10-01, bamboo-build-num
Syntax: ./pcitool <option>
  --h := show this help
  --scan[=all] := scan all PCI devices and optionally show all config data
  --test := test using the default PCI test config file
  --show <--bus=bus# --dev=dev# --func=func#> := show config data for a specific bus:dev.func
  --read <--bus=bus# --dev=dev# --func=func# --offset=offset --count=count> := read 8-bit
config register for bus:dev.func
  --write <--bus=bus# --dev=dev# --func=func# --offset=offset --val=value> := write 8-bit
config register for bus:dev.func
```

- `scan` — Scans all the devices on the PCI bus and returns any device information that is found.
- `test` — Checks the devices on the PCI bus against those that are defined in the configuration file.
- `show` — Shows the configuration space information for the device.
- `read` — Reads specific configuration bytes from the configuration space of a specified device (similar to `show`).
- `write` — Writes a specific configuration byte in the configuration space of the specified device.

Output

scan Output

```
root@amazon:/opt/ngos/bin# ./pcitool --scan
Acquiring PCI device name database
Device#01: bus:dev.fn 00:00.0 - ID=0x0c738086, NOT LISTED
Device#02: bus:dev.fn 00:01.0 - ID=0x0c468086, PCIe port
Device#03: bus:dev.fn 00:02.0 - ID=0x0c478086, PCIe port
Device#04: bus:dev.fn 00:03.0 - ID=0x0c488086, PCIe port
Device#05: bus:dev.fn 00:04.0 - ID=0x0c498086, PCIe port
Device#06: bus:dev.fn 00:0e.0 - ID=0x0c548086, NOT LISTED
...
Device#17: bus:dev.fn 07:00.0 - ID=0x400e12d8, NOT LISTED
Device#18: bus:dev.fn 07:00.1 - ID=0x400e12d8, NOT LISTED
Device#19: bus:dev.fn 07:00.2 - ID=0x400f12d8, EHCI HCD
Device#20: bus:dev.fn 08:00.0 - ID=0x10d38086, E100E
```

test Output

```
root@amazon:/opt/ngos/bin# ./pcitool --test
Testing PCI devices:
+ Checking PCI 00:00.0, ID=0c738086 ........... Passed
+ Checking PCI 00:04.0, ID=0c498086 ........... Passed
+ Checking PCI 00:0e.0, ID=0c548086 ........... Passed
+ Checking PCI 00:13.0, ID=0c598086 ........... Passed
+ Checking PCI 00:13.1, ID=0c5a8086 ........... Passed
+ Checking PCI 00:14.0, ID=0c5f8086 ........... Passed
+ Checking PCI 00:1f.0, ID=0c608086 ........... Passed
+ Checking PCI 01:00.0, ID=b85014e4 ........... Passed
+ Checking PCI 02:00.0, ID=91701b4b ........... Passed
+ Checking PCI 03:00.0, ID=400a12d8 ........... Passed
+ Checking PCI 04:01.0, ID=400a12d8 ........... Passed
+ Checking PCI 04:02.0, ID=400a12d8 ........... Passed
+ Checking PCI 04:03.0, ID=400a12d8 ........... Passed
+ Checking PCI 07:00.0, ID=400e12d8 ........... Passed
+ Checking PCI 07:00.1, ID=400e12d8 ........... Passed
+ Checking PCI 07:00.2, ID=400f12d8 ........... Passed
+ Checking PCI 08:00.0, ID=10d38086 ........... Passed
PCI devices: Overall test results --------- >>> Passed
```

show Output

```
root@dell-diag-os:~# pcitool --show  --bus=0 --dev=4 --func=0
bus:dev.fn 00:04.0
[00000000]: 0x60 0x27 0xc7 0xa6 0xc8 0x7f 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00  ||
`'..............
[00000010]: 0x38 0x02 0x00 0x00 0x00 0x00 0x00 0x00 0xc0 0x3f 0x40 0x00 0x00 0x00 0x00 0x00  ||
8........?@.....
[00000020]: 0x60 0x27 0xc7 0xa6 0xc8 0x7f 0x00 0x00 0x10 0x90 0xea 0x00 0x00 0x00 0x00 0x00  ||
`'..............
[00000030]: 0x00 0xe3 0x5e 0x9e 0xff 0x7f 0x00 0x00 0xc0 0x3f 0x40 0x00 0x00 0x00 0x00 0x00
|| ..^......?@.....
```

```
[00000040]: 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
|| ................
[00000050]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xed 0x70 0xc6 0xa6 0xc8 0x7f 0x00 0x00
|| .........p......
[00000060]: 0x00 0xe3 0x5e 0x9e 0xff 0x7f 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
|| ..^.............
[00000070]: 0x70 0xe3 0x5e 0x9e 0xff 0x7f 0x00 0x00 0x40 0x0e 0x40 0x00 0x00 0x00 0x00 0x00  ||
p.^.....@.@.....
[00000080]: 0xd0 0xe4 0x5e 0x9e 0xff 0x7f 0x00 0x00 0x1d 0x1b 0x40 0x00 0x00 0x00 0x00 0x00
|| ..^.......@.....
[00000090]: 0x04 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xac 0xe3 0x5e 0x9e 0xff 0x7f 0x00 0x00
|| ..........^.....
[000000a0]: 0xbf 0x3e 0x40 0x00 0x00 0x00 0x00 0x00 0x20 0xfe 0x5e 0x9e 0x00 0x7f 0x00 0x00
|| .>@..... .^.....
[000000b0]: 0xf0 0xe3 0x5e 0x9e 0xff 0x7f 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
|| ..^.............
[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 0xd0 0xe4 0x5e 0x9e 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 0x00000230.
  Base Address 1: Memory at 0x00000000.
  Base Address 2: Memory at 0x00403fc0.
  Base Address 3: Memory at 0x00000000.
  Base Address 4: Memory at 0xa6c72760.
  Base Address 5: Memory at 0x00007fc0.
  CardBus CIS pointer 0xea9010 (PCI configuration space), address 0.
```

Configuration File Format

The configuration file format is strict for the PCI devices. To create this configuration file and remove any misidentified devices, Dell Networking recommends using the `pcitool --create` option.

```
Bus:Dev:Fn= #:#.# ID= Vendor|Device Name- including any U Number information
```

Then the configuration space displays:

```
Bus:Dev.Fn=00:00.0 ID=1f0f8086 Intel C2000 Family CP
  1f0f8086 00000007 06000002 00000000 00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000 00000000 ffffffff 00000000 00000000
  00000000 00000000 00000000 00000000 01000021 00000000 01000f02 00000000
```

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 and values SDI identifies in the testable bits of the register. The tool reads the register using SDI interfaces and compares the testable bits from those the SDI database provides. If a mismatch occurs, an error displays.

CLI Options

```
Dell Diag - Programable Logic Tool
version 1.5, 1.10
build, 2014/11/10,

Syntax: pltool <option>
--h := show this help test
--test := test (RW) the scratchpad registers
--list <--lstype=devicetype> := list devices and registers (empty for all)
--listdevicenames := list device names with address
If multiple devices have the same device addr, pass the --devname additionally
--read <--devname=deviceName> <--dev=deviceaddr>
<--reg=reg> := read the specified register of the dev(--dev=0 for lpc access)
--write <--devname=deviceName> <--dev=deviceaddr>
<--reg=reg> <--val=value> := write at the specified register of the dev(--dev=0 for lpc access)
```

- `list` — Lists all the devices and registers within the device and the bit-level definitions.
- `test` — Asks SDI for the testable registers and values within a device and the testable bit mask. It reads the register, masks-out the untestable bits and compares the result. It tests for all devices.
- `listdevicenames` — Lists all the devices with a name to avoid confusion between devices that share the same address.
- `devname and dev` — Reads and writes the address and name from the `listdevicenames` option for the specified device.
- `read` — Reads a register within a device. The device address and register offset are found by either documentation or the `list` command.
- `write` — Writes the device's register with the supplied value. The device address, register offset, and bit width of the register are found by either documentation or the `list` command.

Output

list Output

