Chassis Management for NVIDIA®-Mellanox® Switch Systems with Sysfs User Manual

Rev. 1.9

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1 Release Notes Update History

Revision	Date	Description
1.8	July 01, 2020	Added the following sections: • Read PSU VPD Info • Get Hot-plug Fan Number • Get Hot-plug PSU Number • Get Hot-plug PWR Number • Get FAN hot-plug event status • Get PSU hot-plug event status • PWR hot-plug event status • Read PSU min/max Fan Speed • Read/write Time Window for Thermal Control Periodic Log Report
1.7	Apr 13, 2020	Added the following sections: • 2.2.3 Read SFP Counter • 2.2.4 Read Module Counter • 2.2.5 Read Max System Fans (rotors) • 2.2.6 Read Fan Drawer Number • 2.6.3 Get CPLD Part Number • 2.6.4 Get CPLD Minor Version • 2.6.5 Get CPLD Full Version Modified the following sections: • 2.3.2 Read Fan Module EEPROM Data • 2.6.2 Get CPLD Major Version • 2.7.19 Read PSU Temperature • 2.7.26 Read Temperature Critical Module • 2.7.27 Read Temperature Emergency Module • 2.7.28 Read Temperature Fault Module • 2.7.29 Read Temperature Input Module
1.6	Apr 12, 2020	Modified “2.6.8 Get Reset Cause"
1.5	Nov 27, 2019	Modified “2.6.8 Get Reset Cause"
1.4	Sept 23, 2019	Added “2.6.3 Fan_Dir" Modified “2.6.8 Get Reset Cause"
1.3	June 13, 2019	Added: • Thermal” •

Revision	Date	Description
		• Watchdog”
1.2	April 12, 2019	Updated Sysfs
1.1	December 18, 2018	Added support for new systems
1.0	September 8, 2015	First release

2 Introduction

Mellanox hw-management package uses a virtual file system provided by the Linux kernel called sysfs.

The sysfs file system enumerates the devices and buses attached to the system in a file system hierarchy that can be accessed from the user space.

The major advantage of working with sysfs is that it makes HW hierarchy easy to understand and control without having to learn about HW component location and the buses through which they are connected.

2.1 Software Components

Figure 1 presents the software architecture layout and Figure 2 presents layer separation for sysfs support.

Figure 1 - System Architecture Layout

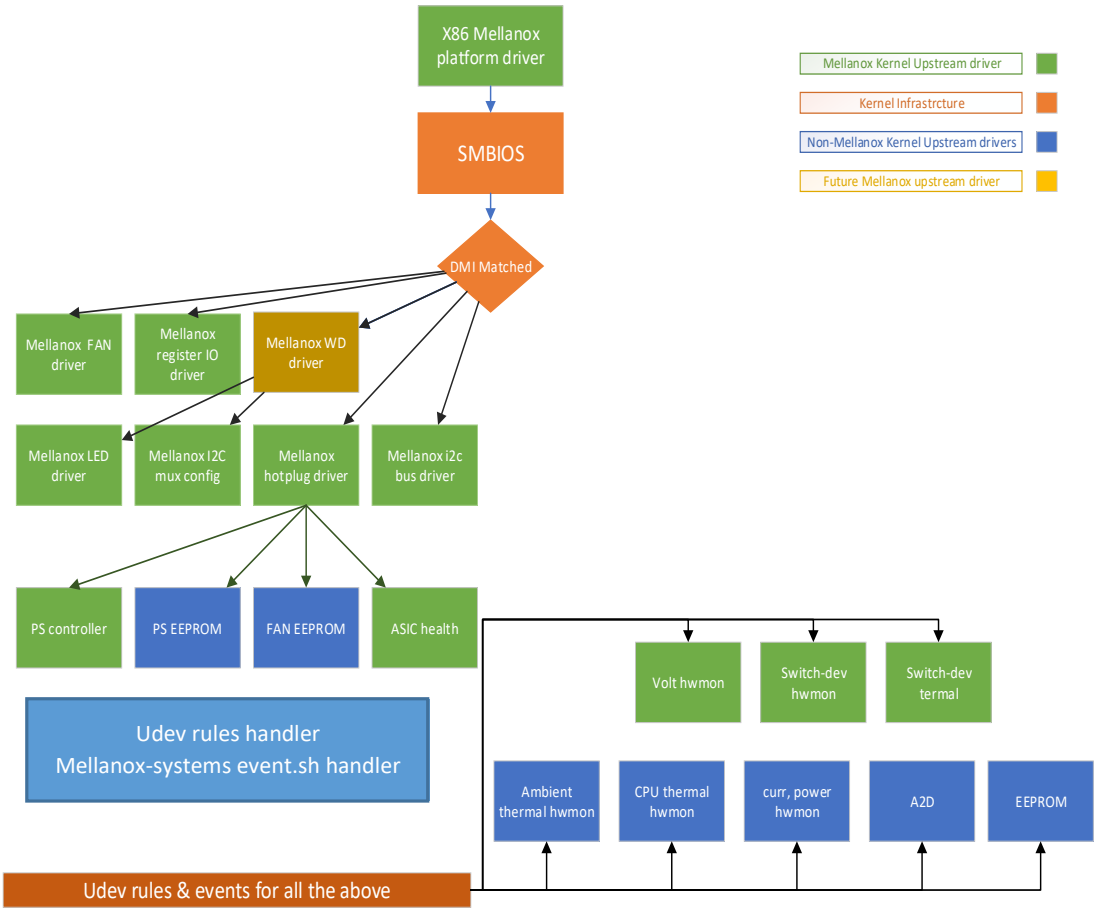
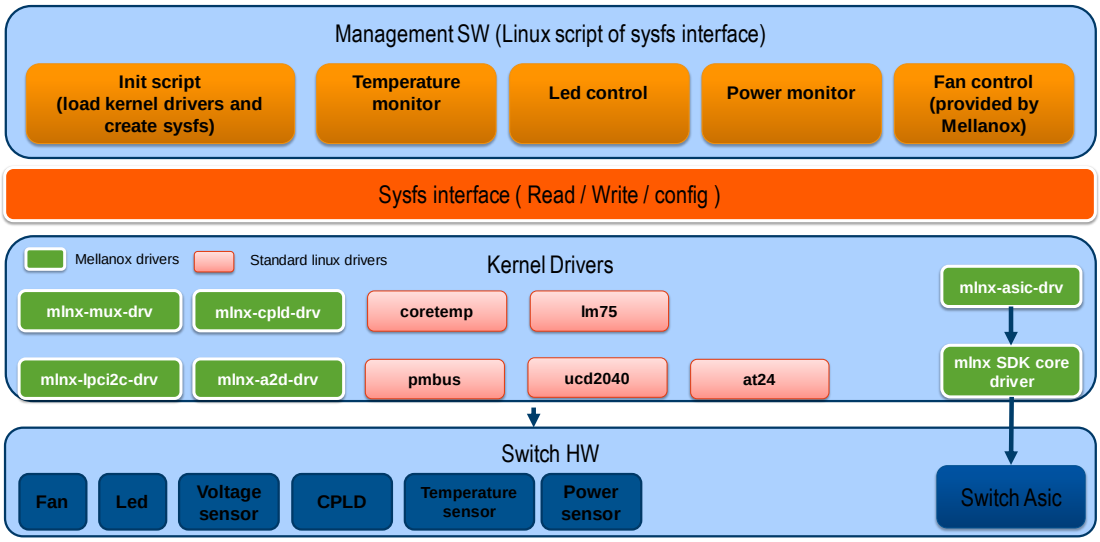


