

Intel® N3000 FPGA Programmable Acceleration Card (PAC) Management Driver and Tools Hypervisor (ESXi 7.0) User Manual

Version: 0.06

Contents

1. Introduction	2
2. Product Overview	3
3. Acronyms	4
4. Scope.....	5
5. System Requirements	5
6. Installation of Package	5
7. IFPGA Management Tools.....	10
8. FAQ's (Frequently Asked Questions)	48

List of Tables

No table of figures entries found.

2. Product Overview

The release of the ifpga-n3000-mgmt package include, FPGA Management driver and set of management and monitoring tools supporting intel N3000 programming accelerator FPGA on VMware hypervisor version ESXi 7.0.U2. The Management driver is developed using VMWare Native driver development kit for VMWare ESXi 7.0 hypervisor. The Figure 1 represents FPGA Management driver architecture,

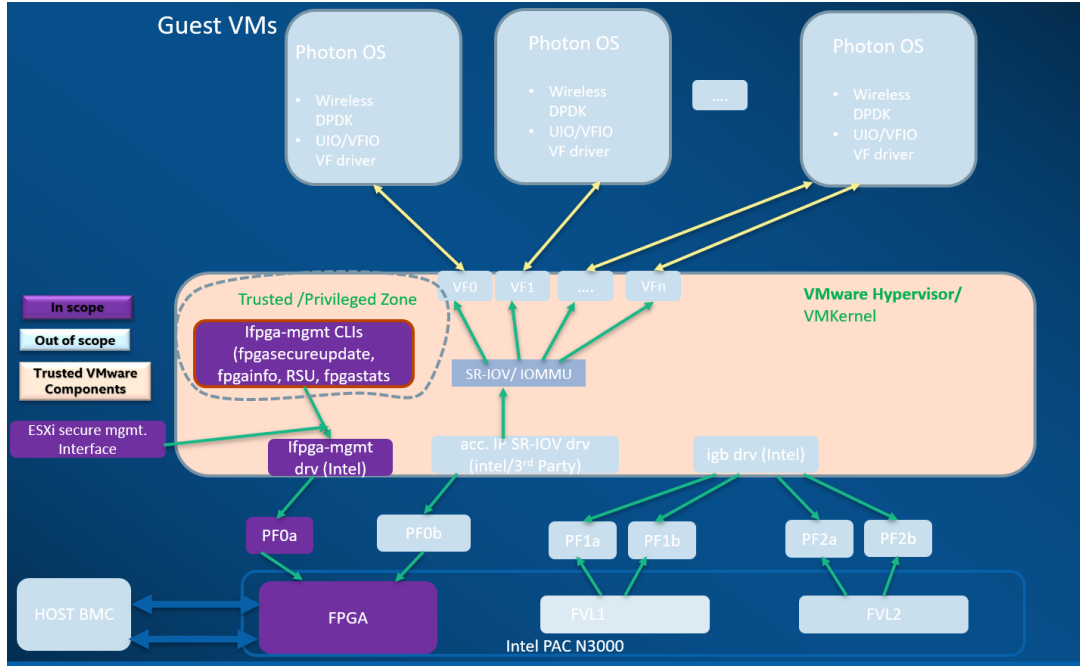


Figure 1: FPGA Management High level Driver Architecture

This architecture consists of ESXi OS base driver module named as ifpga-mgmt-drv and Trusted/Privileged zone consist of ifpga-mgmt CLIs (fpgasupdate, fpgainfo, fpgastatus). The ifpga-n3000-mgmt CLI tools are interfaces to ifpga-n3000-mgmt-drv through VMWare Proprietary Management Interface to access ifpga-n3000-mgmt-drv functionality.

3. Acronyms

Acronym	Expansion	Description
FPGA	Field Programmable Gate Array	
PAC	Programmable Accelerator card	
VIB	vSphere Installation Bundle	
FME	FPGA Management Engine	
OS	Operation System	
CLI	Command Line Interface	This is interface to access ifpga-n3000-mgmt drv through ESXi shell interface via tools

4. Scope

The Scope of document is limited to provide the information about,

1. Installation of VIB package on ESXi OS Platform
 2. FME Tools execution flow on ESXi OS Platform
 - a. fpgainfo
 - b. ifpga-cli
 - c. fpgasupdate
 - d. fpgastatus
-

5. System Requirements

To perform execution of VC FPGA Management tools we require following system requirements,

