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

Rev. 2.6

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1 Release Notes Update History

Revision	Date	Description
2.4	Aug 31, 2023	Adding 'asics_init_done' and 'asic_chipup_completed'
2.3	July 11, 2023	Update LEDs colors to be either red or amber for FAN LED , PSU LED and status LED
2.2	Feb 15, 2022	Add many SN4800 related attributes Add PSU FW version related attributes
2.1	Sept 15, 2021	Add PSU MIN/MAX fan speed. Added the following sections: • Get psu sensors value. • Get psu sensors thresholds. • Get psu sensors capability.
2.0	May 25, 2021	Edit reset causes - page 31-32 Add spectrum 3 Remove comex_wd reason which is disabled.
1.9	Dec 30, 2020	Added updates for Fan Direction JTAG
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
Revision	**Date**	**Description**
		• 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” • • 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

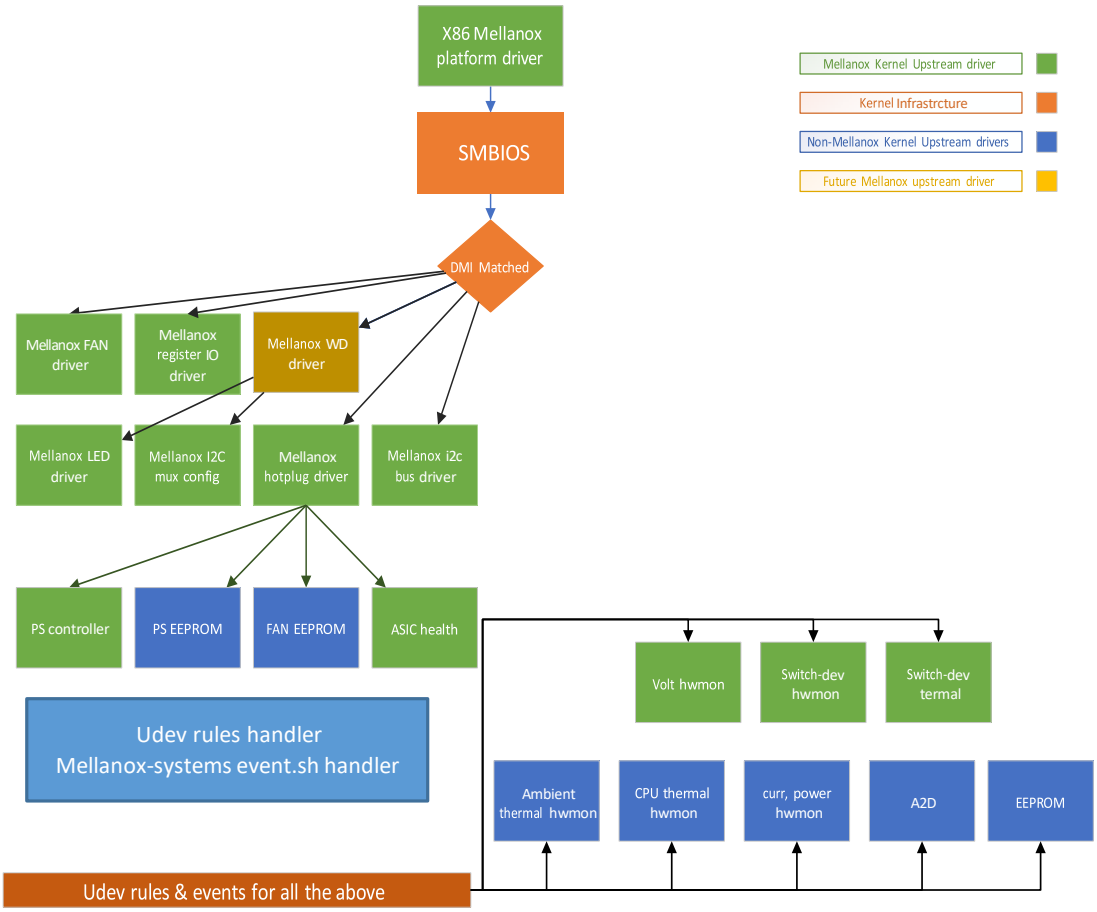
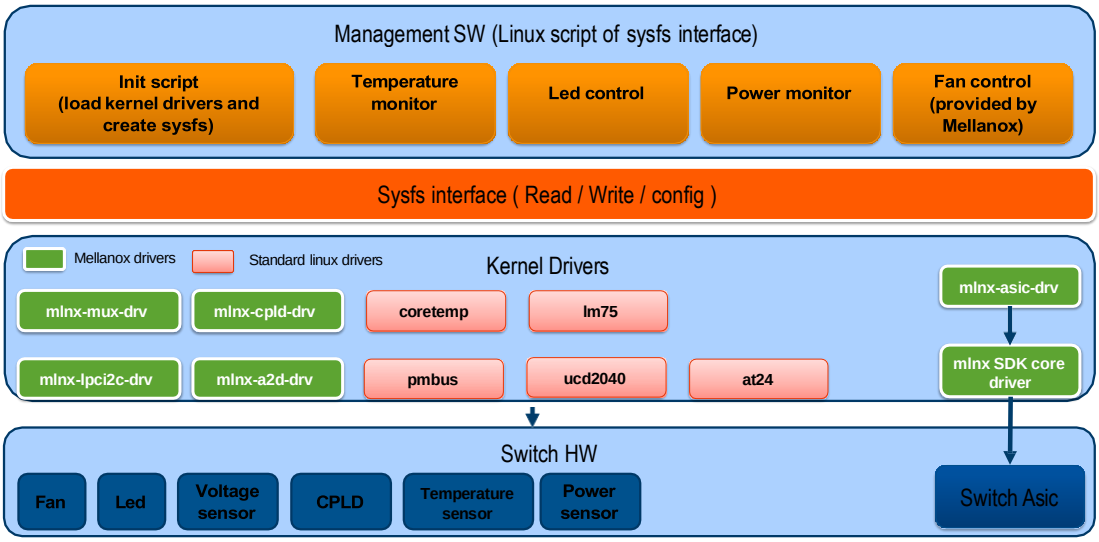