Figure 2 - Sysfs Layout



2.2 Hierarchy and Structure

The package uses the Linux default hierarchy structure of sysfs under the directory /var/run/hw-management.

This path is used by existing applications that use auto-discovery to find existing HW components. Two examples for such applications are:

- libsysfs – the libraries provide a consistent and stable interface for querying system device information exposed through sysfs.
- systool – a utility built upon libsysfs that lists devices by bus, class, and topology.

The disadvantage of using this path is that the hierarchy model includes the BUS type and location model which is subject to change between different system types.

To resolve this limitation, the virtual hierarchy structure that is not HW dependent is supported. This hierarchy is a collection of soft links to the default sysfs structure. This document describes the way to work with this hierarchy in order to control the HW.

Chassis attributes information exported through sysfs can be utilized by a number of standard Linux tools. So, for example, the following are tools from the Linux packages lm-sensors and fancontrol, which are capable of operating on top of sysfs infrastructure:

- pwmconfig – tests the pulse width modulation (PWM) outputs of sensors and configures fancontrol
- fancontrol – automated software-based fan speed regulation
- sensors – print sensors information

2.3 Sysfs Initialization and Driver Registration

As describe in the previous sections, sysfs structure provide access to HW drivers. These drivers need to be initialized before using sysfs. In addition, Mellanox virtual hierarchy also needs to be created in order to use it.

The package provides a simple way to initialize the drivers using the set of the shell scripts. These scripts support initialization and de-initialization of driver, virtual hierarchy structure, udev events handling, based on a set of Mellanox system specific udev rules.

Package contains the following files, used within the workload:

- /lib/systemd/system/hw-management.service: system entries for thermal control activation and de-activation.
- /lib/udev/rules.d/50-hw-management-events.rules: udev rules defining the triggers on which events should be handled. When trigger is matched, rule data is to be passed to the event handler (see below file /usr/bin/hw-management-events.sh).
- /usr/bin/hw-management-control.sh: contains thermal algorithm implementation.
- /usr/bin/hw-management-chassis-events.sh and /usr/bin/hw-management-thermal-events.sh: handle udev triggers, according to the received data, it creates or destroys symbolic links to sysfs entries. It allows to create system independent entries and it allows thermal controls to work over this system independent model. Raises signal to hw-management-control in case of fast temperature decreasing. It could happen in case one or few very hot port cables have been removed. Sets PS units internal FAN speed to default value when unit is connected to power source.
- /usr/bin/hw-management.sh: performs initialization and de-initialization, detects the system type, connects thermal drivers according to the system topology, activates and deactivates thermal algorithm.
- /usr/bin/hw-management-led-state-conversion.sh and /usr/bin/hw-management-power-helper.sh: helper scripts.
- /etc/modprobe.d/hw-management.conf and /etc/modules-load.d/hw-management-modules.conf: configuration for kernel modules loading.

For more details follow package README file.

3 Virtual SysFS Hierarchy

Mellanox virtual hierarchy supports the following HW control ($bsp_path below is a location of virtual SysFS hierarchy, in standard Linux distributions, like Debian, RedHat, Fedora, etcetera this is /var/run/hw-management folder).

Table 1 - Mellanox Hierarchy Node Support

Node Path	Purpose
$bsp_path/config	Internal system specific configuration data
$bsp_path/eeprom	Gets raw data from EEPROM in system modules
$bsp_path/environment	Gets information on environmental sensors (A2D, Volt, Curr)
$bsp_path/led	Gets/sets LED color
$bsp_path/power	Gets information from power sensors
$bsp_path/system	Gets/sets system variables and settings (CPLD version, fan dir, reset, pwr cycle)
$bsp_path/thermal	Gets variant thermal sensors in systems and gets/sets fan attributes
$bsp_path/watchdog	Standard whatcdog sysfs attributes
$bsp_path/Alarm	Get System chassis
$bsp_path/jtag	Provides interface for JTAG CPLD burn

Detailed information on each of these nodes can be found in the following sections.

3.1 Config Control

3.1.1 Get ASIC Bus

Node name	$bsp_path/config/asic_bus		
Description	Get system ASIC bus number		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-99
Example	Get asic bus number: cat $bsp_path/config/asic_bus		

3.1.2 Set Chip-down/Chip-up Delay

Node name	$bsp_path/config/chipdown_delay $bsp_path/config/chipup_delay		
Description	Set delay duration in seconds for hw mgmt service from the chip down/up event.		
Access	Write/Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer (seconds)	0 – no delay other – delay
Example	Get chipdown value: cat $bsp_path/config/chipdown_delay Set 5 seconds delay in chipup value: echo 5 > $bsp_path/config/chipup_delay		

3.1.3 Read CPLD Number

Node name	$bsp_path/config/cpld_num		
Description	Get the number of CPLD modules in the system		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get CPLD number: cat $bsp_path/config/cpld_num		

3.1.4 Read PSU VPD Info

Node name	$bsp_path/eeprom/psu{n}_vpd		
Description	Get PSU VPD info in human readable format		
Access	Read only		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Status	ASCII	EEPROM info
Example	Get PSU VPD info: cat $bsp_path/eeprom/psu{n}_vpd		