```
root@dell-diag-os:/etc/dn/diag# 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
   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
```

listdevicenames Output

Based from the output of `--devicenames`, you can decide if you need to 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:/etc/dn/diag# pltool --read --dev=0 --reg=0x100
CPLD_VERSION : offset 0x100 = 0x3
7: 4 MAJOR_VER = 0
3: 0 MINOR_VER = 3

CPLD2-4 having the same device address, needs to use the devixcename as such
root@dell-diag-os:/etc/dn/diag# pltool --read --devname=CPLD3 --reg=0x10
zQSFP_RESET_CTRL0 : offset 0x10 = 0xff
    7 zQSF20_RST = 1
    6 zQSFP19_RST = 1
    5 zQSFP18_RST = 1
    4 zQSFP17_RST = 1
    3 zQSFP16_RST = 1
    2 zQSFP15_RST = 1
    1 zQSFP14_RST = 1
    0 zQSFP13_RST = 1
```

read Output

```
ONIE:/diag # ./pltool --read --dev=0x33 --reg=0x0
QSFP[8:1] Mode Control Reg : offset 0x00 = 0xff
  7 QSFP8_ModeSel = 1
  6 QSFP7_ModeSel = 1
  5 QSFP6_ModeSel = 1
  4 QSFP5_ModeSel = 1
  3 QSFP4_ModeSel = 1
  2 QSFP3_ModeSel = 1
  1 QSFP2_ModeSel = 1
  0 QSFP1_ModeSel = 1
root@dell-diag-os:/opt/ngos/bin# ./pltool --read --devname=CPLD1 --reg=0x101
BOARD_TYPE : offset 0x101 = 0x1
7: 0 BOARD_TYPE = 1
```

write Output

```
ONIE:/diag # ./pltool --write --dev=0x33 --reg=0x0 --val=0x7f
root@dell-diag-os:/opt/ngos/bin# ./pltool --write --devname=CPLD1 --reg=0x102 --val=0xfa
root@dell-diag-os:/opt/ngos/bin# ./pltool --read --devname=CPLD1 --reg=0x102
SW_SCRATCH : offset 0x102 = 0xfa
7: 0 SW_SCRATCH = fa
```

test Output

```
ONIE:/diag # ./pltool --test
Testing Programmable Devices:
PL Tool test:
+ Checking System CPLD 0x31 Reg: 0x0 ..... Passed
+ Checking Master CPLD 0x32 Reg: 0x1 ..... Passed
+ Checking Slave CPLD 0x33 Reg: 0xa ..... Passed
PL Tool: Overall test results --------------- >>> Passed
```

Configuration File Format

The `pltool` uses the device tree configuration format.

```
# C - CHIP (Master | Slave - Cpld or FPGA), Address, Name, Access
# R - Register, Offset, Mask, Name, RW , Default Val
# B - Bit(s), bitnum(s), Name, RW, Default Val
# I - Information on the bits
=====
C | CPLD | 0x00 | MMC CPLD | lpc | 0 | - |Uxx | 0x00 | 0xf
R | 0x100 | 8 | 0xFF | MMC Revision Reg | RO | 0x02 | 1 | 0x0
B | 7:4 | Board Version | RO | 0x0
B | 3:0 | MMC Minor Version | RO | 0x0
R | 0x101 | 8 | 0xFF | MMC Software Scratch Reg | RW | 0xFF | 0 | 0x0
B | 7:0 | Scratchpad Value | RW | 0x5a
R | 0x102 | 8 | 0xFF | MMC Boot OK Reg | RO | 0x0 | 0 | 0x0
B | 7:2 | Reserved | RO | 0x0
B | 1 | CPU Boot OK | RO | 0x1
I | 1 | CPU Did not boot Ok
I | 0 | CPU Booted OK
B | 0 | BIOS OK | RO | 0x0
I | 1 | CPU Boot OK from BIOS 1
I | 0 | CPU Booted OK from BIOS 0
```

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

```
root@amazon:/opt/ngos/bin# ./psutool
Dell Diag - Power Supply Tool
version 1.4, 1.9
build, 2014/11/10,
Syntax: ./psutool <option>
  --h := show this help
  --test [--supply=power supply] := test using the default config file
  --read <--supply=psu> <--reg=register> := read the register on the Power Supply
  --write <--supply=psu> <--reg=register> <--val=value> := write the value into the Power
Supply Register
```

test Option

```
root@dell-diag-os:/opt/ngos/bin# ./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) : 204.000000 V
```

```
Power Supply 1 Output Voltage(VOUT) : 12.210000 V
Power Supply 1 Input Current(IIN) : 0.380000 A
Power Supply 1 Output Current(IOUT) : 5.390000 A
Power Supply 1 Input Power(PIN) : 75.000000 W
Power Supply 1 Output Power(POUT) : 65.700000 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) : 9088
Getting details of Power Supply 2 using LPC interface

Power Supply 2 is Present
Power Supply 2 Input Type AC
Power Supply 2 Input Voltage(VIN) : 203.000000 V
Power Supply 2 Output Voltage(VOUT) : 12.190000 V
Power Supply 2 Input Current(IIN) : 0.440000 A
Power Supply 2 Output Current(IOUT) : 6.400000 A
Power Supply 2 Input Power(PIN) : 87.000000 W
Power Supply 2 Output Power(POUT) : 77.200000 W
Power Supply 2 Temperature : 30.000000 C
Power Supply 2 Fan Present
```

Configuration File format

The configuration file for the `psutool` has a single supply on each line:

```
Power Supply 2 | cpld | lpc | 0 | 0x0204 | 0x1 | 4 | 0 | 0x0204 | 6 | 1 | x | i2c | 3 | 0x5b |
0x53 | i2c /dev/i2c-3 0x73:0:0:0x40:,:0x71:0:0:8:,:0x72:0:0:0 |
i2c | 0 | 0x40 | 0x4 | - | 0 | 0 | 0
```

- `PSU Name` — The name of the supply to display. The entries do not have to be in any named order.
- `Tool Name` — Name of the tool.
- `Access to Present and Power Good` — The type of access to the CPLD, i2c, LPC, and MEM.
- `Access bus` — For `i2c` devices. Shows which `i2c` bus to use.
- `Address` — For LPC devices, the address of the device or register.
- `Register` — Access size for LPC.
- `Present Bit(s)` — The bit or bits to indicate presence. The range of bits display as end:start and must be contiguous. Disaggregate sets of bits are not supported.
- `PresentValue` — The value present.
- `Power Good Register, Bit(s) and Value` — The bit or bits to indicate present. The range of bits display as end:start and must be contiguous. Disaggregate sets of bits are not supported.
- `Tool Acess Mux Definitions` — If your system needs a MUX to access the CPLD, the MUX definitions display here.
- `FRU and FAN Register access` — Supports `i2c`, LPC, and MEM.

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.

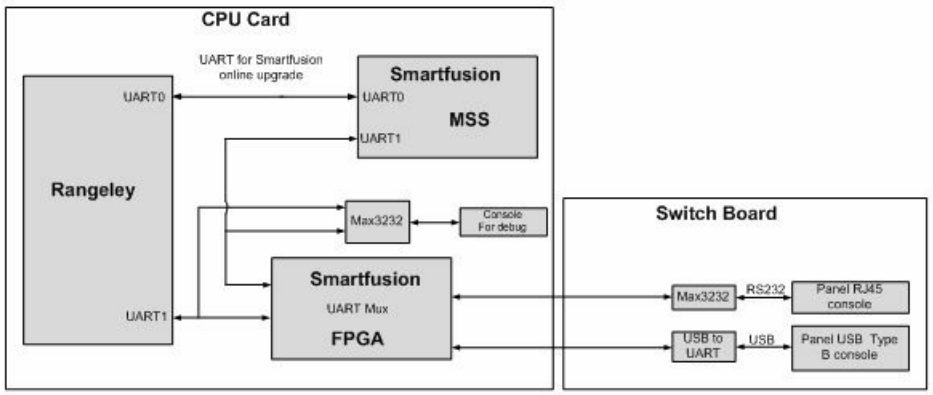
smarttool

This is an optional tool and is only available on systems using a SmartFusion chip.