Figure 2 - Sysfs Layout



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 Asic Chipup Completed

Node name	$bsp_path/config/asic_chipup_completed		
Description	counter of successful ASIC driver initialization completions: 0 - no successful initialization compilation. 1 - one ASIC device has been successful initialized. n – ‘n’ ASIC devices has been successful initialized.		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get asic chipup completed: cat $bsp_path/config/asic_chipup_completed		

3.1.11 Read Init Done

Node name	$bsp_path/config/asics_init_done		
Description	is to be set to one, when 'asic_chipup_completed' attribute matches 'asic_num' attribute (old static attribute /var/run/hw-management/config/asic_num)		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get asics init done: cat $bsp_path/config/asics_init_done		

3.1.12 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		

3.1.13 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		

3.1.14 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		

3.1.15 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		

3.1.16 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		

3.1.17 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		

3.1.18 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		

3.1.19 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

3.1.20 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		

3.1.21 Read DPU Number

Node name	$bsp_path/config/dpu_num		
Description	Number of DPUs (1-4)		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer (number)	X
Example	Get dpu number: cat $bsp_path/config/dpu_num		

3.1.22 Read DPU Board type

Node name	$bsp_path/config/dpu_board_type		
Description	Whether DPU sensors are loaded static or dynamic		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	String	Static / dynamic
Example	Get dpu board tyoe cat $bsp_path/config/dpu_board_type		

3.1.23 Read DPU pci bus id

Node name	$bsp_path/config/dpu[1-4]_pci_bus_id		
Description	PCI bus id for the DPUc		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Hex (number)	XX.XX.X
Example	Get dpu pci bus number: cat $bsp_path/config/dpu[1-4]_pci_bus_id		

3.1.24 Read DPU board bus offset

Node name	$bsp_path/config/dpu_brd_bus_offset		
Description	DPU i2c bus offset		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer (number)	X
Example	Get dpu i2c bus offset cat $bsp_path/config/dpu_brd_bus_offset		

3.1.25 Read DPU bus offset

Node name	$bsp_path/config/dpu_bus_off		
Description	I2c bus offset for the dpu		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer (number)	X
Example	Get dpu bus offset number: cat $bsp_path/config/dpu_bus_off		

3.1.26 Read DPU events

Node name	$bsp_path/config/dpu_events		
Description	Events supported by DPUs		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	String	Ev1, ev2, etc.
Example	Get the events supported by DPU cat $bsp_path/config/dpu_events		

3.1.27 Read DPU events to host

Node name	$bsp_path/config/dpu_to_host_events		
Description	DPU events to host		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	String	X
Example	Get dpu events to host cat $bsp_path/config/dpu_to_host_events		

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		

3.2.5 Read System Chassis EEPROM Parsed Data

Node name	$bsp_path/eeprom/vpd_data		
Description	Read system chassis parsed data in text format		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	string	string format of memory
Example	Get system chassis EEPROM information: cat $bsp_path/eeprom/vpd_data		

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		

3.4.4 DPU Ready event

Node name	$bsp_path/events/dpu[1..4]_ready		
Description	Get dpu ready event		
Access	Read		
Release version	V.7.0030.4000		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Get dpu[1..4] ready status cat $bsp_path/events/dpu[1..4]_ready		

3.4.5 DPU Shutdown event

Node name	$bsp_path/events/dpu[1..4]_shtdn_ready
Description	Get dpu shutdown ready event
Access	Read

Release version	V.7.0030.4000		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Get dpu[1..4] shut down ready status cat $bsp_path/events/dpu[1..4]_shtdn_ready		

3.5 PSU FW

3.5.1 Get Secondary FW version of PSU

Node name	$bsp_path/firmware/psu<index>_fw_ver		
Description	Get secondary FW version of PSU<index> For Murata 1500/2000 and Delta 550 the contents of the file is the relevant FW version For all other PSUs - the contents is string "N/A"		
Access	Read		
Release version	V.7.0020.2000		
Arguments	Name	Data type	Values
	version	string	
Example	Get secondary FW version of PSU1 $bsp_path/ firmware/psu1_fw_ver		

3.5.2 Get Primary FW version of PSU

Node name	$bsp_path/firmware/psu<index>_fw_primary_ver		Node name
Description	Get primary FW version of PSU<index> Primary files exist only for Murata. For all other PSUs - the contents is string "N/A"		
Access	Read		Access
Release version	V.7.0020.2000		Release version
Arguments	Name	Arguments	Values
	version	string	
Example	Get primary FW version of PSU1 $bsp_path/ firmware/psu1_fw_primary_ve r		

3.6 DPU system attributes

3.6.1 Get DPU id

Node name	$bsp_path/dpu{n}/system/dpu_id		
Description	Read dpu{n} id		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	X
Example	Read dpu{n} id cat $bsp_path/dpu{n}/system/dpu_id		

3.6.2 Get DPU boot progress

Node name	$bsp_path/dpu{n}/system/boot_progress		
Description	Read dpu{n} boot progress		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} boot progress cat $bsp_path/dpu{n}/system/boot_preogress		