3.1.5 Get Hot-plug Fan Number

Node name	$bsp_path/config/hotplug_fans		
Description	Get hot-plug FAN number in the system		
Access	Read only It can be zero on fixed system.		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Status	Integer	0-X
Example	Get hot-plug fan number: cat $bsp_path/config/hotplug_fans		

3.1.6 Get Hot-plug PSU Number

Node name	$bsp_path/config/hotplug_fans		
Description	Get hot-plug PSU number in the system. It can be zero on fixed system.		
Access	Read only		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Status	Integer	0-X
Example	Get hot-plug psu number: cat $bsp_path/config/hotplug_psus		

3.1.7 Get Hot-plug PWR Number

Node name	$bsp_path/config/hotplug_pwrs		
Description	Get hot-plug Power cable number in the system. It can be zero on fixed system.		
Access	Read only		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Status	Integer	0-X

Example	Get hot-plug power cable number: cat $bsp_path/config/hotplug_pwrs

3.1.8 Read SFP Counter

Node name	$bsp_path/config/sfp_counter		
Description	Get the number of sfp interfaces in the system Note: this is attribue is valid only for I2C ASIC driver		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get sfp counter: cat $bsp_path/config/sfp_counter		

3.1.9 Read Module Counter

Node name	$bsp_path/config/module_counter		
Description	Get the number of sfp modules in the system Note: this is attribue is valid only for I2C ASIC driver		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get sfp module: cat $bsp_path/config/module_counter		

3.1.10 Read Max System Fans (rotors)

Node name	$bsp_path/config/max_tachos		
Description	Get max number of system fans.		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get fans max value: cat $bsp_path/config/max_tachos		

3.1.11 Read Fan Drawer Number

Node name	$bsp_path/config/fan_drwr_num		
Description	Get number of system FAN drawers		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get number of system FAN drawers: cat $bsp_path/config/fan_drwr_num		

3.1.12 Read Fan Command

Node name	$bsp_path/config/fan_command		
Description	Get PMBUS command for PSU config		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Hex	0xhh
Example	Get fan command: cat $bsp_path/config/fan_command		

3.1.13 Read Fan Max/Min Speed

Node name	$bsp_path/config/fan_max_speed $bsp_path/config/fan_min_speed		
Description	Get the absolute system fan max/min speed		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	X
Example	Get fan max speed: cat $bsp_path/config/fan_max_speed Get fan min speed: cat $bsp_path/config/fan_min_speed		

3.1.14 Read PSU Default Fan Speed

Node name	$bsp_path/config/fan_psu_defualt
Description	Get the default value of PSU fans speed

Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	HEX	0x14-0x64
Example	Get fan PSU default: cat $bsp_path/config/fan_psu_default		

3.1.15 Read PSU min/max Fan Speed

Node name	psu_fan_min/psu_fan_max		
Description	Get the default min/max values of PSU fans speed RPM		
Access	Read/Write		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Status	Integer	X
Example	Get PSU FAN min default speed in RPM: cat $bsp_path/config/psu2_fan_min		

3.1.16 Read/write Time Window for Thermal Control Periodic Log Report

Node name	$bsp_path/config/periodic_report		
Description	Get/Set time for thermal control periodic log report (sec, default 7200)		
Access	Read/Write		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Status	Integer	X
Example	Set periodic log report time: echo 3000 > $bsp_path/config/periodic_report		

3.1.17 Read PSU I2C Address

Node name	$bsp_path/config/psu<power supply module number>_i2c_addr		
Description	Get the I2C address of PSU for direct connection		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values

	Status	Hex	0xhh
Example	Get PSU1 I2C address: cat $bsp_path/config/psu1_i2c_addr		

3.1.18 Read PSU I2C Bus

Node name	$bsp_path/config/psu<power supply module number>_i2c_bus		
Description	Get the I2C bus of PSU for direct connection		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	X
Example	Get PSU1 I2C bus: cat $bsp_path/config/psu1_i2c_bus		

3.1.19 Read Thermal Delay

Node name	$bsp_path/config/termal_delay		
Description	Get the delay duration (seconds) since the HW mgmt service starts until thermal control init		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer (seconds)	X
Example	Get thermal delay: cat $bsp_path/config/thermal_delay		

3.2 EEPROM Control

3.2.1 Read CPU EEPROM Data

Node name	$bsp_path/eeprom/cpu_info		
Description	Read CPU raw data in hexadecimal format		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	Hex	Hex dump format of memory
Example	Get CPU EEPROM information: cat $bsp_path/eeprom/cpu_info		

3.2.2 Read Fan Module EEPROM Data

Node name	$bsp_path/eeprom/fan<fan module number>_info		
Description	Read fan module raw data in hexadecimal format Note: This attribute is not supported on Comex CPU systems.		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	Hex	Hex dump format of memory
Example	Get fan module 1 EEPROM information: hexdump -C $bsp_path/eeprom/fan1_info		

3.2.3 Read Power Supply Module EEPROM Data

Node name	$bsp_path/eeprom/psu<power supply module number>_info		
Description	Read power supply module raw data in hexadecimal format		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	Hex	Hex dump format of memory
Example	Get power supply module 1 EEPROM information: cat $bsp_path/eeprom/psu1_info		

3.2.4 Read System Chassis EEPROM Data

Node name	$bsp_path/eeprom/vpd_info		
Description	Read system chassis raw data in hexadecimal format		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	Hex	Hex dump format of memory
Example	Get system chassis EEPROM information: cat $bsp_path/eeprom/vpd_info		

3.3 Environment Control

3.3.1 Get A2D Voltage

Node name	$bsp_path/environment/a2d_iio:device< number>_raw<index>

Description	Get raw voltage input from A2D sensor		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get voltage input from A2D1: cat $bsp_path/environment/a2d_iio:device0_raw_1		

3.3.2 Get Comex Voltage Current

Node name	$bsp_path/environment/comex_voltmon<index>_curr<index>_input		
Description	Get raw voltage input from Comex Note: This attribute is for Comex based system only		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get comex voltage monitor 1 current2 reading: cat $bsp_path/environment/comex_voltmon1_curr2_input		

3.3.3 Get Comex Voltage Input

Node name	$bsp_path/environment/comex_voltmon<index>_in<index>_input		
Description	Get raw voltage input from Comex Note: This attribute is for Comex based system only		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get Comex voltage monitor 1 input reading: cat $bsp_path/environment/comex_voltmon1_in1_input		