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 in the following illustration. 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.

Figure 7. smarttool Upgradable MSS and FPGA



SMF Upgrade Binaries

- <*platform*>_SMF_MSS_V1.41_logic_V0.E_Release_Notes.xls
- <*platform*>_SMF_MSS_v1.41_A_region.bin
- <*platform*>_SMF_MSS_v1.41_B_region.bin
- <*platform*>_SMF_MSS_v1.41_G_region.bin
- <*platform*>_SMF_MSS_v1.41_logic_v0.E.pdb

Upgrading SMF MSS

You can upgrade SMF MSS using the following steps.

To find out what region is currently 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.

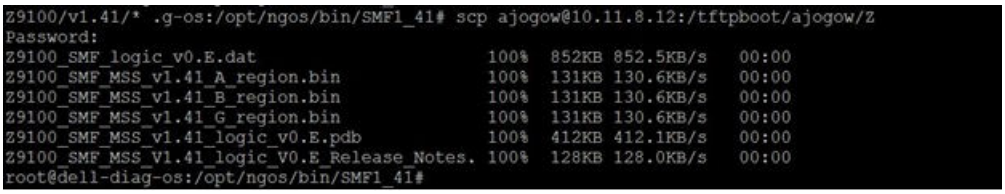
```
Upgrade mss A-region when mss is running in G-region:
    ./smarttool -um /dev/ttyS0 <platform>_SMF_MSS_v1.41_A_region.bin
Upgrade mss B-region when mss is running in A-region:
     ./smarttool -um /dev/ttyS0 <platform>_SMF_MSS_v1.41_B_region.bin
```

Upgrade mss A-region when mss is running in B-region:

```
./smarttool -um /dev/ <platform>_SMF_MSS_v1.41_A_region.bin
```

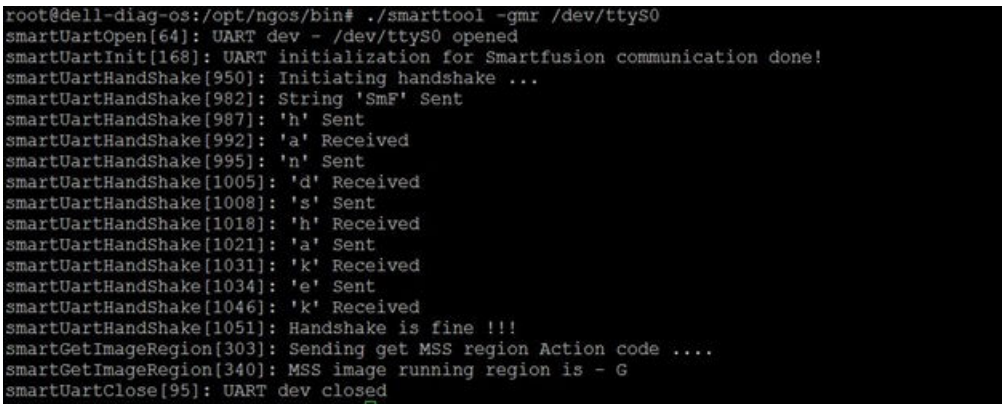
1 Copy all the binaries needed for the upgrade into a local directory.

Figure 8. Copy All Needed Binaries



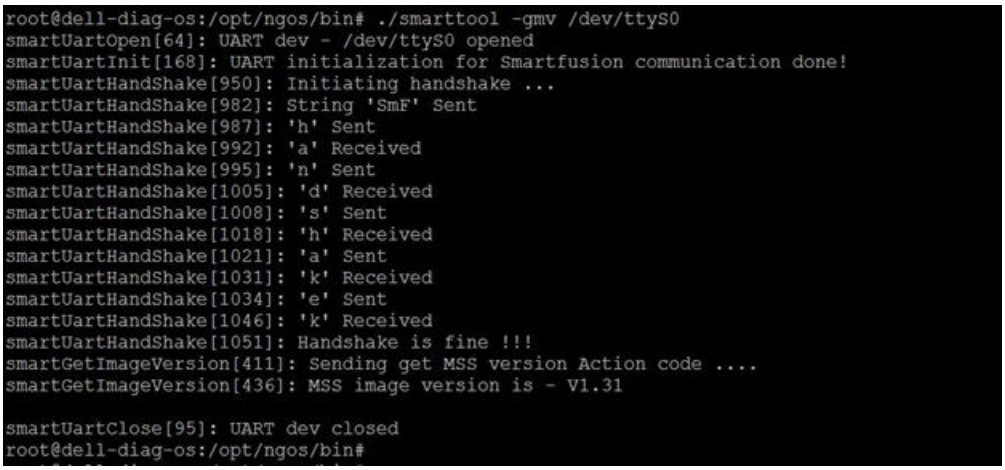
2 Check the MSS region using the `smarttool -gmr /dev/ttyS0` command.

Figure 9. Check the MSS Region



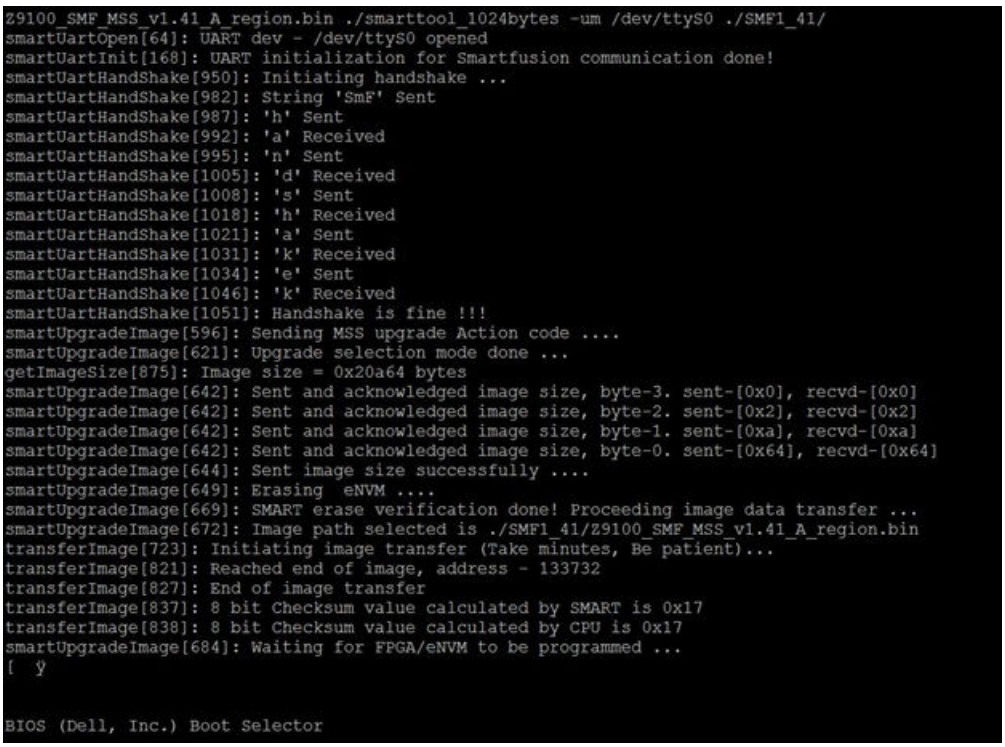
3 Check the MSS version using `smarttool -gmv /dev/ttyS0` command.