3.6.3 Get DPU cpld version

Node name	$bsp_path/dpu{n}/system/cpld		
Description	Read dpu{n} cpd version		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	XXXXX XXXX XXXX
Example	Read dpu{n} cpld version cat $bsp_path/dpu{n}/system/cpld		

3.6.4 Get DPU cpld base version

Node name	$bsp_path/dpu{n}/system/cpld_base

Description	Read dpu{n} cpld base version		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	XXXX XXXX XXXX
Example	Read dpu{n} cpld base version cat $bsp_path/dpu{n}/system/cpld_base		

3.6.5 Get DPU auxiliary power reset reason

Node name	$bsp_path/dpu{n}/system/reset_aux_pwr_or_reload		
Description	Read dpu{n} reset reason auxiliary power		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} reset reason auxiliary power cat $bsp_path/dpu{n}/system/reset_aux_pwr_or_reload		

3.6.6 Get DPU main board reset reason

Node name	$bsp_path/dpu{n}/system/ reset_from_main_board		
Description	Read dpu{n} main board reset reason		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} main board reset reason cat $bsp_path/dpu{n}/system/reset_from_main_board		

3.6.7 Get DPU comex power failure

Node name	$bsp_path/dpu{n}/system/reset_comex_pwr_fail
Description	Read dpu{n} reset reason for comex power failure
Access	Read
Release version	1.0

Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} id cat $bsp_path/dpu{n}/system/reset_comex_pwr_fail		

3.6.8 Get DPU power reset reason

Node name	$bsp_path/dpu{n}/system/reset_pwr_off		
Description	Read dpu{n} reset reason for power off		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} id cat $bsp_path/dpu{n}/system/reset_pwr_off		

3.6.9 Get DPU thermal shutdown reason

Node name	$bsp_path/dpu{n}/system/reset_dpu_thermal		
Description	Read dpu{n} thermal shutdown reset reason		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} thermal shutdown reset reason cat $bsp_path/dpu{n}/system/reset_dpu_thermal		

3.6.10 Get DPU tpm reset reason

Node name	$bsp_path/dpu{n}/system/tpm_rst		
Description	Read dpu{n} tpm reset reason		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} tpm reset reason cat $bsp_path/dpu{n}/system/tpm_rst		

3.6.11 Get DPU perst reset reason

Node name	$bsp_path/dpu{n}/system/perst_rst
Description	Read dpu{n} PERST signal to asic
Access	Read

Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	X
Example	Read dpu{n} PERST signal to asic cat $bsp_path/dpu{n}/system/perst_rst		

3.6.12 Get DPU phy reset reason

Node name	$bsp_path/dpu{n}/system/phy_rst		
Description	Read dpu{n} phy reset reason		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} phy reset reason cat $bsp_path/dpu{n}/system/phy_rst		

3.6.13 Get DPU usb phy reset reason

Node name	$bsp_path/dpu{n}/system/usbphy_rst		
Description	Read dpu{n} usb phy reset reason		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	X
Example	Read dpu{n} usb phy reset reason cat $bsp_path/dpu{n}/system/usbphy_rst		

3.6.14 Get DPU fpga part number

Node name	$bsp_path/dpu{n}/system/fpga1_pn		
Description	Read dpu{n} fpga part number		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values

	dpu	Integer	X
Example	Read dpu{n} fpga part number cat $bsp_path/dpu{n}/system/fpga1_pm		

3.6.15 Get DPU fpga minor version

Node name	$bsp_path/dpu{n}/system/fpga1_version_min		
Description	Read dpu{n} minor version		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	X
Example	Read dpu{n} fpga minor version cat $bsp_path/dpu{n}/system/fpga1_version_min		

3.6.16 Get DPU ufm upgrade status

Node name	$bsp_path/dpu{n}/system/ufm_upgrade		
Description	Read dpu{n} ufm upgrade status		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} ufm upgrade status cat $bsp_path/dpu{n}/system/ufm_upgrade		

3.6.17 Get DPU VR update status

Node name	$bsp_path/dpu{n}/system/voltreg_update_status		
Description	Read dpu{n} VR update status		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1

Example	Read dpu{n} VR update status cat $bsp_path/dpu{n}/system/voltreg_update_status

3.7 DPU events

3.7.1 Get DPU PLL power good indication

Node name	$bsp_path/dpu{n}/system/pg_1v8		
Description	Read dpu{n} PLL power good indication		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} PLL power good indication: cat $bsp_path/dpu{n}/events/pg_1v8		

3.7.2 Get DPU input power indication

Node name	$bsp_path/dpu{n}/system/pg_comparator		
Description	Read dpu{n} 12V input power good indication		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} DPU 12V input power good indication cat $bsp_path/dpu{n}/events/pg_comparator		

3.7.3 Get DPU serdes power indication

Node name	$bsp_path/dpu{n}/system/pg_dvdd		
Description	Read dpu{n} serdes core power good indication		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1

Example	Read dpu{n} serdes core power good indication: cat $bsp_path/dpu{n}/events/pg_dvdd

3.7.4 Get DPU serdes analog power indication

Node name	$bsp_path/dpu{n}/system/pg_hvdd		
Description	Read dpu{n} *serdes analog power good indication*		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} *serdes analog power good indication*: cat $bsp_path/dpu{n}/events/pg_hvdd		

3.7.5 Get DPU core power indication

Node name	$bsp_path/dpu{n}/system/pg_vdd		
Description	Read dpu{n} *core power good indication*		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} *core power good indication*: cat $bsp_path/dpu{n}/events/pg_vdd		

3.7.6 Get DPU cpu power indication

Node name	$bsp_path/dpu{n}/system/pg_vdd_cpu		
Description	Read dpu{n} *CPU power good indication*		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} *CPU power good indication*: cat $bsp_path/dpu{n}/events/pg_vdd_cpu		