1. OS: ESXi 7.0.1 build- 16358407 and ESXi 7.0.1 build- 17143448
 2. Driver: Intel N3000 FPGA Management VIB Package (e.g: ifpga.vib)
-

6. Installation of Package

Get ESXi Components for ifpga-n3000-mgmt driver and tool by unzip following packages

```
Intel-ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807_18188203-package.zip
|→ Component: Intel-ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807_18188203.zip
Intel-ifpga-mgmt-tool-utils_1.0.1-1OEM.700.1.0.15843807_18179169-package.zip
|→ Component: Intel-ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807_18188203.zip
```

The following steps shall be executed on ESXi Machine ssh shell prompt to get zip for install component and VIB file to install VIB Package.

➤ Driver Component/VIB Installation

Component Installation command:

- Ensure <component.zip> packages in ESXi machine which will be used for installation.
E.g. "Intel-ifpga-mgmt-tool-utils_1.0.1-1OEM.700.1.0.15843807_18179169-package.zip"
"Intel-ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807_18225162-package.zip"
- Enable Maintenance mode in ESXi OS by executing following command at ESXi ssh shell prompt
<prompt#>: esxcli system maintenanceMode set -e 1
- Install component package using following command sequentially.
Syntax: esxcli software component apply -d <AbosolutePath/component.zip>
E.g:
esxcli software component apply -d <AbosolutePath>/Intel-ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807_18188203-package.zip

Output:

Installation Result

Components Installed: Intel-ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807

```
Components Removed:
Components Skipped:
Message: Operation finished successfully.
Reboot Required: false
```

esxcli software component apply -d <Abosolutepath>/Intel-ifpga-mgmt-tool-utils_1.0.1-10EM.700.1.0.15843807_18225162-package.zip

```
Output:
Installation Result
Components Installed: Intel-ifpga-mgmt-tool-utils_1.0.1-10EM.700.1.0.15843807
Components Removed:
Components Skipped:
Message: Operation finished successfully.
Reboot Required: false
```

- **Verify driver and tools Component installed under component tree**

- **esxcli software component list | grep Intel-ifpga**

```
Intel-ifpga-mgmt-tool-utils          Intel (R)  FPGA N3000
Management Tools for VMware ESXi
1.0.1-10EM.700.1.0.15843807          1.0.1-0
Intel  06-16-2021      PartnerSupported

Intel-ifpga-n3000-mgmt                Intel N3000  MGMT  FPGA
driver                                1.0.9-
10EM.700.1.0.15843807                1.0.9-0      Intel
06-17-2021      PartnerSupported
```

- **Check tools existence upon successful component installation**

The below tools should be present in /opt/intel directory of ESXi 7.0 OS

- Ifpga-cli
- Fpgainfo
- Fpgastatus
- Fpgasupdate

- Disable MaintenanceMode setting of ESXi OS using following command
esxcli system maintenanceMode set -e 0

VIB Installation command:

- Ensure VIB package like <vibName.vib) placed in any storage directory of ESXi machine which is
 - E.g:


```
INT_bootbank_ifpga-n3000-mgmt_1.0.9-10EM.700.1.0.15843807.vib
INT_bootbank_ifpga-mgmt-tools_1.0.1-10EM.700.1.0.15843807.vib
```
- Install VIB package using following command sequentially,
 - Syntax: **esxcli software vib install --maintenance-mode -v <absolutePath/vib name>**
 - E.g:


```
esxcli software vib install --maintenance-mode -v
<Abosolutepath>/INT_bootbank_ifpga-n3000-mgmt_1.0.9-10EM.700.1.0.15843807.vib
```

output:

```
Installation Result
  Message: Operation finished successfully.
  Reboot Required: false
  VIBs Installed: INT_bootbank_ifpga-n3000-mgmt_1.0.9-
1OEM.700.1.0.15843807
  VIBs Removed:
  VIBs Skipped:
```

```
esxcli software vib install --maintenance-mode -v
<Abosolutepath>/INT_bootbank_ifpga-mgmt-tool-utils_1.0.1-1OEM.700.1.0.15843807.vib
```

output:

```
Installation Result
  Message: Operation finished successfully.
  Reboot Required: false
  VIBs Installed: INT_bootbank_ifpga-mgmt-tool-utils_1.0.1-
1OEM.700.1.0.15843807
  VIBs Removed:
  VIBs Skipped:
```