3.3.4 Get Comex Voltage Power

Node name	$bsp_path/environment/comex_voltmon<index>_power<index>_input
Description	Get raw voltage input from Comex Note: This attribute is for Comex based system only
Access	Read only
Release version	1.0

Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get Comex voltage monitor 1 power reading: cat $bsp_path/environment/comex_power2_input		

3.3.5 Get System Voltage Current

Node name	$bsp_path/environment/voltmon<index>_curr<index>_input		
Description	Get raw voltage input from system		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get voltage monitor 1 current2 reading: cat $bsp_path/environment/voltmon1_curr2_input		

3.3.6 Get System Voltage Input

Node name	$bsp_path/environment/voltmon<index>_in<index>_input		
Description	Get raw voltage input from system		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get voltage monitor 1 input reading: cat $bsp_path/environment/voltmon1_in1_input		

3.3.7 Get System Voltage Power

Node name	$bsp_path/environment/voltmon<index>_power<index>_input		
Description	Get raw voltage input from system		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get voltage monitor 1 power reading: cat $bsp_path/environment/voltmon1_power2_ input		

3.4 Events

3.4.1 Get FAN hot-plug event status

Node name	$bsp_path/events/fan<index>		
Description	Get hot-plug event status of FAN<index> Index max value corresponds to $bsp_path/config/hotplug_fans 0 – FAN<index> was removed, 1 – FAN<index> was inserted.		
Access	Read		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Thermal	Integer	0 / 1
Example	Get FAN3 hot-plug status: cat $bsp_path/events/fan3		

3.4.2 Get PSU hot-plug event status

Node name	$bsp_path/events/psu<index>		
Description	Get hot-plug event status of PSU<index> Index max value corresponds to $bsp_path/config/hotplug_psus 0 – PSU<index> was removed, 1 – PSU<index> was inserted.		
Access	Read		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Thermal	Integer	0 / 1
Example	Get PSU2 hot-plug status: cat $bsp_path/events/psu2		

3.4.3 PWR hot-plug event status

Node name	$bsp_path/events/pwr<index>

Description	Get latest hot-plug event status of PWR<index> Index max value corresponds to $bsp_path/config/hotplug_pwrs 0 – PWR<index> cable was plugged-out, 1 – PWR<index> cable was plugged-in.		
Access	Read		
Release version	V.7.0010.1300		
Arguments	Name	Data type	Values
	Thermal	Integer	0 / 1
Example	Get Power1 cable hot-plug status: cat $bsp_path/events/pwr1		

3.5 LED Control

3.5.1 Get Fan Status LED

Node name	$bsp_path/led/led_fan<fan module number>		
Description	Read/write fan module status LED		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	LED color	Integer	none; green; green_blink; orange; orange_blink;
Example	Get fan module 1 status LED color: cat $bsp_path/led/ led_fan1		

3.5.2 Get Fan LED Capabilities

Node name	$bsp_path/led/led_fan<fan module number>_capability		
Description	Read fan module status LED		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	green_blink orange_blink green orange

			none
Example	Get fan module 1 capabilities: cat $bsp_path/led/ led_fan1_capability		

3.5.3 Set Fan LED Green/Orange

Node name	$bsp_path/led/led_fan<fan module number>_<color>		
Description	Set fan module status LED active		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set fan module 1 active: echo 255 > $bsp_path/led/led_fan1_green		

3.5.4 Set Fan LED Green/Orange Delay Off

Node name	$bsp_path/led/led_fan<fan module number>_<color>_delay_off		
Description	Set fan led blinking off frequency		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set fan led module 1green delay off: echo 10 > $bsp_path/led/led_fan1_green_delay_off		

3.5.5 Set Fan LED Green/Orange Delay On

Node name	$bsp_path/led/led_fan<fan module number>_<color>_delay_on		
Description	Set fan led blinking on frequency		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set fan module 1 active: echo 255 > $bsp_path/led/led_fan1_green_delay_on		

3.5.6 Get PSU Status LED

Node name	$bsp_path/led/led_PSU

Description	Read/write PSU module status LED		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	LED color	Integer	none; green; green_blink; orange; orange_blink;
Example	Get PSU module status LED color: cat $bsp_path/led/led_psu		

3.5.7 Get PSU LED Capabilities

Node name	$bsp_path/led/led_psu_capability		
Description	Read PSU module status LED		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	green_blink orange_blink green orange none
Example	Get PSU module capabilities: cat $bsp_path/led/ led_psu_capability		

3.5.8 Set Fan PSU Green/Orange

Node name	$bsp_path/led/led_psu_<color>		
Description	Set PSU module status LED active		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set fan module active: echo 255 > $bsp_path/led/led_psu_green		

3.5.9 Set PSU LED Green/Orange Delay Off

Node name	$bsp_path/led/led_psu_<color>_delay_off
Description	Set PSU LED blinking off frequency
Access	Read/Write

Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set PSU led module 1green delay off: echo 10 > $bsp_path/led/led_psu_green_delay_off		

3.5.10 Set PSU LED Green/Orange Delay On

Node name	$bsp_path/led/led_psu_<color>_delay_on		
Description	Set PSU LED blinking on frequency		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set PSU module 1 active: echo 255 > $bsp_path/led/led_psu_green_delay_on		

3.5.11 Get Status LED

Node name	$bsp_path/led/led_status		
Description	Read status module status LED		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	LED color	Integer	none; green; green_blink; orange; orange_blink;
Example	Get status LED color: cat $bsp_path/led/led_status		

3.5.12 Get Status LED Capabilities

Node name	$bsp_path/led/led_status_capability		
Description	Read status module status LED		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	green_blink orange_blink green orange

			none
Example	Get status led capabilities: cat $bsp_path/led/led_status_capability		

3.5.13 Set Status Green/Orange

Node name	$bsp_path/led/led_status_<color>		
Description	Set status LED active		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set status led active: echo 255 > $bsp_path/led/led_status_green		

3.5.14 Set Status LED Green/Orange Delay Off

Node name	$bsp_path/led/led_status_<color>_delay_off		
Description	Set status LED blinking off frequency		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set status led module 1green delay off: echo 10 > $bsp_path/led/led_status_green_delay_off		

3.5.15 Set Status LED Green/Orange Delay On

Node name	$bsp_path/led/led_status_<color>_delay_on		
Description	Set status LED blinking on frequency		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set status module 1 active: echo 255 > $bsp_path/led/led_status_green_delay_on		