3.7.7 Get DPU digital interfaces power

Node name	$bsp_path/dpu{n}/system/pg_vddio		
Description	Read dpu{n} *digital interfaces power good indication*		
Access	Read		
Release version	1.0		
Arguments	dpu	Data type	Values

	dpu	Integer	0 / 1
Example	Read dpu{n} *digital interfaces power good indication*: cat $bsp_path/dpu{n}/events/pg_vddio		

3.7.8 Get DPU ddr5 power indication

Node name	$bsp_path/dpu{n}/system/pg_vddq		
Description	Read dpu{n} *DDR5 power good indication*		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} *DDR5 power good indication*: cat $bsp_path/dpu{n}/events/pg_vddq		

3.7.9 Get DPU thermal trip indication

Node name	$bsp_path/dpu{n}/system/thermal_trip		
Description	Read dpu{n} thermal trip signal		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} thermal trip indication: cat $bsp_path/dpu{n}/events/thermal_trip		

3.7.10 Get DPU tps upgrade status

Node name	$bsp_path/dpu{n}/system/ufm_upgrade_done		
Description	Read dpu{n} TPS upgrade process finished successfully or not		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} TPS upgrade process finished successfully or not: cat $bsp_path/dpu{n}/events/ufm_upgrade_done		

3.7.11 Get DPU cpu power fault indication

Node name	$bsp_path/dpu{n}/system/vdd_cpu_alert

Description	Read dpu{n} cpu power fault indication		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} cpu power fault indication cat $bsp_path/dpu{n}/events/vdd_cpu_alert		

3.7.12 Get DPU cpu VR hot alert

Node name	$bsp_path/dpu{n}/system/vdd_cpu_hot_alert		
Description	Read dpu{n} cpu VR hot alert		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} cpu VR hot alert: cat $bsp_path/dpu{n}/events/vdd_cpu_hot_alert		

3.7.13 Get DPU ddr5 fault indication

Node name	$bsp_path/dpu{n}/system/vddq_alert		
Description	Read dpu{n} DDR5 fault indication		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} DDR5 fault indication cat $bsp_path/dpu{n}/events/vddq_alert		

3.7.14 Get DPU ddr5 hot alert

Node name	$bsp_path/dpu{n}/system/vddq_hot_alert		
Description	Read dpu{n} DDR5 VR hot alert		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	dpu	Integer	0 / 1
Example	Read dpu{n} DDR5 VR hot alert: cat $bsp_path/dpu{n}/events/vddq_hot_alert		

3.8 LC Alarms

3.8.1 Get LC Hot Swap Power Alarm

Node name	$bsp_path/lc{n}/alarm/hotswap_power<index>_alarm		
Description	Read lc<index> hotswap power <index> alarm, alarm set on (1, 0)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	0 / 1
Example	Read lc1 hotswap power 1 alarm: cat $bsp_path/lc1/alarm/hotswap_power1_alarm		

3.8.2 Get LC Voltage Input Alarm

Node name	$bsp_path/lc{n}/alarm/voltmon<index>_in<index>_alarm		
Description	Read lc<index> Voltage<index> Input <index> alarm, set on (1, 0)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	0 / 1
Example	Read lc1 Voltage 1 Input 3 alarm cat $bsp_path/lc1/alarm/voltmon1_in3_alarm		

3.8.3 Get LC Voltage Current Alarm

Node name	$bsp_path/lc{n}/alarm/voltmon<index>_curr<index>_alarm		
Description	Read lc<index> Voltage<index> Current <index> alarm, set on (1, 0)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	0 / 1
Example	Read lc1 Voltage 1 current 3 alarm cat $bsp_path/lc1/alarm/voltmon1_curr3_alarm		

3.8.4 Get LC Voltage Power Alarm

Node name	$bsp_path/lc{n}/alarm/voltmon<index>_power<index>_alarm		
Description	Read lc<index> Voltage<index> Power<index> alarm, set on (1, 0)		
Access	Read		
Release version	1.0		
Arguments	Name	Name	Name
	Thermal	Thermal	Thermal
Example	Read lc1 Voltage 1 power 1 alarm: cat $bsp_path/lc1/alarm/voltmon1_power1_alarm		

3.9 LC EEPROM

3.9.1 Read LC EEPROM FRU

Node name	$bsp_path/lc{n}/eeprom/fru		
Description	Read lc<index> eeprom hexdump of fru		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	Hex	Hex dump format of memory
Example	Read lc1 eeprom hexdump of fru : cat $bsp_path/lc1/eeprom/fru		

3.9.2 Read LC EEPROM INI

Node name	$bsp_path/lc{n}/eeprom/ini		
Description	Read lc<index> eeprom hexdump of ini		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	Hex	Hex dump format of memory
Example	Read lc1 eeprom hexdump of ini : cat $bsp_path/lc1/eeprom/ini		

3.9.3 Read LC EEPROM VPD Parsed

Node name	$bsp_path/lc{n}/eeprom/vpd_parsed		
Description	Read lc<index> eeprom vpd parsed		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	text	text format of memory
Example	Read lc1 eeprom ini parsed : cat $bsp_path/lc1/eeprom/vpd_parsed		

3.9.4 Read LC EEPROM INI Parsed

Node name	$bsp_path/lc{n}/eeprom/ini_parsed		
Description	Read lc<index> eeprom ini parsed		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	EEPROM information	text	text format of memory
Example	Read lc1 eeprom ini parsed : cat $bsp_path/lc1/eeprom/ini_parsed		