- Verify Intel N3000 card detection as PCIe card in VMWare Hypervisor,
 - o `lspci -p | grep 0b30`

e.g:

```
0000:1c:00.0 8086:0b30 8086:0000 255/ / A V ifpga-n3000-mgmt
0000:26:00.0 8086:0b30 8086:0000 255/ / A V ifpga-n3000-mgmt
```

- Verify driver successful attachment of device

- o `lspci -p | grep 0b30`

```
0000:1c:00.0 8086:0b30 8086:0000 255/ / A V ifpga-n3000-mgmt
0000:26:00.0 8086:0b30 8086:0000 255/ / A V ifpga-n3000-mgmt
```

➤ **Check tools existence upon successful VIB installation**

- The below tools should be present in /opt/intel directory of ESXi 7.0 OS
 - o Ifpga-cli
 - o Fpgainfo
 - o Fpgastatus
 - o Fpgasupdate

➤ **Driver Component/VIB UNInstallation**

Component Removal/uninstall command:

- Enable Maintenance mode in ESXi OS by executing following command at ESXi ssh shell prompt

<prompt#>: `esxcli system maintenanceMode set -e 1`

- Remove/uninstall component package using following command sequentially.

Syntax: `esxcli software component remove -n <installed component name>`

E.g:

`esxcli software component remove -n Intel-ifpga-mgmt-tool-utils`

Output:

Removal Result

Components Installed:

Components Removed: Intel-ifpga-mgmt-tool-utils_1.0.1-1OEM.700.1.0.15843807

Components Skipped:

Message: Operation finished successfully.

Reboot Required: false

`esxcli software component remove -n Intel-ifpga-n3000-mgmt`

Output:

Removal Result

Components Installed:

Components Removed: Intel-ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807

Components Skipped:

Message: Operation finished successfully.

Reboot Required: false

- Check tools removal upon successful component removal**

The below tools will not be present in /opt/intel directory of ESXi 7.0 OS

- o Ifpga-cli
- o Fpgainfo
- o Fpgastatus
- o Fpgasupdate

- Disable MaintenanceMode setting of ESXi OS using following command
`esxcli system maintenanceMode set -e 0`

VIB Removal/Uninstall command:

- Removal/Uninstall VIB package using following command sequentially,
 - Syntax: `esxcli software vib remove --maintenance-mode -n <vib name>`
 - E.g:
`esxcli software vib remove --maintenance-mode -n ifpga-mgmt-tool-utils`

output:

Removal Result

Message: Operation finished successfully.

Reboot Required: false

VIBs Installed:

VIBs Removed: INT_bootbank_ifpga-mgmt-tool-utils_1.0.1-1OEM.700.1.0.15843807

VIBs Skipped:

```
esxcli software vib remove --maintenance-mode -n ifpga-n3000-mgmt
```

output:

Removal Result

Message: Operation finished successfully.

Reboot Required: false

VIBs Installed:

VIBs Removed: INT_bootbank_ifpga-n3000-mgmt_1.0.9-1OEM.700.1.0.15843807

VIBs Skipped:

- Verify Intel N3000 card detection as PCIe card in VMWare Hypervisor,
 - o `lspci -p | grep 0b30`

e.g:

```
0000:1c:00.0 8086:0b30 8086:0000 255/ / A V
```

```
0000:26:00.0 8086:0b30 8086:0000 255/ / A V
```

- Verify driver successful attachment of device
 - o `lspci -p | grep 0b30`

```
0000:1c:00.0 8086:0b30 8086:0000 255/ / A V
```

```
0000:26:00.0 8086:0b30 8086:0000 255/ / A V
```

➤ **Check tools removal upon successful VIB installation**

- The below tools should be present in /opt/intel directory of ESXi 7.0 OS
 - o Ifpga-cli
 - o Fpgainfo
 - o Fpgastatus
 - o Fpgasupdate

7. IFPGA Management Tools

➤ ifpga-cli(/opt/intel/ifpga-cli)

SYNOPSIS

```
ifpga-cli [-h] {read, write, target, version} --json
```

DESCRIPTION

ifpga-cli display FPGA driver version, tools version and their compatibility with driver and esxi sysfs target key value pairs, their attributes.

The command argument is one of the following:

```
'version', 'target', 'read', 'write'
```

FPGAINFO COMMANDS

version

Shows driver, tools version and compatibility status between driver and tools.

target

This command used to get information of registered target device names in driver registered format in accordance with '-l' option.