Figure 10. Check the MSS Version



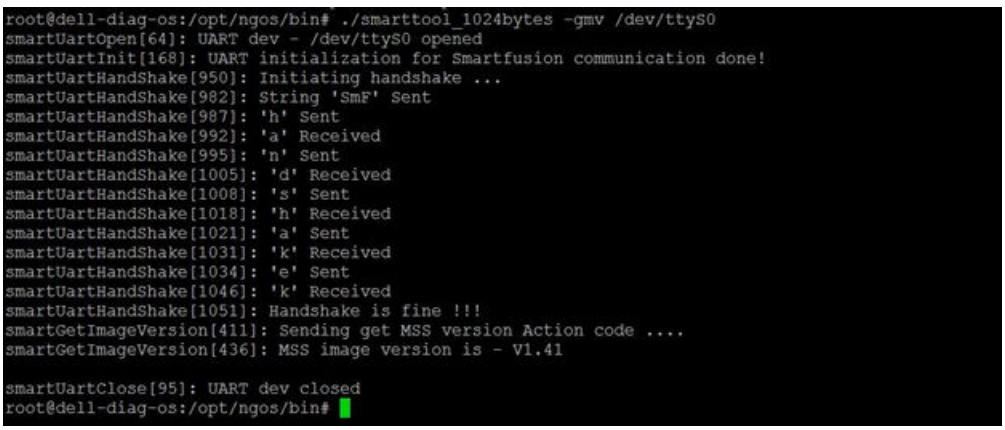
4 Because the MSS is running in region G in this example, use the region A image to upgrade your device: `smarttool -um /dev/ttyS0 <Path_to_the_image>/<platform>_SMF_MSS_v1.41_A_region.bin`. The device automatically reboots after the upgrade.

Figure 11. Upgrade Using Region A



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

Figure 12. Check the MSS Upgrade

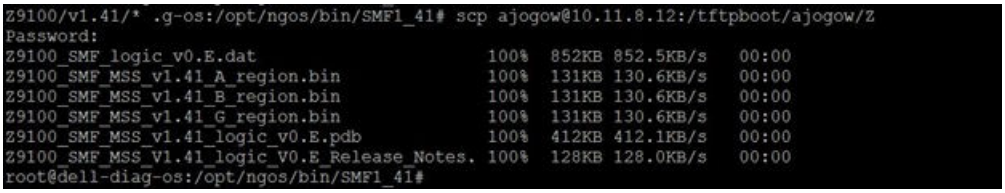


Upgrading SMF FPGA

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

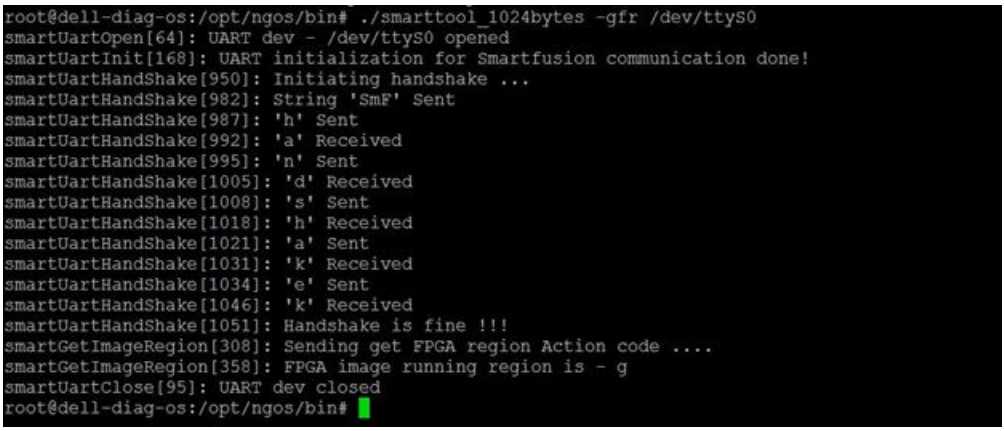
1 Copy all the binaries needed for upgrade into a local directory.

Figure 13. Copy the Needed Binaries



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

Figure 14. Check the FPGA Region



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

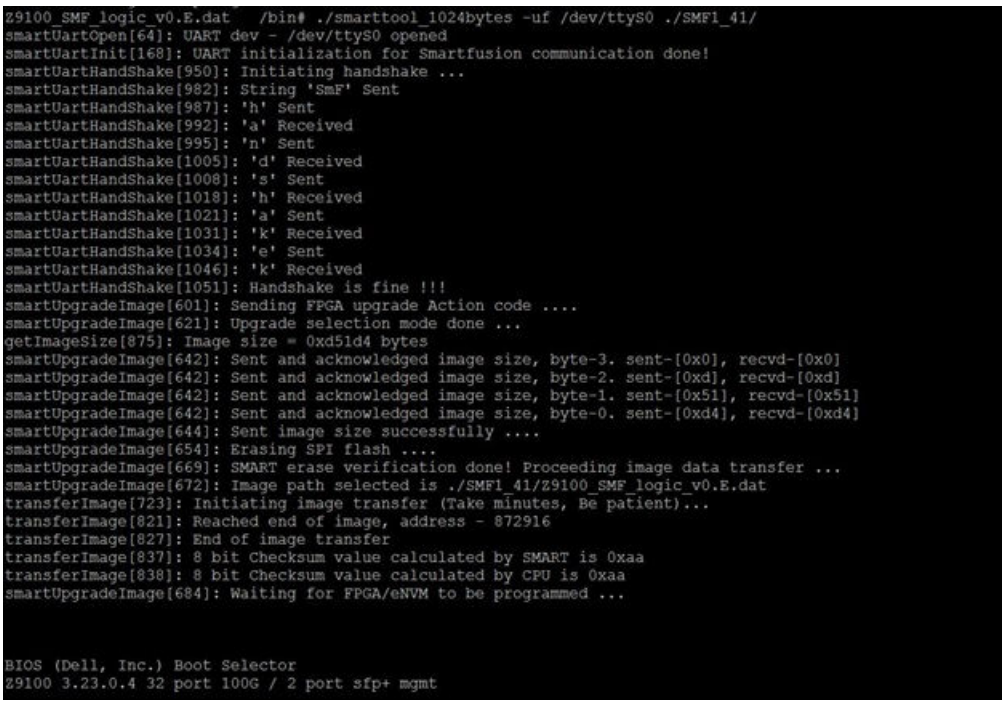
Table 1. Smartfusion FPGA Registers

Offset	Name	Description
0x200	SMF_VER	Smartfusion FPGA version register

Figure 15. Get the 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. You must be in region G to upgrade to region A. The device automatically reboots after the upgrade.

Figure 16. Upgrade the FPGA



5 Verify that the FPGA is upgraded using the `lpctool` utility. You can 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.

CLI Options

```
root@dell-diag-os:~# smbiostool
Dell Diag - SMBIOS Tool
version 1.1, 1.10
build, 2016/01/04,

Syntax: smbiostool <option>
                        --h := show this help
                --biosversion := Print the BIOS version
            --biosflashdetect := Check whether the SPI flash was detected
                  --bioserase := Erase the BIOS
          --bioswrite FILEPATH := Program a new BIOS into SPI flash
           --biosread FILEPATH := Take a backup of the Current running BIOS
                --biosdumpall := Dump the DMI table
    --biosdumpfields [SUBOPT] := Check whether the SPI flash was detected
                 SUBOPT for --biosdumpfields :
                           -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
3.23.0.5

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

--bioserase, --biosread and --bioswrite I cannot get you output for as I am not sure how
destructive they are.
```

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 prior to the test. You can run additional 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

```
Dell Diag - Storage Tool
version 1.1, 1.10
build, 2014/11/10,
Syntax: storagetool <option>
  --h := show this help
  --mountusb := mount usb device when inserted (mandatory)
  --unmountusb := unmount usb device before removed (mandatory)
  --list := list devices
  --test <--dev=listedDevice> := test devices (empty for all)
  --smart <--dev=device> := get the smart status for a device
  --bonnie := Run the bonnie tools on the filesystems
```

- `list` — Lists any devices that are mounted and tested.
- `test` — Performs the file-level tests on the device.
- `smart` — Displays the SMART media data from the device (if you enabled SMART).
- `bonnie` — Runs the bonnie tests on the device.