3.10 LC Environment

3.10.1 Get LC Voltage Current

Node name	$bsp_path/lc{n}/environment/voltmon<index>_curr<index>_input		
Description	Get lc<index> raw voltage current <index> input		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get lc1 voltage monitor 1 current 2 reading: cat $bsp_path/lc1/environment/voltmon1_curr2_input		

3.10.2 Get LC Voltage Input

Node name	$bsp_path/lc{n}/environment/voltmon<index>_in<index>_input		
Description	Get lc<index> raw voltage input<index>		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get lc1 voltage monitor 1 input 1 reading: cat $bsp_path/lc1/environment/voltmon1_in1_input		

3.10.3 Get LC Voltage Power

Node name	$bsp_path/lc{n}/environment/voltmon<index>_power<index>_input		
Description	Get lc<index> raw voltage power<index> input		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get lc1 voltage monitor 1 power 2 reading: cat $bsp_path/lc1/environment/voltmon1_power2_ input		

3.10.4 Get LC Hot Swap Current

Node name	$bsp_path/lc{n}/environment/hotswap_curr<index>_input		
Description	Get lc<index> raw hotswap current <index> input		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get lc1 hotswap current 1 reading: cat $bsp_path/lc1/environment/hotswap_curr1_input		

3.10.5 Get LC Hot Swap Input

Node name	$bsp_path/lc{n}/environment/hotswap_in<index>_input
Description	Get lc<index> raw hotswap input<index>
Access	Read only

Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get lc1 hotswap input 1 reading: cat $bsp_path/lc1/environment/hotswap_in1_input		

3.10.6 Get LC Hot Swap Power

Node name	$bsp_path/lc{n}/environment/hotswap_power<index>_input		
Description	Get lc<index> raw hotswap power<index> input		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get lc1 hotswap power 1 reading: cat $bsp_path/lc1/environment/hotswap_power1_input		

3.10.7 Get LC A2D Voltage

Node name	$bsp_path/lc{n}/environment/a2d_iio:device<number>_raw<index>		
Description	Get lc<index> raw voltage input <index> from A2D sensor<number>		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get lc1 voltage input 0 from A2D1: cat $bsp_path/lc1/environment/a2d_iio:device0_raw_1		

3.10.8 Get LC A2D Voltage Scale

Node name	$bsp_path/lc{n}/environment/device<number>_voltage_scale		
Description	Get lc<index> voltage scale from A2D sensor <number >		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X

Example	Get lc1 voltage scale 0 from A2D: cat $bsp_path/lc1/environment/device0_voltage_scale

3.11 LC LED

3.11.1 Get LC Status LED

Node name	$bsp_path/lc{n}/led/led_status		
Description	Read lc<index> 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 lc1 status LED color: cat $bsp_path/lc1/led/led_status		

3.11.2 Get LC Status LED Capabilities

Node name	$bsp_path/lc{n}/led/led_status_capability		
Description	Read lc<index> status module status LED capabilities		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	green_blink orange_blink green orange none
Example	Get lc1 status LED capabilities: cat $bsp_path/lc1/led/led_status_capability		

3.11.3 Set LC Status Green/Orange

Node name	$bsp_path/lc{n}/led/led_status_<color>
Description	Set lc<index> status LED active
Access	Read/Write

Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set lc1 status led active: echo 255 > $bsp_path/lc1/led/led_status_green		

3.11.4 Set LC Status LED Green/Orange Delay Off

Node name	$bsp_path/lc{n}/led_status_<color>_delay_off		
Description	Set lc<index> status LED blinking off frequency		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set lc1 status led green delay off: echo 10 > $bsp_path/lc1/led/led_status_green_delay_off		

3.11.5 Set LC Status LED Green/Orange Delay On

Node name	$bsp_path/lc{n}/led/led_status_<color>_delay_on		
Description	Set lc<index> status LED blinking on frequency		
Access	Read/Write		
Release version	1.0		
Arguments	Name	Data type	Values
	LED capabilities	Integer	
Example	Set lc1 status led green delay on: echo 255 > $bsp_path/lc1/led/led_status_green_delay_on		

3.12 LC Config

3.12.1 Read LC CPLD Number

Node name	$bsp_path/lc{n}/config/cpld_num
Description	Get the number of CPLD modules in lc<index>
Access	Read only
Release version	1.0

Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get lc1 CPLD number: cat $bsp_path/lc1/config/cpld_num		

3.12.2 Read LC FPGA Number

Node name	$bsp_path/lc{n}/config/fpga_num		
Description	Get the number of FPGA modules in lc<index>		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get lc1 FPGA number: cat $bsp_path/lc1/config/fpga_num		

3.12.3 Read LC Gearbox Number

Node name	$bsp_path/lc{n}/config/gearbox_num		
Description	Get the number of gearbox modules in lc<index>		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get lc1 gearbox number: cat $bsp_path/lc1/config/gearbox_num		

3.12.4 Read LC Gearbox Manager Number

Node name	$bsp_path/lc{n}/config/gearbox_mgr_num		
Description	Get the number of gearbox manager modules in lc<index>		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values

	Status	Integer	1-X
Example	Get lc1 gearbox manager number: cat $bsp_path/lc1/config/gearbox_mgr_num		

3.12.5 Read LC Port Number

Node name	$bsp_path/lc{n}/config/port_num		
Description	Get the number of ports in lc<index>		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Status	Integer	1-X
Example	Get lc1 port number: cat $bsp_path/lc1/config/port_num		

3.12.6 Read LC Module Counter

Node name	$bsp_path/lc{n}/module_counter		
Description	Get the number of sfp modules in lc<index> Note: this is attribute 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 the number of sfp modules in lc1: cat $bsp_path/lc1/config/module_counter		