3.5.16 Get Fan LED Capabilities

Node name	$bsp_path/led/led_system_capability

Description	Set/get system status LED		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	green_blink red_blink green red none
Example	Get system status LED capabilities: cat $bsp_path/led/led_system_capability		

3.6 System / Power Control

3.6.1 Get ASIC Health

Node name	$bsp_path/system/asic_health		
Description	Read ASIC health indicator		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	2 - Good Other – error
Example	Get ASIC health: cat $bsp_path/system/asic_health		

3.6.2 Get CPLD Major Version

Node name	$bsp_path/system/cpld<index>_version		
Description	Get CPLD major version of each CPLD index		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Get CPLD1 version: cat $bsp_path/system/cpld1_version		

3.6.3 Get CPLD Part Number

Node name	$bsp_path/system/cpld<index>_pn		
Description	Get CPLD part number of each CPLD index		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Get CPLD1 part number: cat $bsp_path/system/cpld1_pn		

3.6.4 Get CPLD Minor Version

Node name	$bsp_path/system/cpld<index>_version_min		
Description	Get CPLD minor version of each CPLD index		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Get CPLD1 minor version: cat $bsp_path/system/cpld1_version_min		

3.6.5 Get CPLD Full Version

Node name	$bsp_path/system/cpld		
Description	Get CPLD full version Note: for systems equipped with Spectrum1 only CPLD major version is available for port CPLD)		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	string	
Example	Get CPLD full version: cat $bsp_path/system/cpld CPLD000120_REV0601_CPLD000165_REV0303_CPLD000166_REV0300_CPLD000167_REV0100		

3.6.6 Fan Direction

Node name	$bsp_path/system/fan_dir		
Description	Get FAN direction (forward or reverse) Bitwise attribute which indicates each fan direction: 0 - reversed. 1 - forward. For example, value 15 indicate system with 4 forward fans. Fan direction in case of fan absence return zero value, therefore it is recommended to check fan presence before reading fan direction. Note: This attribute supported from SPC2 forward. SPC1 systems require fan eeprom read. Model name contain 'F'/'R' character for direction.		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	0-255
Example	Read fan direction. cat > $bsp_path/system/fan_dir		

3.6.7 Set JTAG Mode

Node name	$bsp_path/system/jtag_enable		
Description	Set JTAG mode enable/disable		
Access	Write / Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	0/1
Example	Enable jtag interface: echo 1 > $bsp_path/system/jtag_enable		

3.6.8 Set PSU On/Off

Node name	$bsp_path/system/psu<index>_on		
Description	Set system PSU to be ON/OFF		
Access	Write / Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	

Example	Turn PSU1 off: echo 0 > $bsp_path/system/psu1_on

3.6.9 Set System Power Cycle

Node name	$bsp_path/system/pwr_cycle		
Description	Set system power cycle		
Access	Write / Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Power cycle the system: echo 1 > $bsp_path/system/pwr_cycle		

3.6.10 Set System Power Down

Node name	$bsp_path/system/pwr_down		
Description	Set system power down		
Access	Write / Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Turn system off: echo 1 > $bsp_path/system/pwr_down		

3.6.11 Get Reset Cause

Node name	$bsp_path/system/reset_<cause>
Description	Reset cause vary between SPC and SPC2. Get last reset cause – <cause>: Spectrum: • long_pb – Reset button was pushed for more than 15 seconds. • short_pb – Reset button was pushed for less than 15 seconds. • aux_pwr_or_ref – Main 12V DC drop due to power failure or AC removal in both PS units -or- CPLD code refresh by the CPLD field upgrade tool. • main_pwr_fail - CPU power failure. • sw_reset - Reset or power off initiated by the OS. • fw_reset - Reset or power off initiated by the Switch ASIC FW.

	• hotswap_or_wd - Reset or power off initiated by the watch dog mechanism. • asic thermal – Switch ASIC power drop due to failure or due to thermal shutdown activation. **Note**: MSN2010, MSN2100 and MSN2740 systems supports two additonal causes: • hotswap_or_halt - Reset or power off intitaed by PSU swap. • sff_wd - Reset or power off initiated by CPU watch dog mechanism. Spectrum-2: • long_pb – Reset button was pushed for more than 15 seconds. • short_pb – Reset button was pushed for less than 15 seconds. • aux_pwr_or_ref – Main 12V DC drop due to power failure or AC removal in both PS units -or- CPLD code refresh by the CPLD field upgrade tool. • from_comex - Reset or power off initiated by the OS. • from_asic - Reset or power off initiated by the Switch ASIC FW. • swb_wd - reset or power off initiated by swb watchdog. • asic thermal – ASIC power drop due to failure or due to thermal shutdown activation • comex_pwr_fail – power failure to comex. • comex_wd - reset or power off initiated by Comex watchdog. • voltmon_upgrade_fail - Reset due to voltage monitor upgrade failure. • system – system initiate reset • comex_thermal - Comex power drop due to thermal shutdown activation. • reload_bios - Reset caused by BIOS reload. • sw_pwr_off - reset triggered by power off initiated by software through CPLD • Note: For must causes only one attribute is on, except Comex wd and Comex power fail causes which are set in addition to reset_from_comex.		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values

	System attribute	Integer	1 – reset caused 0 – not related.
Example	Check if long button press caused reset: cat $bsp_path/system/reset_long_pb		

3.7 Thermal

3.7.1 Read Switch ASIC Temperature

Node name	$bsp_path/thermal/asic		
Description	Read value of switch module ASIC temperature		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	Degrees in Celsius
Example	Get switch module ASIC temperature: cat $bsp_path/thermal/asic		

3.7.2 Read Switch Comex Temperature

Node name	$bsp_path/thermal/comex_amb		
Description	Read value of Comex ambient temperature Note: supported by comex based systems only		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	Degrees in Celsius
Example	Get comex ambient temperature. cat $bsp_path/thermal/comex_amb		

3.7.3 Read Cooling State

Node name	$bsp_path/thermal/cooling_cur_state		
Description	Set PWM steps		
Access	Write/Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	

Example	Set PWM state: cat $bsp_path/thermal/cooling_cur_state

3.7.4 Read CPU Core Temperature

Node name	$bsp_path/thermal/cpu_core<index>		
Description	Get CPU core temperature (in millidegrees Celsius)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get CPU core 2 temperature: cat $bsp_path/thermal/cpu_core2		