NOTE: `Bonnie` returns a failure message when storage is more than 80% full.

- `mountusb` — Mounts the USB device before testing it. You must use this option before testing or retrieving status.
- `unmountusb` — Unmounts the USB device before physically removing it. This option is mandatory.

Output

list Output

```
root@amazon:/opt/ngos/bin# ./storagetool --list
Mounted Filesystem Devices:
/dev/sda7 / ext4
```

test Output

```
root@amazon:/opt/ngos/bin# ./storagetool --test --dev=/dev/sda7
Testing Storage Devices ............. Passed
```

smart Output

```
root@amazon:/opt/ngos/bin# ./storagetool --smart --dev=/dev/sda7
smartctl 6.2 2013-07-26 r3841 [x86_64-linux-3.14.0-rc8] (local build)
Copyright (C) 2002-13, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF INFORMATION SECTION ===
Device Model: ATP IG CFast
Serial Number: 99001130930331400083
Firmware Version: L0412C
User Capacity: 15,829,303,296 bytes [15.8 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)
Local Time is: Mon Jan 12 22:47:45 2015 UTC
SMART support is: Available - device has SMART capability.
SMART support is: Enabled

=== START OF READ SMART DATA SECTION ===
SMART overall-health self-assessment test result: PASSED
See vendor-specific Attribute list for marginal Attributes.

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: ( 0) seconds.
Offline data collection
capabilities: (0x00) Offline data collection not supported.
SMART capabilities: (0x0002) Does not save SMART data before
  entering power-saving mode.
  Supports SMART auto save timer.
Error logging capability: (0x00) Error logging NOT supported.
  General Purpose Logging supported.

SMART Attributes Data Structure revision number: 1
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 100 100 000 Old_age Offline - 0
  5 Reallocated_Sector_Ct 0x0000 100 100 000 Old_age Offline - 0
  9 Power_On_Hours 0x0000 100 100 000 Old_age Offline - 3490
  192 Power-Off_Retract_Count 0x0000 100 100 000 Old_age Offline - 0
  194 Temperature_Celsius 0x0000 100 100 000 Old_age Offline - 27
  195 Hardware_ECC_Recovered 0x0000 100 100 000 Old_age Offline - 0
```

```
  196 Reallocated_Event_Count 0x0000 100 100 016 Old_age Offline - 0
  198 Offline_Uncorrectable 0x0000 100 100 050 Old_age Offline - 0
  199 UDMA_CRC_Error_Count 0x0000 100 100 050 Old_age Offline - 0
  12 Power_Cycle_Count 0x0000 100 100 000 Old_age Offline - 157
  241 Total_LBAs_Written 0x0000 100 100 000 Old_age Offline - 4696
  242 Total_LBAs_Read 0x0000 100 100 000 Old_age Offline - 1267
  160 Unknown_Attribute 0x0000 100 100 000 Old_age Offline - 0
  161 Unknown_Attribute 0x0000 100 100 000 Old_age Offline - 142
  163 Unknown_Attribute 0x0000 100 100 000 Old_age Offline - 16
  164 Unknown_Attribute 0x0000 100 100 000 Old_age Offline - 37861
  165 Unknown_Attribute 0x0000 100 100 050 Old_age Offline - 63
  166 Unknown_Attribute 0x0000 100 100 050 Old_age Offline - 0
  167 Unknown_Attribute 0x0000 100 100 100 Old_age Offline FAILING_NOW 18

Read SMART Log Directory failed: scsi error aborted command

SMART Error Log not supported

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

Selective Self-tests/Logging not supported
```

bonnie Output

```
root@amazon:/opt/ngos/bin# ./storagetool --bonnie --dev=/dev/sda7
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
amazon.dell-ng 400M 12984 96 185593 99 298978 99 14300 99 +++++ +++ +++++ +++
  ------Sequential Create------ --------Random Create--------
  -Create-- --Read--- -Delete-- -Create-- --Read--- -Delete--
  files /sec %CP /sec %CP /sec %CP /sec %CP /sec %CP /sec %CP
  32 16190 97 +++++ +++ 22056 99 17050 99 +++++ +++ 19644 93
amazon.dellngos.
com,400M,12984,96,185593,99,298978,99,14300,99,+++++,+++,+++++,+++,32,16190,97,+++++,+++,
22056,99,17050,99,+++++,+++,19644,93
```

smartctl

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

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 region 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.

```
> smartctl -h
smartctl 6.2 2013-07-26 r3841 [x86_64-linux-3.13.0-27-generic] (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, 3w  are,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 --quietmode=errorsonly /dev/hda
  (Prints Self-Test & Attribute errors)
smartctl --all --device=3ware,2 /dev/sda
smartctl --all --device=3ware,2 /dev/twe0
smartctl --all --device=3ware,2 /dev/twa0
smartctl --all --device=3ware,2 /dev/twl0
  (Prints all SMART info for 3rd ATA disk on 3ware RAID controller)
smartctl --all --device=hpt,1/1/3 /dev/sda
  (Prints all SMART info for the SATA disk attached to the 3rd PMPort
  of the 1st channel on the 1st HighPoint RAID controller)
smartctl --all --device=areca,3/1 /dev/sg2
  (Prints all SMART info for 3rd ATA disk of the 1st enclosure
  on Areca RAID controller)

The smartctl can be used directly from the command line, but for logging purposes it is best to
issue through the storagetool

If SMART is not enabled on a device you can use the command
  smartctl --smart=on /dev/<device>
```

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, Dell Networking recommends using bonnie++ within storagetool.

```
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
We run bonnie++ in the system using the parameters
  ./bonnie++ -u root:0 -s 400 -n 32 -r 200 -d /tmp
```

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

```
Dell Diag - Temperature Tool
version 2.0
admin, 2014-10-01, bamboo-build-num
Syntax: ./temptool <option>
  --h := show this help
  --test --config=<config_file> := test the pre-programmed configuration
  --show --config=<config_file> := show current temp device values for
```

- 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/ngos/bin# ./temptool --test --lpc
Testing Temp sensor  devices:
No. of sensors in the system  :6
Temperature Sensor 1 temperature value is 34.7 C and temperature is normal
```

```
..................... Passed
Temperature Sensor 2 temperature value is 45.7 C and temperature is normal
..................... Passed
Temperature Sensor 3 temperature value is 17.2 C and temperature is normal
..................... Passed
Temperature Sensor 4 temperature value is 17.7 C and temperature is normal
..................... Passed
Temperature Sensor 6 temperature value is 21.6 C and temperature is normal
..................... Passed
Temperature Sensor 9 temperature value is 22.2 C and temperature is normal
..................... Passed
Temp Sensors: Overall test results -------------------- >>> Passed
root@dell-diag-os:/opt/ngos/bin#


root@dell-diag-os:/opt/ngos/bin# ./temptool --show
Show Temperature Sensors:
root@dell-diag-os:/opt/ngos/bin# ./temptool --show --lpc
Temperature Sensor 1 temperature value is 34.7 C
Temperature Sensor 2 temperature value is 45.6 C
Temperature Sensor 3 temperature value is 17.3 C
Temperature Sensor 4 temperature value is 18.1 C
Temperature Sensor 6 temperature value is 21.6 C
Temperature Sensor 9 temperature value is 22.1 C
root@dell-diag-os:/opt/ngos/bin#
```

show Output

```
root@amazon:/opt/ngos/bin# ./temptool --show --config=/etc/dn/diag/gpio_01_sensors.cfg
Show Temperature Sensors:
Checking sensor: [MAC sensor]
  LM75 sensor temperature 31.0 C
Checking sensor: [NIC sensor]
  LM75 sensor temperature 30.0 C
Checking sensor: [AMB sensor]
  LM75 sensor temperature 25.0 C
```

Configuration File Format

The temperature sensor configuration file displays each sensor on its own line.

- `Sensor Name` — The name that describes the purpose of the sensor.
- `Sensor Driver Type` — The type of chip used for the sensor. LM75, MAX6699, and EMC1428 are supported.