3.13 LC thermal

3.13.1 Read LC Gearbox Temperature Input

Node name	$bsp_path/lc{n}/thermal/gearbox<index>_temp_input		
Description	Get lc<index> gearbox<index> temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values

	Thermal	Integer	
Example	Read lc1 gearbox1 temp input: cat $bsp_path/lc1/thermal/gearbox1_temp_input		

3.13.2 Get LC QSFP/SFP Module Thermal

Node name	$bsp_path/lc{n}/thermal/mlxsw-module<index>		
Description	Get lc<index> port thermal zones		
Access	Folder		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal		
Example	Get lc1 mlxsw module 1: cat $bsp_path/lc1/thermal/mxlsw-module1		

3.13.3 Read Temperature Critical Module

Node name	$bsp_path/lc{n}/thermal/module<index>_temp_crit		
Description	Get lc<index> port module <index> critical temperature level		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get lc1 temp critical module 18: cat $bsp_path/lc1/thermal/module18_temp_crit_		

3.13.4 Read Temperature Emergency Module

Node name	$bsp_path/lc{n}/thermal/module<index>_temp_emergency		
Description	Get lc<index> port module <index> critical emergency level		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get lc1 temp emergency module 18: cat $bsp_path/lc1/thermal/module18_temp_emergency		

3.13.5 Read Temperature Fault Module

Node name	$bsp_path/lc{n}/thermal/module<index>_temp_fault

Description	Get lc<index> indication of port module<index> is in fault state (1-FAULT, 0-VALID)		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get lc1 temp fault module 18: cat $bsp_path/lc1/thermal/module18_temp_fault		

3.13.6 Read Temperature Input Module

Node name	$bsp_path/lc{n}/thermal/module<index>_temp_input		
Description	Get lc<index> port module <index> temperature		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get lc1 temp input module 18: cat $bsp_path/thermal/module18_temp_input		

3.14 LED Control

3.14.1 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; amber/red; amber_blink/red _blink;
Example	Get fan module 1 status LED color: cat $bsp_path/led/ led_fan1		

3.14.2 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 amber_blink/ red_blink green amber/red; none
Example	Get fan module 1 capabilities: cat $bsp_path/led/ led_fan1_capability		

3.14.3 Set Fan LED Green/[Amber/Red]

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		

3.14.4 Set Fan LED Green/[Amber/Red] 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		

3.14.5 Set Fan LED Green/[Amber/Red] 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		

3.14.6 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	green_blink amber_blink / red_blink green amber/red; none
Example	Get PSU module status LED color: cat $bsp_path/led/led_psu		

3.14.7 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 amber_blink / red_blink green amber/red; none
Example	Get PSU module capabilities: cat $bsp_path/led/ led_psu_capability		

3.14.8 Set PSU LED Green/[Amber/Red]

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		

3.14.9 Set PSU LED Green/[Amber/Red] 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		

3.14.10 Set PSU LED Green/[Amber/Red] 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		

3.14.11 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	green_blink amber_blink / red_blink green amber/red; none
Example	Get status LED color: cat $bsp_path/led/led_status		

3.14.12 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 amber_blink / red_blink green amber/red; none
Example	Get status led capabilities: cat $bsp_path/led/led_status_capability		

3.14.13 Set Status Green/[Amber/Red]

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		

3.14.14 Set Status LED Green/[Amber/Red] 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		

3.14.15 Set Status LED Green/[Amber/Red] 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		

3.14.16 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 green_blink amber_blink / red_blink green amber/red; none
Example	Get system status LED capabilities: cat $bsp_path/led/led_system_capability		

3.15 Power Control

3.15.1 Get PSU sensor Current + thresholds

Node name	$bsp_path/power/psu<index>_curr<sensor_name><treshold>		
Description	Get raw current value from psu sensor. Index: PSU index (1,2.. etc.) sensor_name: "_in" – input current sensor "" – output current sensor treshold (if exists): "_max" - maximum "_crit" – critical maximum *Note: available threshold types and their values depends on PSU type*		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Current	Integer	X
Example	Get psu input current : cat $bsp_path/power/psu<index>_curr_in Get psu output current : cat $bsp_path/power/psu<index>_curr		

3.15.2 Get PSU sensor Voltage + thresholds

Node name	$bsp_path/power/psu<index>_volt<sensor_name><treshold>

Description	Get raw volt value from psu sensor. Index: PSU index (1,2.. etc.) sensor_name: "_in" – input volt sensor "_out2" – output volt sensor treshold (if exists): "_lcrit" – critical minimum "_min" –minimum "_max" - maximum "_crit" – critical maximum *Note: available threshold types and their values depends on PSU type*		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	Voltage	Integer	X
Example	Get psu input volt: cat $bsp_path/power/psu<index>_volt_in Get psu output volt: cat $bsp_path/power/psu<index>_volt_out2		

3.15.3 Get PSU sensor Power + thresholds

Node name	$bsp_path/power/psu<index>_power<sensor_name><treshold>
Description	Get raw power value from psu sensor.
	Index: PSU index (1,2.. etc.) sensor_name: "_in" – input power sensor "" – output power sensor treshold (if exists): "_max" - maximum "_crit" – critical maximum *Note: available threshold types and their values depends on PSU type*
Access	Read only

Release version	1.0		
Arguments	Name	Data type	Values
	Power	Integer	X
Example	Get psu input power: cat $bsp_path/power/psu<index>_power_in Get psu output power: cat $bsp_path/power/psu<index>_power		