Read

This command used to get read key-value target list, read key-value target pairs data in accordance with '-l', read with key respectively.

Write

This command used to get write key-value target list, write key-value target pairs with value data in accordance with '-l', write with key and value respectively.

OPTIONAL ARGUMENTS

```
--help, -h`
```

Prints help information and exit.

COMMON ARGUMENTS

```
-l`
```

Helps to list the requested command output.

```
--json`
```

Display command output information as JSON Format.

ifpga-cli Help Messages

```
ifpga-cli -h
```

```
usage: ifpga-cli [-h] {read,write,target,version} ...
```

```
Intel FPGA Management Utility
```

```
optional arguments:
```

```
  -h, --help            show this help message and exit
```

```
Commands:
```

```
The FPGA management utility supports the following commands. Run the command to get further help
```

```

{read,write,target,version}
  read           read the value associated with a named key
  write          write a value to a named key
  target         shows target information
  version        provides driver and cli version and its compatibility
                  status

ifpga-cli target -h
usage: ifpga-cli target [-h] [-l] [--json]

shows target information

optional arguments:
  -h, --help show this help message and exit
  -l, --list list the targets available
  --json      prints in json format

ifpga-cli read -h
usage: ifpga-cli read [-h] [-l] [--json] [key]

read the value associated with a named key

positional arguments:
  key          the name of the key to read

optional arguments:
  -h, --help show this help message and exit
  -l, --list list the keys available for read
  --json      prints in json format

ifpga-cli write -h
usage: ifpga-cli write [-h] [-l] [--json] [key] [value]

write a value to a named key

positional arguments:
  key          the name of the key to read
  value        the value to write

optional arguments:
  -h, --help show this help message and exit
  -l, --list list the keys available to be written
  --json      prints in json format

```

EXAMPLES

This command shows list of target devices registered with driver
`./ifpga-cli target -l`

Example Output:

```

0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0

```

This command shows list of read key value pairs for the target devices registered with driver
`./ifpga-cli read -l`

Example Output:

```
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/revision r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/ports_num r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/cache_size r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/version r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/socket_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/bitstream_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/bitstream_metadata r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/pcie_dev_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme_obj_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/is_secupdate_progress r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/revision r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1 r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold2 r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold_trip r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1_reached r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold2_reached r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1_policy r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/temperature r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/revision r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pcie0_errors r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pcie1_errors r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/nonfatal_errors r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/catfatal_errors r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/inject_error r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-errors/errors r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-errors/first_error r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-errors/next_error r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-errors/fme_error_cap r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/pr/revision r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/pr/interface_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/revision r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/clock r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/pcie0_read r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/pcie0_write r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/mmio_read r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/mmio_write r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/enable r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/freeze r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/port0/pcie0_read
r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/port0/pcie0_write r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/port0/mmio_read
r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/port0/mmio_write
r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/port0/enable r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/eth_group_phy1_info r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/revision r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ltr r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap1_event r
```

```
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap2_event r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/power_state r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcmd r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcntrcmd r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqsts r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcntrststs r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/port_obj_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/pcie_dev_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/afu_id r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/revision r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/errors r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/first_error r
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/first_malformed_req r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/revision r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/ports_num r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/cache_size r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/version r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/socket_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/bitstream_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/bitstream_metadata r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/pcie_dev_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme_obj_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/is_secupdate_progress r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/revision r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold1 r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold2 r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold_trip r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold1_reached r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold2_reached r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold1_policy r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/temperature r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/revision r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie0_errors r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie1_errors r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/nonfatal_errors r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/catfatal_errors r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/inject_error r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-errors/errors r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-errors/first_error r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-errors/next_error r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-errors/fme_error_cap r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/pr/revision r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/pr/interface_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/revision r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/clock r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/pcie0_read r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/pcie0_write r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/mmio_read r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/mmio_write r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/enable r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/freeze r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/port0/pcie0_read r
```

```

0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/port0/pcie0_write r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/port0/mmio_read
r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/port0/mmio_write
r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/port0/enable r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/eth_group_phy1_info r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/revision r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ltr r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap1_event r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap2_event r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/power_state r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqcmd r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqntrcmd r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqsts r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqntrsts r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/port_obj_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/pcie_dev_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/afu_id r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/revision r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/errors r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/first_error r
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/first_malformed_req r