```
TEMPLATE:Name of sensor|sensor type|dev bus path|dev adrs|Muxes|low|warn|critical|COMMENTS
Inlet Ambient Sensor |MAX6699|/dev/i2c-3|0x1a|0|/dev/i2c-3 0x73:0x0:0xff:0x40:,:0x71:0x0:0xff:
0x2|-5|45|50|Front to Rear - U7273
Inlet Ambient Sensor |MAX6699|/dev/i2c-3|0x1a|1|/dev/i2c-3 0x73:0x0:0xff:0x40:,:0x71:0x0:0xff:
0x2|-5|45|50|Front to Rear - Q7000
Inlet Ambient Sensor |MAX6699|/dev/i2c-3|0x1a|2|/dev/i2c-3 0x73:0x0:0xff:0x40:,:0x71:0x0:0xff:
0x2|-5|45|50|Rear to Front - Q7001
Helix Shutdown Sensor|MAX6699|/dev/i2c-3|0x1a|3|/dev/i2c-3 0x73:0x0:0xff:0x40:,:0x71:0x0:0xff:
0x2|-5|45|50|Front to Rear - Q7751
Helix Shutdown Sensor|MAX6699|/dev/i2c-3|0x1a|4|/dev/i2c-3 0x73:0x0:0xff:0x40:,:0x71:0x0:0xff:
0x2|-5|45|50|Rear to Front - Q7752
CPU Errata Sensor|MAX6699|/dev/i2c-3|0x1a|1|/dev/i2c-3 0x73:0x0:0xff:0x2|-5|45|50|Front to Rear
- Q5
CPU Errata Sensor|MAX6699|/dev/i2c-3|0x1a|2|/dev/i2c-3 0x73:0x0:0xff:0x2|-5|45|50|Rear to Front
- Q6
```

vmetool

The `CPLDupgradetool` uses `vmetool` to upgrade CPLD.

CLI Options

```
root@dell-diag-os:/opt/dell/diag/bin# vmetool
                Lattice Semiconductor Corp.

             ispVME(tm) V12.2 Copyright 1998-2011.
```

Outputs

The following shows daisy chain programming of all in-system programmable devices.

```
Usage: vme [option] vme_file [vme_file]
Example: vme vme_file1.vme vme_file2.vme
Example: vme -c | -cl | -ch
Example: where sel_pin will be LOW for -cl option and HIGH for -ch
Example: vme -c | -cl | -ch vme_file1.vme vme_file2.vme

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

edatool

The `edatool` is included in the diagnostic tools. Use the tool to test the basic functionality of the system.

The `edatool` executes a script of simple commands, similar to commands in the CLI. In most cases, these tests are run by the diagnostics tools. The success or failure of these tools is reported, and at the end of the `edatool` run, reports the PASSED or FAILED results in a standard format easily parsed by test scripts.

Tests

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

CLI Options

```
Dell Diag - Extended Diagnostics Application
version 1.4, 1.10
build, 2015/07/13,
Syntax: edatool <option>
  --h := show this help
  --list := lists tests in config files
  --config=<config file> := Config file to use for tests
  --extended-config=<config file> : Config file to use for extended tests
```