3.15.4 Get PSU sensor capability

Node name	$bsp_path/power/psu<index>_<sensor_type>_capability		
Description	Get available thresholds capability list for psu sensor. Show available sensor thresholds separated by space. Index: PSU index (1,2.. etc.) sensor_type: any available psu sensor. Example: “volt_in” – input volt sensor “curr” – output current sensor “power_in” – input power sensor		
Access	Read only		
Release version	1.0		
Arguments	Name	Data type	Values
	capability	String	X
Example	Get psu input voltage capability: cat $bsp_path/power/psu<index>_volt_in_capability min max crit lcrit Get psu output power capability: cat $bsp_path/power/psu<index> power_capability max crit		

3.16 System / Power Control

3.16.1 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		

3.16.2 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		

3.16.3 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		

3.16.4 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		

3.16.5 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		

3.16.6 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

3.16.7 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		

3.16.8 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		

3.16.9 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		

3.16.10 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		

3.16.11 Set Line Card Power

Node name	$bsp_path/system/lc{n}_pwr		
Description	switching line cards power on and off. 1 - related line card is powered on, 0 - powered off.		
Access	Write / Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Turn power off echo 0> $bsp_path/system/lc1_pwr		

3.16.12 Set Line Card Enable

Node name	$bsp_path/system/lc{n}_enable
Description	line cards enable state control. 1 - related line card is in enable state, 0 – card in disabled state.
Access	Write / Read

Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Turn lc enabled: echo 1 > $bsp_path/system/lc1_enable		

3.16.13 Read Line Card Active

Node name	$bsp_path/system/lc{n}_active		
Description	Read lc<index> active status		
Access	Read		
Release version	1.0		
Arguments	Name	Name	Name
	System attribute	System attribute	System attribute
Example	read lc1 activity status: cat $bsp_path/system/lc1_active		

3.16.14 Read Line Card Powered

Node name	$bsp_path/system/lc{n}_powered		
Description	Read lc<index> powered status		
Access	Read		
Release version	1.0		
Arguments	Name	Name	Name
	System attribute	System attribute	System attribute
Example	read lc1 powered status: cat $bsp_path/system/lc1_powered		

3.16.15 Read Line Card Present

Node name	$bsp_path/system/lc{n}_present		
Description	Read lc<index> present status		
Access	Read		
Release version	1.0		
Arguments	Name	Name	Name
	System attribute	System attribute	System attribute
Example	read lc1 present status: cat $bsp_path/system/lc1_present		

3.16.16 Read Line Card Ready

Node name	$bsp_path/system/lc{n}_ready		
Description	Read lc<index> ready status		
Access	Read		
Release version	1.0		
Arguments	Name	Name	Name
	System attribute	System attribute	System attribute
Example	read lc1 ready status: cat $bsp_path/system/lc1_ready		

3.16.17 Read Line Card Synced

Node name	$bsp_path/system/lc{n}_synced		
Description	Read lc<index> synced status		
Access	Read		
Release version	1.0		
Arguments	Name	Name	Name
	System attribute	System attribute	System attribute
Example	read lc1 synced status: cat $bsp_path/system/lc1_synced		

3.16.18 Read Line Card Verified

Node name	$bsp_path/system/lc{n}_verified		
Description	Read lc<index> verified status		
Access	Read		
Release version	1.0		
Arguments	Name	Name	Name
	System attribute	System attribute	System attribute
Example	read lc1 verified status: cat $bsp_path/system/lc1_verified		

3.16.19 Read Line Card Reset Mask

Node name	$bsp_path/system/lc{n}_rst_mask
Description	Read lc<index> reset mask
Access	Read
Release version	1.0

Arguments	Name	Name	Name
	System attribute	System attribute	System attribute
Example	read lc1 reset mask: cat $bsp_path/system/lc1_rst_mask		

3.16.20 Set Line Card Shutdown

Node name	$bsp_path/system/lc{n}_shutdown		
Description	Set lc<index> shutdown		
Access	Write		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Set lc1 shutdown: echo 1 > $bsp_path/system/lc1_shutdown		

3.16.21 Set VPD Write Protect

Node name	$bsp_path/system/vpd_wp		
Description	allow to overwrite system VPD. 1 - write protection is disabled, when 0 - enabled. By default write is protected.		
Access	Write / Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Turn write protect off: echo 1 > $bsp_path/system/vpd_wp		

3.16.22 Set ASIC Up during PCIe root complex reset

Node name	$bsp_path/system/pcie_asic_reset_dis		
Description	allows to retain ASIC up during PCIe root complex reset, when attribute is set 1		
Access	Write / Read		
Release version	1.0		
Arguments	Name	Data type	Values

	System attribute	Integer	
Example	Retain ASIC up: echo 1 > $bsp_path/system/pcie_asic_reset_dis		

3.16.23 Get Voltreg Update status

Node name	$bsp_path/system/voltreg_update_status		
Description	exposes the configuration update status of burnable voltage regulator devices. The status values are as following: 0 - OK; 1 - CRC failure; 2 = I2C failure; 3 - in progress.		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Get voltreg update status: cat $bsp_path/system/voltreg_update_status		

3.16.24 Get Config1, Config2

Node name	$bsp_path/system/config1 | $bsp_path/system/config2		
Description	show system static topology identification like system's static I2C topology, number and type of FPGA devices within the system and so on.		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Get config1 status: cat $bsp_path/system/config1		

3.16.25 Get Ufm Version

Node name	$bsp_path/system/ufm_version

Description	exposes the firmware version of burnable voltage regulator devices.		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	System attribute	Integer	
Example	Get ufm version: cat $bsp_path/system/ufm_version		

3.16.26 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 additional causes: • hotswap_or_halt - Reset or power off intitaed by PSU swap. • sff_wd - Reset or power off initiated by CPU watch dog mechanism. **Note**: MSN2210 supports additional causes: • reset_system • reset_sw_pwr_off • reset_cpu_pwr_fail • reset_reload_bios