3.7.5 CPU Core Critical Temperature

Node name	$bsp_path/thermal/cpu_core<index>_crit		
Description	Get CPU core maximum junction temperature (in millidegrees Celsius)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get CPU core 2 temperature critical level: cat $bsp_path/thermal/cpu_core2_crit		

3.7.6 CPU Core Critical Temperature Alarm

Node name	$bsp_path/thermal/cpu_core<index>_crit_alarm		
Description	When critical temperature reached, alarm set on (1, 0)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	1,0
Example	Get CPU core 2 temperature: cat $bsp_path/thermal/cpu_core2_crit_alarm		

3.7.7 CPU Core Temperature Max

Node name	$bsp_path/thermal/cpu_core<index>_max
Description	Get CPU core max temperature that require cooling device full speed

Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get CPU core 2 temperature: cat $bsp_path/thermal/cpu_core2_max		

3.7.8 Read CPU Pack Temperature

Node name	$bsp_path/thermal/cpu_pack		
Description	Get CPU core temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get CPU pack temperature: cat $bsp_path/thermal/cpu_pack		

3.7.9 CPU Pack Critical Temperature

Node name	$bsp_path/thermal/cpu_pack_crit		
Description	Get CPU pack maximum junction temperature (in millidegrees Celsius)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get CPU pack: cat $bsp_path/thermal/cpu_core2_crit		

3.7.10 CPU Pack Critical Temperature Alarm

Node name	$bsp_path/thermal/cpu_pack_crit		
Description	When CPU pack critical temperature reached, alarm set on (1, 0)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	1,0
Example	Get CPU pack: cat $bsp_path/thermal/cpu_pack_crit_alarm		

3.7.11 CPU Pack Temperature Max

Node name	$bsp_path/thermal/cpu_pack_max		
Description	Get CPU pack max temperature that require cooling device full speed		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get CPU pack: cat $bsp_path/thermal/cpu_pack_max		

3.7.12 Read Fan Max Speed

Node name	$bsp_path/thermal/fan<index>_max		
Description	Get fan max speed		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get fan4 max speed: cat $bsp_path/thermal/fan4_max		

3.7.13 Read Fan Min Speed

Node name	$bsp_path/thermal/fan<index>_min		
Description	Get fan min speed		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get fan4 min speed: cat $bsp_path/thermal/fan4_min		

3.7.14 Read Fan Direction

Node name	$bsp_path/thermal/fan<index>_dir
Description	Get fan Direction
Access	Read
Release version	7.0010.2100

Arguments	Name	Data type	Values
	Thermal	Integer	0,1 (0=intake,1=exhaust)
Example	Get fan4 direction: cat $bsp_path/thermal/fan4_dir		

3.7.15 Read Fan Status

Node name	$bsp_path/thermal/fan<index>_status		
Description	Get fan status		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get fan4 status: cat $bsp_path/thermal/fan4_status		

3.7.16 Read Fan Fault

Node name	$bsp_path/thermal/fan<index>_fault		
Description	Is fan in fault state (0-OK, 1-FAULT)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	0,1
Example	Get fan4 fault: cat $bsp_path/thermal/fan4_fault		

3.7.17 QSFP/SFP Module Thermal

Node name	$bsp_path/thermal/mlxsx-module<index>		
Description	Get port thermal zones		
Access	Folder		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal		

3.7.17.1 Read Module Temperature Trip Critical

Node name	$bsp_path/thermal/mlxsw-module<index>/temp_trip_crit
Description	Get module critical temperature level (system shutdown)

Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get module 12 critical temp: cat $bsp_path/thermal/mlxsw-module12/temp_trip_crit		

3.7.17.2 Read Module Temperature Trip High

Node name	$bsp_path/thermal/mlxsw-module<index>/temp_trip_high		
Description	Get module high temperature level (produce warning message)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal/mlxsw-module	Integer	
Example	Get module 12 high temp: cat $bsp_path/thermal/mlxsw-module12/temp_trip_high		

3.7.17.3 Read Module Temperature Trip Hot

Node name	$bsp_path/thermal/mlxsw-module<index>/temp_trip_hot		
Description	Get module hot temperature level (perform hot algorithm)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get module hot temp: cat $bsp_path/thermal/mlxsw-module12/temp_trip_hot		

3.7.17.4 Read Module Temperature Trip Norm

Node name	$bsp_path/thermal/mlxsw-module<index>/temp_trip_norm		
Description	Get module norm temperature level (keep minimal speed)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get module 12 norm temp trip: cat $bsp_path/thermal/mlxsw-module12/temp_trip_norm		

3.7.17.5 Read Module Thermal Zone Mode

Node name	$bsp_path/thermal/mlxsw-module<index>/thermal_zone_mode		
Description	Get module thermal zone mode (enabled/disabled)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	1,0
Example	Get module 12 thermal zone mode: cat $bsp_path/thermal/mlxsw-module12/thermal_zone_mode		

3.7.17.6 Read Module Thermal Zone Policy

Node name	$bsp_path/thermal/mlxsw-module<index>/thermal_zone_policy		
Description	Get module thermal zone policy (user space or step wise)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	string	
Example	Get module 12 thermal zone policy: cat $bsp_path/thermal/mlxsw-module12/thermal_zone_mode		

3.7.17.7 Read Module Thermal Zone Temp

Node name	$bsp_path/thermal/mlxsw-module<index>/thermal_zone_temp		
Description	Get module thermal zone temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get module 12 temperature: cat $bsp_path/thermal/mlxsw-module12/thermal_zone_temp		

3.7.18 Gearbox

Node name	$bsp_path/thermal/mlxsw-gearbox<index>		
Description	Note: this module is available on systems that supports gearbox		
Access	Folder		
Release version	1.0		
Arguments	Name	Data type	Values

	Thermal		

3.7.18.1 Read Gearbox Temperature Trip Critical

Node name	$bsp_path/thermal/mlxsw-gearbox<index>/temp_trip_crit		
Description	Get module critical temperature level (system shutdown)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get gearbox 4 critical temperature: cat $bsp_path/thermal/mlxsw-gearbox4/temp_trip_crit		