Output

```
root@dell-diag-os:~# edatool
****************************
*  Diagnostics Application  *
****************************
Dell Diag edatool version 1.4, package 1.10 2016/01/04
```

```
Dell Diag cputool - version 1.1 package 1.10 2016/01/04
Dell Diag fantool - version 1.5 package 1.10 2016/01/04
Dell Diag gpiotool - version 1.4 package 1.10 2016/01/04
Dell Diag i2ctool - version 1.5 package 1.10 2016/01/04
Dell Diag ledtool - version 1.0 package 1.10 2016/01/04
Dell Diag lpctool - version 1.0 package 1.10 2016/01/04
Dell Diag memtool - version 1.5 package 1.10 2016/01/04
Dell Diag nputool - version 1.0 sdk-6.4.8 package 1.10 2016/01/04
Dell Diag nvramtool - version 1.5 package 1.10 2016/01/04
Dell Diag opticstool - version 1.0 package 1.10 2016/01/04
Dell Diag pcitool - version 1.5 package 1.10 2016/01/04
Dell Diag phytool - version 1.1 package 1.10 2016/01/04
Dell Diag pltool - version 1.5 package 1.10 2016/01/04
Dell Diag psutool - version 1.4 package 1.10 2016/01/04
Dell Diag rtctool - version 1.1 package 1.10 2016/01/04
Dell Diag smbiostool - version 1.1 package 1.10 2016/01/04
Dell Diag storagetool - version 1.1 package 1.10 2016/01/04
Dell Diag temptool - version 1.4 package 1.10 2016/01/04
Testing PCI devices:
+ Checking PCI 00:00.0, ID=1f0c8086 ..................... 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=b96014e4 ..................... Passed
+ Checking PCI 01:00.1, ID=b96014e4 ..................... Passed
+ Checking PCI 02:00.0, ID=260812d8 ..................... Passed
+ Checking PCI 03:01.0, ID=260812d8 ..................... Passed
+ Checking PCI 03:02.0, ID=260812d8 ..................... Passed
+ Checking PCI 03:03.0, ID=260812d8 ..................... Passed
+ Checking PCI 03:04.0, ID=260812d8 ..................... Passed
+ Checking PCI 08:00.0, ID=702110ee ..................... Passed
PCI devices: Overall test results ------------------- >>> Passed
Testing I2C devices:

Checking I2C devices on bus 1:

+ Checking Clock GEN             0x69  ..... Passed

+ Checking DDR3 VREF Tuning      0x2e  ..... Passed

+ Checking SPD0                  0x50  ..... Passed

Checking I2C devices on bus 2:

+ Checking CPU Board I2C Mux     0x70  ..... Passed

+ Checking CPU Board EEPROM1     0x50  ..... Passed

+ Checking CPU Board EEPROM2     0x51  ..... Passed

+ Checking CPU Board EEPROM3     0x52  ..... Passed

+ Checking CPU Board EEPROM4     0x53  ..... Passed

+ Checking CPU Board EEPROM5     0x54  ..... Passed

+ Checking CPU Board EEPROM6     0x55  ..... Passed

+ Checking CPU Board EEPROM7     0x56  ..... Passed

+ Checking CPU Board EEPROM8     0x57  ..... Passed
```

```
+ Checking Switch Brd EEPROM     0x50  ..... Passed

+ Checking Switch Brd CPLD       0x3e  ..... Passed

+ Checking SFP1 EEPROM           0x50  ..... Passed

+ Checking SFP2 EEPROM           0x50  ..... Passed

+ Checking IOM_1 CPLD            0x3e  ..... Passed

+ Checking IOM_1 EEPROM          0x50  ..... Passed

+ Checking IOM_1 QSFP1           0x50
Error reading at offset 0x00
..... FAILED <<<---

+ Checking IOM_1 QSFP2           0x50  ..... Passed

+ Checking IOM_1 QSFP3           0x50  ..... Passed

+ Checking IOM_1 QSFP4           0x50  ..... Passed

+ Checking IOM_1 QSFP5           0x50  ..... Passed

+ Checking IOM_1 QSFP6           0x50  ..... Passed

+ Checking IOM_1 QSFP7           0x50  ..... Passed

+ Checking IOM_1 QSFP8           0x50  ..... Passed

+ Checking IOM_2 CPLD            0x3e  ..... Passed

+ Checking IOM_2 EEPROM          0x50  ..... Passed

+ Checking IOM_2 QSFP1           0x50  ..... Passed

+ Checking IOM_2 QSFP2           0x50  ..... Passed

+ Checking IOM_2 QSFP3           0x50  ..... Passed

+ Checking IOM_2 QSFP4           0x50  ..... Passed

+ Checking IOM_2 QSFP5           0x50  ..... Passed

+ Checking IOM_2 QSFP6           0x50  ..... Passed

+ Checking IOM_2 QSFP7           0x50  ..... Passed

+ Checking IOM_2 QSFP8           0x50  ..... Passed

+ Checking IOM_3 CPLD            0x3e  ..... Passed

+ Checking IOM_3 EEPROM          0x50  ..... Passed

+ Checking IOM_3 QSFP1           0x50  ..... Passed

+ Checking IOM_3 QSFP2           0x50  ..... Passed

+ Checking IOM_3 QSFP3           0x50  ..... Passed

+ Checking IOM_3 QSFP4           0x50  ..... Passed

+ Checking IOM_3 QSFP5           0x50  ..... Passed

+ Checking IOM_3 QSFP6           0x50  ..... Passed

+ Checking IOM_3 QSFP7           0x50  ..... Passed

+ Checking IOM_3 QSFP8           0x50  ..... Passed
```

```
+ Checking IOM_4 CPLD           0x3e  ..... Passed

+ Checking IOM_4 EEPROM         0x50  ..... Passed

+ Checking IOM_4 QSFP1          0x50  ..... Passed

+ Checking IOM_4 QSFP2          0x50  ..... Passed

+ Checking IOM_4 QSFP3          0x50  ..... Passed

+ Checking IOM_4 QSFP4          0x50  ..... Passed

+ Checking IOM_4 QSFP5          0x50  ..... Passed

+ Checking IOM_4 QSFP6          0x50  ..... Passed

+ Checking IOM_4 QSFP7          0x50  ..... Passed

+ Checking IOM_4 QSFP8          0x50  ..... Passed
I2C Devices: Overall test results --------------------- >>> FAILED <<<---
Power Supply Test all
Getting details of Power Supply 1 using LPC interface

Power Supply 1 is Present
Power Supply 1 Input Type DC
Power Supply 1 Output Voltage High
Power Supply 1 Output Voltage Low
Power Supply 1 Type Mismatching
Power Supply 1 Input Voltage(VIN) : 208.750000 V
Power Supply 1 Output Voltage(VOUT) : 12.210000 V
Power Supply 1 Input Current(IIN) : 1.230000 A
Power Supply 1 Output Current(IOUT) : 19.370000 A
Power Supply 1 Input Power(PIN) : 256.000000 W
Power Supply 1 Output Power(POUT) : 236.500000 W
Power Supply 1 Temperature : 48.000000 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) : 2576
Getting details of Power Supply 2 using LPC interface

Power Supply 2 is Present
Power Supply 2 Input Type DC
Power Supply 2 Output Voltage High
Power Supply 2 Output Voltage Low
Power Supply 2 Type Mismatching
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) : 0
Power Supply Test ........................... Passed
Fan Controller Test LPC.....................
Max number of Fan Trays in the System : 4
Number of fans per tray : 1
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 3561 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 3581 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 3577 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 3526 RPM
Fan Controller Test LPC..................... Passed
Fan Controller Test LPC.....................
Max number of Fan Trays in the System : 4
Number of fans per tray : 1
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 3558 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 3581 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 3577 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 3526 RPM
Fan Controller Test LPC........................ Passed
Fan 1 speed is 3558 RPM
Fan 2 speed is 3581 RPM
Fan 3 speed is 3577 RPM
Fan 4 speed is 3529 RPM
optional module index :1
Slot:0, opt slot :0, Type:2
optional module index :2
Slot:1, opt slot :1, Type:2
optional module index :3
Slot:2, opt slot :2, Type:2
optional module index :4
Slot:3, opt slot :3, Type:2
Testing Temp sensor  devices:
No. of sensors in the system  :10
Temperature Sensor 1 temperature value is 31.2 C and temperature is normal
........................ Passed
Temperature Sensor 2 temperature value is 32.7 C and temperature is normal
........................ Passed
Temperature Sensor 3 temperature value is 29.3 C and temperature is normal
........................ Passed
Temperature Sensor 4 temperature value is 28.2 C and temperature is lower than HW lower
threshold
........................ FAILED <<<---
Temperature Sensor 5 temperature value is 28.7 C and temperature is normal
........................ Passed
Temperature Sensor 6 temperature value is 29.2 C and temperature is normal
........................ Passed
Temperature Sensor 7 temperature value is 29.3 C and temperature is normal
........................ Passed
Temperature Sensor 8 temperature value is 30.2 C and temperature is normal
........................ Passed
Temperature Sensor 9 temperature value is 27.7 C and temperature is normal
........................ Passed
Temperature Sensor 10 temperature value is 20.1 C and temperature is normal
```

```
..................... Passed
Temp Sensors: Overall test results -------------------- >>> FAILED <<<---
Testing Programmable Devices:
PL Tool test:
IOM1CPLD: SW_SCRATCH..................... Passed
IOM2CPLD: SW_SCRATCH..................... Passed
IOM3CPLD: SW_SCRATCH..................... Passed
IOM4CPLD: SW_SCRATCH..................... Passed
CPLD1 ..................... Passed
SmartFusion FPGA ..................... Passed
bus:dev.fn 08:00.0
[00000000]: 0xee 0x10 0x21 0x70 0x07 0x00 0x10 0x00 0x00 0x00 0x00 0x00 0x10 0x00 0x00 0x00
|| ..!p............
[00000010]: 0x00 0x00 0xe0 0xdf 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 0xee 0x10 0x07 0x00
|| ................
[00000030]: 0x00 0x00 0x00 0x00 0x40 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x07 0x01 0x00 0x00
|| ....@...........
[00000040]: 0x01 0x48 0x23 0x00 0x08 0x00 0x00 0x00 0x05 0x60 0x80 0x00 0x00 0x00 0x00 0x00
|| .H#......`......
[00000050]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
|| ................
[00000060]: 0x10 0x00 0x02 0x00 0x29 0x80 0xe8 0x07 0x27 0x28 0x00 0x00 0x12 0xf4 0x03 0x00
|| ....)...'(......
[00000070]: 0x40 0x00 0x12 0x10 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00  ||
@...............
[00000080]: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
|| ................
[00000090]: 0x02 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
|| ................
[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 0x00
|| ................

  Base Address 0: Memory at 0xdfe00000.
  Base Address 1: Memory at 0x00000000.
  Base Address 2: Memory at 0x00000000.
  Base Address 3: Memory at 0x00000000.
  Base Address 4: Memory at 0x00000000.
  Base Address 5: Memory at 0x00000000.
  Address 0 at 0xdfe00000, 32 bit
  Extended capabilities, first structure at offset 0x40.
  Extended PCI capability type 1 at 0x40, next 72.
   Power management entry ver. 3: Capabilities 0023, Ctrl 0008, Event 0000.
   Power state D0.
  Extended PCI capability type 5 at 0x48, next 96.
  Extended PCI capability type 16 at 0x60, next 0.

Xilinx FPGA ..................... Passed
PL Tool: Overall test results ------------------------ >>> Passed
Show Optics in System
Port #  Name       Status  Type    Part Number      Rev  Serial Number
------  --------   ------  ------- ---------------  ---  ---------------
   1    IOM1 QSFP   REMOVED
   2    IOM1 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513002D
   3    IOM1 QSFP   PRESENT QSFP28  1PCP8             X0   LEO15130015
   4    IOM1 QSFP   PRESENT QSFP28  1PCP8             X0   LEO15130029
   5    IOM1 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513007Q
   6    IOM1 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513009G
   7    IOM1 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513007R
   8    IOM1 QSFP   PRESENT QSFP28  1PCP8             X0   LEO151300AJ
```

```
  17    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513001M
  18    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513002C
  19    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO15130016
  20    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO15130011
  21    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513008D
  22    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513009X
  23    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513009P
  24    IOM2 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513009R
  33    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO15130091
  34    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO151300AL
  35    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO151300AK
  36    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO151300AW
  37    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513008V
  38    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO151300AN
  39    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513008G
  40    IOM3 QSFP   PRESENT QSFP28  1PCP8             X0   LEO151300C0
  49    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO151300AV
  50    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513003M
  51    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513002X
  52    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513001Q
  53    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513006G
  54    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513003A
  55    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513002Q
  56    IOM4 QSFP   PRESENT QSFP28  1PCP8             X0   LEO1513004N
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
Testing RTC Devices ....................
Testing RTC Device for rollover  ....................
Set Current RTC date to 1/1/2000, RTC time to 00:00:59.
Set Current RTC date to 1/1/2000, RTC time to 00:59:59.
Set Current RTC date to 1/1/2000, RTC time to 23:59:59.
Set Current RTC date to 1/31/2000, RTC time to 23:59:59.
Set Current RTC date to 12/31/2000, RTC time to 23:59:59.
Set Current RTC date to 2/7/2000, RTC time to 07:30:52.
Passed
Mounted Filesystem Devices:
/dev/sda3 / ext4
rmmod: ERROR: Module linux_user_bde is not currently loaded
rmmod: ERROR: Module linux_kernel_bde is not currently loaded
DMA pool size: 16777216
PCI unit 0: Dev 0xb960, Rev 0x01, Chip BCM56960_A0, Driver BCM56960_A0
sysconf_probe successful
global_sal_config successful
***  1 BCM devices are detected
SOC unit 0 attached to PCI device BCM56960_A0
*** unit 0: configured for normal latency
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
```

```
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
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Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
Starting Firmware download through MDIO,  it takes few seconds...
Firmware download through MDIO success
0:phy_84740_init: 84752 init u=0 port=66 rom code ver. 0x105: MDIO_TO_RAM boot
0:phy_84740_init: 84752 init u=0 port=100 rom code ver. 0x105: MDIO_TO_RAM boot
*** unit 0: ports capable of limited speed range cut-thru
0:bcmi_xgs5_bfd_init: uKernel BFD application not available
Current mode is now ESW
Diag NPU initialization over
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 104 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 105 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 103 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 69 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 44 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 45 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 43 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 11 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 12 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 16 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 49 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 72 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 73 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 75 is DOWN
```

```
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 106 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 107 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 6 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 115 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 82 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 83 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 81 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 40 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 41 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 113 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 4 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 34 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 35 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 37 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 76 is DOWN
ERROR: npu_link_status_test[61]: ERROR: NPU 0 - Port 77 is DOWN
         Test link_status_test for NPU 0 ......... FAILED <<<---
       Test snake_traffic_test for NPU 0 ......... SKIPPED <<<---
            Test prbs_mac_test for NPU 0 ......... SKIPPED <<<---
            Test prbs_ext_test for NP0 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 ....................................... FAILED <<<---

EDA: Overall test results -------------------- >>> FAILED <<<---
```

