Power and Thermal

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Preface

This guide outlines the list of messages and errors encountered from the power and thermal modules. Some of these messages are printed on the console and some in the RShim log.

Command Cheat Sheet

Sensors

Arm thermal sensor data can be accessed using the `sensors` command. All the Arm thermal sensors and DDR temperature are provided under `acpitz-acpi` section.

```
# sensors
mlx5-pci-0300
Adapter: PCI adapter
asic:          +45.0C  (crit = +91.0C, highest = +57.0C)

acpitz-acpi-0
Adapter: ACPI interface
temp1:         +41.4C  (crit = +115.0C)
temp2:         +41.2C  (crit = +115.0C)
temp3:         +39.4C  (crit = +115.0C)
temp4:         +41.9C  (crit = +115.0C)
temp5:         +42.0C  (crit = +115.0C)
temp6:         +42.4C  (crit = +115.0C)
temp7:         +42.4C  (crit = +115.0C)
temp8:         +42.1C  (crit = +115.0C)
temp9:         +44.4C  (crit = +115.0C)
temp10:        +80.0C  (crit = +105.0C)

nvme-pci-0600
Adapter: PCI adapter
Composite:     +40.9C  (low  = -40.1C, high = +114.8C)
                       (crit = +122.8C)
```

```
Sensor 1:      +38.9C  (low  = -273.1C, high = +65261.8C)
```

The sensor name corresponding to the `tempX` node can be known by reading this node: `/sys/bus/acpi/devices/LNXTHERM:(X-1)/description`.

For example, the temperature value displayed next to `temp1` corresponds to:

```
# cat /sys/bus/acpi/devices/LNXTHERM\:00/description
center
```

Logging and Counters

RShim Error Messages

The following messages are seen in RShim log. To see the RShim log, run the following commands:

```
# echo "DISPLAY_LEVEL 2" > /dev/rshimX/misc
# cat /dev/rshimX/misc
```

Message	Description
`cannot access vr0`	VR0 is not responding. This indicates a hardware issue on the device.
`cannot access vr1`	VR1 is not responding. This indicates a hardware issue on the device.
`set_page err:X`	VR is not responding. This indicates a hardware issue on the device.
`mfr_vr_mc err:X`	Access to VR is inconsistent. This indicates a hardware issue on the device, resulting in an unstable connection to the VR.

Message	Description
`pmbus_lsb err:X`	Access to VR is inconsistent. This indicates a hardware issue on the device. resulting in an unstable connection to the VR.
`read_vout err:X`	Access to VR is inconsistent. This indicates a hardware issue on the device, resulting in an unstable connection to the VR.
`set_vout err:X`	Unable to set the requested v-out value. This indicates either the requested v-out is out of bounds or unstable connections to the VRs.
`PTMERROR: VR access error`	VR is not responding. This indicates a hardware issue on the device.
`PTMERROR: Unknown OPN`	Power capping is disabled on the device because VRs are not detected and the OPN is not known.
`CRITICAL ERROR: ATX power not detected! Halting system!!`	This critical error message indicates that ATX power is not detected on the device and the system is halted. To recover, connect the ATX power cable and restart.
`power capping disabled`	This indicates that the power capping is disabled on the device.

Console Error Messages

Runtime messages related to power and thermal capping are logged to the console. These messages are in the following format:

```
PTM:<timestamp>:<event_type>:<throttle_action>:<event_details>
```

Element	Description
`timestamp`	Current CPU cycle value since boot. This is counted at the speed of the RShim clock.
`event_type`	1 – Thermal event 2 – Power event

Element	Description
`throttle_act ion`	0 – No change 1 – Switched to P0 (100%) 2 – Switched to P1 (80%) 3 – Switched to P2 (50%)
`event_detail s`	0 – None 1 – Device in LiveFish mode 3 – DDR reported error when reading temperature 4 – VR read error 6 – Power capping disabled 7 – Power capping enabled 8 – Thermal state is normal 9 – Thermal state is in Alarm-P1 state (temperature over threshold) 10 – Thermal state is in Alarm-P2 state (temperature consistently over threshold) 11 – DDR temperature over threshold

Debug Info Packages

N/A

Scenarios

Abrupt System Halt in 150W BlueField-3 Platforms

On 150W BlueField platforms, system halt occurs in power capping code when the ATX cable is not connected or is removed during operation. In this case, the system is halted and the following message is printed on the RShim log and console:

```
CRITICAL ERROR: ATX power not detected! Halting system!!
```

To resume normal operation, connect the ATX cable and power cycle the device.

To connect the ATX cable, use the following harness for BlueField-3:

Tip

Good connectors for BlueField-3 are all black on the clipper side and should be easy to connect without using force.

> ⚠️ **Warning**
>
> Avoid common mistakes around matching the ATX harnesses to the BlueField-3!
>
> - The following connector, although 8 pins, is an ATX harness for GPUs and does not fit BlueField-3:
>
>   images/download/attachments/3348406549/harness-version-1-modificationdate-1731453311587-api-v2.png

- It can be forced into the BlueField-3 ATX socket, but that should be avoided!

- Note the all-yellow wires on the clipper side. The polarity is not right and will prevent the server from powering on.

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