3.7.18.2 Read Module Temperature Trip High

Node name	$bsp_path/thermal/mlxsw-gearbox<index>/temp_trip_high		
Description	Get module high temperature level (produce warning msg)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal/mlxsw-module	Integer	
Example	Get gearbox 4 high temperature: cat $bsp_path/thermal/mlxsw-gearbox4/temp_trip_high		

3.7.18.3 Read Module Temperature Trip Hot

Node name	$bsp_path/thermal/mlxsw-gearbox<index>/temp_trip_hot		
Description	Get module hot temperature level (perform hot algorithm)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get gearbox 4 hot temperature: cat $bsp_path/thermal/mlxsw-gearbox4/temp_trip_hot		

3.7.18.4 Read Module Temperature Trip Norm

Node name	$bsp_path/thermal/mlxsw-gearbox<index>/temp_trip_norm
Description	Get module norm temperature level (keep minimal speed)

Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get gearbox 4 norm temperature trip: cat $bsp_path/thermal/mlxsw-gearbox4/temp_trip_norm		

3.7.18.5 Read Module Thermal Zone Mode

Node name	$bsp_path/thermal/mlxsw-gearbox<index>/thermal_zone_mode		
Description	Get module thermal zone mode (enabled/disabled)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	1,0
Example	Get gearbox 4 thermal zone mode: cat $bsp_path/thermal/mlxsw-gearbox4/thermal_zone_mode		

3.7.18.6 Read Module Thermal Zone Policy

Node name	$bsp_path/thermal/mlxsw-gearbox<index>/thermal_zone_policy		
Description	Get module thermal zone policy (user space or step wise)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	string	
Example	Get gearbox 4 thermal zone policy: cat $bsp_path/thermal/mlxsw-gearbox4/thermal_zone_mode		

3.7.18.7 Read Module Thermal Zone Temp

Node name	$bsp_path/thermal/mlxsw-gearbox<index>/thermal_zone_temp		
Description	Get module thermal zone temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get gearbox 4 temperature: cat $bsp_path/thermal/mlxsw-gearbox4/thermal_zone_temp		

3.7.19 Read Port Ambient

Node name	$bsp_path/thermal/port_amb		
Description	Get ports ambient temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get ports ambient temperature: cat $bsp_path/thermal/port_amb		

3.7.20 Read PSU Temperature

Node name	$bsp_path/thermal/psu<index>_temp		
Description	Get power supply unit temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get PSU2 temperature: cat $bsp_path/thermal/psu2_temp		

3.7.21 Read PSU Alarm

Node name	$bsp_path/thermal/psu<index>_alarm		
Description	Get power status (0-OK, 1-FAULT)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	0,1
Example	Get PSU2 alarm: cat $bsp_path/thermal/psu2_alarm		

3.7.22 Read PSU Max

Node name	$bsp_path/thermal/psu<index>_max
Description	Get power supply max temperature
Access	Read
Release version	1.0

Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get PSU2 max: cat $bsp_path/thermal/psu2_max		

3.7.23 Read PSU Fan Speed

Node name	$bsp_path/thermal/psu<index_A>_fan<index_B>_speed_get		
Description	Get power supply fans speed. <index_A> Number power supplies plugged into the system. <index_B> Number of fans in power supply		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get PSU2 fan1 speed: cat $bsp_path/thermal/psu2_fan1_speed_get		

3.7.24 Read PSU Power Status

Node name	$bsp_path/thermal/psu<index>_pwr_status		
Description	Get power supply power status (1-PWR_GOOD, 0-UNPLUGGED/ UNFUNCTIONAL)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	1,0
Example	Get PSU2 power status: cat $bsp_path/thermal/psu2_pwr_status		

3.7.25 Read PSU Status

Node name	$bsp_path/thermal/psu<index>_status		
Description	Get power supply status (1 – IN; 0 – OUT)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	1,0

Example	Get PSU2 status: cat $bsp_path/thermal/psu2_status

3.7.26 Read System PWM1

Node name	$bsp_path/thermal/pwm1		
Description	Get/Set system fans duty cycle		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	0-255 0-low;255-max
Example	Get PWM1: cat $bsp_path/thermal/pwm1		

3.7.27 Read Temperature Critical Module

Node name	$bsp_path/thermal/module<index>_temp_crit		
Description	Get port module critical temperature level		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get temp critical module 18: cat $bsp_path/thermal/module18_temp_crit_		

3.7.28 Read Temperature Emergency Module

Node name	$bsp_path/thermal/module<index>_temp_emergency		
Description	Get port module critical emergency level		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get temp emergency module 18: cat $bsp_path/thermal/module18_temp_emergency		

3.7.29 Read Temperature Fault Module

Node name	$bsp_path/thermal/module<index>_temp_fault

Description	Get indication of port module is in fault state (1-FAULT, 0-VALID)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get temp fault module 18: cat $bsp_path/thermal/module18_temp_fault		

3.7.30 Read Temperature Input Module

Node name	$bsp_path/thermal/module<index>_temp_input		
Description	Get port module temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get temp input module 18: cat $bsp_path/thermal/module18_temp_input		

3.7.31 Read Switch CPU Temperature

Node name	$bsp_path/thermal/cpu_<core0 | core1 | pack>		
Description	Read value of CPU module temperature		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	Degrees in Celsius
Example	Get CPU Core 0 temperature: cat $bsp_path/thermal/cpu_core0		

3.7.32 Read Switch Fan Temperature

Node name	$bsp_path/thermal/fan_amb		
Description	Read value of switch fan ambient temperature		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values

	Thermal	Integer	Degrees in Celsius
Example	Get switch board ambient fan temperature: cat $bsp_path/thermal/fan_amb		

3.7.33 Read Switch Port Temperature

Node name	$bsp_path/thermal/port_amb		
Description	Read value of switch port ambient temperature		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	Degrees in Celsius
Example	Get switch board ambient temperature: cat $bsp_path/thermal/port_amb		

3.7.34 Read Switch Power Supply Temperature

Node name	$bsp_path/thermal/psu<psu module number>		
Description	Read value of power supply temperature		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	Degrees in Celsius
Example	Get switch power supply 1 temperature: cat $bsp_path/thermal/psu1		

3.8 Watchdog

3.8.1 Read Boot Status

Node name	$bsp_path/watchdog/main/bootstatus $bsp_path/watchdog/aux/bootstatus		
Description	Get indication if last boot result from WD (32-wd, 0-other)		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	watchdog	Integer	0,32
Example	Get watchdog: cat $bsp_path/watchdog/main/bootstatus cat $bsp_path/watchdog/aux/bootstatus		