Configuration File Format

Find the standard configuration files in the `/etc/dn/diag` directory. The configuration files are `default_eda_script.cfg` and `default_eda_extended_script.cfg` that hold the scripts for normal and extended tests, respectively.

The configuration file format has a single command on a single line. The `edatool` does not use the complex shell script constructs in the configuration file.

```
root@dell-diag-os:/etc/dn/diag# cat default_eda_script.cfg
cputool --version
fantool --version
gpiotool --version
i2ctool --version
ledtool --version
lpctool --version
memtool --version
nputool --version
nvramtool --version
opticstool --version
pcitool --version
phytool --version
pltool --version
psutool --version
rtctool --version
smbiostool --version
storagetool --version
temptool --version
pcitool --test
i2ctool --test
psutool --test --lpc
fantool --test --lpc
fantool --short-test --lpc
fantool --get --fan=all --lpc
temptool --test --lpc
pltool --test
opticstool --show
memtool --test
rtctool --test
```

```
storagetool --list
nputool -i -t 0

root@dell-diag-os:/etc/dn/diag# cat default_eda_extended_script.cfg
ledtool --test
```

Do not modify the default scripts as they are used as tests for the general health status of the switch. Instead, you can write your own scripts and use them through `edatool` using the `--config=` and `--extended-config=` parameters, as shown.

```
root@dell-diag-os:/etc/dn/diag# edatool --config=/etc/dn/diag/eda.test
The extended tests are only run if the EDA Extended Tests bit is set in the NVRAM using the
nvramtool
EDA Control Bits : offset 0x55 = 0x1
5:4 EDA Verbose Level = 0
  3 EDA Extended Tests = 0
  2 EDA Verbose Mode = 0
  1 EDA Stop on Error = 0
  0 EDA Enable = 1
```

Verbose Mode

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

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

   ```
   nvrammtool –write --reg=0x55 –val= xx10x1xx
   ```
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.

Diagnostic Packaging

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

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

6

Technical Support

This chapter contains the following sections:

Topics:

- Dell Support
- Contacting the Technical Assistance Center
- Requesting a Hardware Replacement

Dell Support

Dell Support provides a range of documents and tools to assist you with effectively using Dell Networking equipment and mitigating the impact of network outages.

Through Dell Support you can obtain technical information regarding Dell Networking products, access to software upgrades and patches, and open and manage your Technical Assistance Center (TAC) cases. Dell Networking Support provides integrated, secure access to these services.

Accessing Support Services

The URL for Dell Support is http://www.dell.com/support. You must have a userid and password to access Support services. If you do not have a userid and password, you can request these at the website.

To request a userid, password, and Dell Support services, follow these steps.

1 On the Dell Networking Support page, click the **Account Request** link.

2 Fill out the User Account Request form and click **Send**. You will receive your userid and password by email.

3 To access Dell Support services, click the **LOGIN** link and enter your userid and password.

Contacting the Technical Assistance Center

How to Contact Dell Networking TAC	Log in to Dell Support at http://www.dell.com/support and select the Service Request tab.
Information to Submit When Opening a Support Case	• Your name, company name, phone number, and email address • Preferred method of contact • Model number • Software version number • Symptom description

Managing Your Case	Log in to Dell Support and select the **Service Request** tab to view all open cases and Return Materials Authorizations (RMAs).
Technical Documentation	Log in to Dell Support and select the **Documents** tab. You can access this page without logging in using the **Documentation** link on the Support page.
Contact Information	Web: http://www.dell.com. Email: Networking-Support@Dell.com Telephone: • US and Canada: 1.866.965.5800 • International: +1.800.456.3355

Requesting a Hardware Replacement

To request replacement hardware, follow these steps.

1 Determine the part number and serial number of the component.
To list the numbers for all components installed in the chassis, use the `show hardware` command.

2 Request an RMA number from TAC by opening a support case. Open a support case by:
- Using the Create Service Request form on the Support page.
- Contacting Dell Networking directly by email or by phone.
- Provide the following information when using email or phone:
  - Part number, description, and serial number of the component.
  - Your name, organization name, telephone number, fax number, and email address.
  - Shipping address for the replacement component, including a contact name, phone number, and email address.