	• reset_ac_pwr_fail Spectrum-2/3: • 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. • 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. For MSN4800 **From management board** • reset_long_pb - Reset push button was pressed for more than 15 seconds **(Button)** • reset_short_pb - Reset push button was pressed for less than 15 seconds **(Button)** • reset_aux_pwr_or_fu - Reset was asserted due to CPLD power down or CPLD code refresh **(CPLD)** • reset_mgmt_dc_dc_pwr_fail - Failure one of management board DC2DC voltage regulator 5 Volt rail **(Power issue)** • reset_sys_comex_bios - Reset, or power cycle was requested by SW or BIOS reload **(SW)**

	From COME module • reset_sw_reset - Power cycle command (1sec pulsed) **(SW)** • reset_aux_pwr_or_reload - Auxiliary power failure or CPLD field upgrade. **(Power issue or CPLD update)** • reset_comex_pwr_fail - Power failure of COME **(Power issue)** • reset_platform Reboot command **(SW)** • reset_soc - Power off was initiated by SOC (linux "poweroff" command) **(SW)** • reset_pwr_off_from_carrier - Failure of 12 Volt power domain **(Power issue)** **From switch board** • reset_swb_wd - Power off or reset was triggered by switch board watchdog **(Watchdog)** • reset_swb_aux_pwr_or_fu - Reset due to CPLD power down or CPLD code refresh **(CPLD)** • reset_swb_dc_dc_pwr_fail - Switch board reset or DC2DC power failure on switch board **(Power issue)** • reset_swb_12v_fail - Failure of switch board 12 Volt power domain **(Power issue)** • reset_system - Reset by system reset cycle, system power on, power cycle,ASIC reset, ASIC power on. (**SW /FW)** • reset_thermal_spc_or_pciesw Power cycle was initiate by the thermal shutdown mechanism due to ConnectX or Spectrum3 critical temperature (**ASIC or PCIe thermal shutdown)**		
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		

3.17 Thermal

3.17.1 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 mili Celsius
Example	Get switch module ASIC temperature: cat $bsp_path/thermal/asic		

3.17.2 Read Switch ASIC Temperature Normal

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

3.17.3 Read Switch ASIC Temperature Critical

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

3.17.4 Read Switch ASIC Temperature Emergency

Node name	$bsp_path/thermal/asic_temp_emergency
Description	Read value of switch module ASIC temperature emergency
Access	Read only

Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	Degrees in mili Celsius
Example	Get switch module ASIC temperature emergency: cat $bsp_path/thermal/asic_temp_emergency		

3.17.5 Read Switch ASIC Temperature Trip Critical

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

3.17.6 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 mili Celsius
Example	Get comex ambient temperature. cat $bsp_path/thermal/comex_amb		

3.17.7 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		

3.17.8 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		

3.17.9 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		

3.17.10 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		

3.17.11 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		

3.17.12 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		

3.17.13 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		

3.17.14 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		

3.17.15 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		

3.17.16 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		

3.17.17 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		

3.17.18 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		

3.17.19 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		

3.17.20 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		

3.17.21 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		

3.17.22 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		

3.17.23 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		

3.17.24 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		

3.17.25 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		

3.17.26 Read PSU min/max Fan Speed

Node name	psu<index>_fan_min/psu<index>_fan_max		
Description	Get the default min/max values of PSU fans speed RPM		
Access	Read		
Release version	V.7.0010.3300		
Arguments	Name	Data type	Values
	Status	Integer	X
Example	Get PSU FAN min default speed in RPM: cat $bsp_path/thermal/psu<index>_fan_min		

3.17.27 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		

3.17.28 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		

3.17.29 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		

3.17.30 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_		

3.17.31 Read Temperature Emergency Module

Node name	$bsp_path/thermal/module<index>_temp_emergency
Description	Get port module 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		

3.17.32 Read Temperature Trip Critical Module

Node name	$bsp_path/thermal/module<index> _temp_trip_crit		
Description	Get port module temperature trip critical level		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get temp trip critical module 18: cat $bsp_path/thermal/module18_temp_trip_crit		

3.17.33 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		

3.17.34 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		

3.17.35 Read Temperature Critical Gearbox

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

3.17.36 Read Temperature Emergency Gearbox

Node name	$bsp_path/thermal/gearbox <index>_temp_emergency		
Description	Get gearbox emergency level		
Access	Read		
Release version	1.0		
Arguments	Name	Data type	Values
	Thermal	Integer	
Example	Get temp emergency gearbox 18: cat $bsp_path/thermal/gearbox18_temp_emergency		

3.17.37 Read Temperature Trip Critical Gearbox

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

3.17.38 Read Temperature Input Gearbox

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

3.17.39 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 mili Celsius
Example	Get CPU Core 0 temperature: cat $bsp_path/thermal/cpu_core0		

3.17.40 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 mili Celsius
Example	Get switch board ambient fan temperature: cat $bsp_path/thermal/fan_amb		

3.17.41 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 mili Celsius
Example	Get switch board ambient temperature: cat $bsp_path/thermal/port_amb		

3.17.42 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 mili Celsius
Example	Get switch power supply 1 temperature: cat $bsp_path/thermal/psu1		

3.18 Watchdog

3.18.1 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		

3.18.2 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		

3.18.3 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		

3.18.4 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		

3.18.5 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		

3.18.6 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		

3.18.7 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		

3.19 JTAG interface

3.19.1 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		

3.19.2 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		

3.19.3 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		

3.19.4 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		

3.19.5 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.