3.8.2 Read Identity

Node name	$bsp_path/watchdog/main/identity $bsp_path/watchdog/aux/identity		
Description	Get wd instance (main or aux)		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	watchdog	string	“mlx-wdt-main” or “mlx-wdt-aux”
Example	Get watchdog: cat $bsp_path/watchdog/main/identity cat $bsp_path/watchdog/aux/identity		

3.8.3 Read No Way Out

Node name	$bsp_path/watchdog/main/nowayout $bsp_path/watchdog/aux/nowayout		
Description	Indication if watchdog can be stopped once started. (0-can be stopped, 1-no wayout).		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values

	watchdog	Integer	0,1
Example	Get watchdog: cat $bsp_path/watchdog/main/nowayout cat $bsp_path/watchdog/aux/nowayout		

3.8.4 Read State

Node name	$bsp_path/watchdog/main/state $bsp_path/watchdog/aux/state		
Description	Get watchdog state (enable/disable)		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	watchdog	string	“active” -or- “inactive”
Example	Get watchdog: cat $bsp_path/watchdog/main/state cat $bsp_path/watchdog/aux/state		

3.8.5 Read Status

Node name	$bsp_path/watchdog/main/status $bsp_path/watchdog/aux/status		
Description	Get bitmap of WD extra information, like: is the watchdog timer running/active, or is the nowayout bit set. same as #3 & #4.		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	watchdog	Hex	2bytes
Example	Get watchdog: cat $bsp_path/watchdog/main/status cat $bsp_path/watchdog/aux/status		

3.8.6 Read Timeout

Node name	$bsp_path/watchdog/main/timeout $bsp_path/watchdog/aux/timeout
Description	Read watchdog real value. Type1 – 1-32 (seconds)

	Type2 – 1-255(seconds)		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	watchdog	Integer	See above
Example	Get watchdog: cat $bsp_path/watchdog/main/timeout cat $bsp_path/watchdog/aux/timeout		

3.8.7 Read Timeleft

Node name	$bsp_path/watchdog/main/timeleft $bsp_path/watchdog/aux/timeleft		
Description	Read watchdog remaining timer (timeout – seconds from last keep-alive) This value is in seconds. * This attribute is not supported on IVB & Rangeley CPU based systems.		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	watchdog	Integer	0-255 seconds
Example	Get watchdog: cat $bsp_path/watchdog/main/timeout cat $bsp_path/watchdog/aux/timeout		

3.9 JTAG interface

3.9.1 Enable / Disable JTAG mechanism

Node name	$bsp_path/jtag/jtag_enable		
Description	Enable / Disable JTAG mechanism for CPLD burn		
Access	Write / Read only		
Release version	7.0010.2100		
Arguments	Name	Data type	Values
	System attribute	Integer	0 or 1
Example	Enable JTAG: echo 1 > $bsp_path/jtag/jtag_enable Disable JTAG: echo 0 > $bsp_path/jtag/jtag_enable		

3.9.2 Set JTAG TCK pin

Node name	$bsp_path/jtag/jtag_tck
Description	JTAG TCK pin for bit-banging JTAG mechanism simulation
Access	Write / Read only
Release version	7.0010.2100

Arguments	Name	Data type	Values
	System attribute	Integer	0 or 1
Example	echo 1 > $bsp_path/jtag/jtag_tck		

3.9.3 Set JTAG TDI pin

Node name	$bsp_path/jtag/jtag_tdi		
Description	JTAG TDI pin for bit-banging JTAG mechanism simulation		
Access	Write / Read only		
Release version	7.0010.2100		
Arguments	Name	Data type	Values
	System attribute	Integer	0 or 1
Example	echo 0 > $bsp_path/jtag/jtag_tdi		

3.9.4 Set JTAG TMS pin

Node name	$bsp_path/jtag/jtag_tms
Description	JTAG TMS pin for bit-banging JTAG mechanism simulation
Access	Write / Read only

Release version	7.0010.2100		
Arguments	Name	Data type	Values
	System attribute	Integer	0 or 1
Example	echo 1 > $bsp_path/jtag/jtag_tms		

3.9.5 Get JTAG TDO pin

Node name	$bsp_path/jtag/jtag_tdo		
Description	JTAG TDO pin for bit-banging JTAG mechanism simulation		
Access	Read only		
Release version	7.0010.2100		
Arguments	Name	Data type	Values
	System attribute	Integer	0 or 1
Example	cat $bsp_path/jtag/jtag_tdo		

4 Thermal Control

The thermal algorithm controls is described in a separate document - Thermal Monitoring for Mellanox Systems with third party OS.pdf

5 Drivers

5.1 Hotplug

TBD

5.2 Watchdog

Mellanox watchdog device is implemented in a programmable logic device.

There are 2 types of HW watchdog implementations:

- Type 1 – actual HW timeout defined as a power of 2 msec. For example: Timeout 20 sec is rounded up to 32768 msec. The maximum timeout period is 32 sec (32768 msec). Get time-left is not supported.
- Type 2 – actual HW timeout defined in seconds and is the same as user-defined timeout. Maximum timeout is 255 sec. Get time-left is supported.

Type 1 HW watchdog implementation exists in old systems and all new systems have Type 2 HW watchdog. The two types of HW implementation also have a different register map.

Mellanox systems can have 2 watchdogs: Main and auxiliary. Main and auxiliary watchdog devices can be enabled together on the same system. There are several actions that can be defined in the watchdog: System reset, start fans on full speed, and increase register counter. The last 2 actions are performed without a system reset. Actions without reset are provided for the auxiliary watchdog device, which is optional.

Watchdog can be started during a probe. In this case it is pinged by the watchdog core before the watchdog device is opened by the user space application.

Watchdog can be initialized in using a nowayout method. That is, once started it cannot be stopped.

The mlx-wdt driver supports both HW watchdog implementations.

Watchdog driver is probed from the common mlx_platform driver. Mlx_platform driver provides an appropriate set of registers for Mellanox watchdog device, identity name (mlx-wdt-main or mlx-wdt-aux), initial timeout, performed action in expiration and configuration flags.

Watchdog configuration flags: nowayout and start_at_boot. HW watchdog version: type1 or type2. The driver checks during initialization if the previous system reset was done by the watchdog. If yes, it makes a notification about this event.

Access to HW registers is performed through a generic regmap interface.