```

This command shows list of write key value pairs for the target devices registered with driver

```
./ifpga-cli write -l
```

Example Output:

```

0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1 w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold2 w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/thermal_mgmt/threshold1_policy w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pcie0_errors w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pcie1_errors w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/inject_error w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-errors/clear w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/enable w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/freeze w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/port0/enable w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap1_event w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap2_event w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcmd w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqntrcmd w
0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/clear w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold1 w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold2 w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/threshold1_policy w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie0_errors w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie1_errors w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/inject_error w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-errors/clear w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/enable w
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/freeze w

```

```
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/port0/enable w  
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap1_event w  
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap2_event w  
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqcmd w  
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqctrCmd w  
0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/clear w
```


This command reads the current value of the key for the target device and displays the value.

```
./ifpga-cli read 0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/bitstream_id
```

Example Output:

```
0x23000404000000
```

This command allows to set the user provided value to the writable key value pair target device.

```
./ifpga-cli write ./ifpga-cli write 0000:1c:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/clear 0 0
```

This command shows list of key value pairs for the target devices registered with driver in json format

```
./ifpga-cli target -l --json
```

Example Output:

```
{
  "target list": [
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0",
    ""
  ]
}
```

This command shows list of read key value pairs for the target devices registered with driver

```
./ifpga-cli read -l --json
```

Example Output:

```
{
  "readable key list": [
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/revision r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/ports_num r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/cache_size r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/version r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/socket_id r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/bitstream_id r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/bitstream_metadata r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/pcie_dev_id r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme_obj_id r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/is_secupdate_progress r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/revision r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1 r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold2 r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold_trip r",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1_reached r",
```

```
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/thermal_mgmt/threshold2_reached r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/thermal_mgmt/threshold1_policy r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/thermal_mgmt/temperature r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/revision r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pcie0_errors
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pciel_errors
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/errors/nonfatal_errors r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/errors/catfatal_errors r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/inject_error
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-errors/errors
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-
errors/first_error r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-
errors/next_error r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-
errors/fme_error_cap r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/pr/revision r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/pr/interface_id r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/revision r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/clock r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/pcie0_read r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/pcie0_write r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/mmio_read r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/mmio_write r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/enable
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/freeze
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/port0/pcie0_read r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/port0/pcie0_write r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/port0/mmio_read r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/port0/mmio_write r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
fme.1/dperf/fabric/port0/enable r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/eth_group_phy1_info
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/revision r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/id r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ltr r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap1_event r",
```

```

"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap2_event r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/power_state r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcmd r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcntrcmd
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqsts r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcntrsts
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/port_obj_id r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/pcie_dev_id r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/afu_id r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/revision r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/errors r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/first_error
r",
"0000:23:00.0/intel-fpga-dev.1/intel-fpga-
port.1/errors/first_malformed_req r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/revision r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/ports_num r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/cache_size r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/version r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/socket_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/bitstream_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/bitstream_metadata
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/pcie_dev_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme_obj_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/is_secupdate_progress r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/revision r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/threshold1 r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/threshold2 r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/threshold_trip r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/threshold1_reached r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/threshold2_reached r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/threshold1_policy r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/thermal_mgmt/temperature r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/revision r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie0_errors
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie1_errors
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/errors/nonfatal_errors r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/errors/catfatal_errors r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/inject_error
r",

```

```

"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-errors/errors
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-
errors/first_error r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-
errors/next_error r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-
errors/fme_error_cap r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/pr/revision r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/pr/interface_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/revision r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/clock r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/pcie0_read r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/pcie0_write r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/mmio_read r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/mmio_write r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/enable
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/freeze
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/port0/pcie0_read r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/port0/pcie0_write r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/port0/mmio_read r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/port0/mmio_write r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
fme.0/dperf/fabric/port0/enable r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/eth_group_phy1_info
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/revision r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ltr r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap1_event r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap2_event r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/power_state r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqcmd r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqctr cmd
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqsts r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqctrsts
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/port_obj_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/pcie_dev_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/afu_id r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/revision r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/errors r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/first_error
r",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-
port.0/errors/first_malformed_req r",

```

```

    ""
  ]
}

```

This command shows list of write key value pairs for the target devices registered with driver

```
./ifpga-cli write -l --json
```

Example Output:

```

{
  "writable key list": [
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1 w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold2 w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/thermal_mgmt/threshold1_policy w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pcie0_errors w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/pcie1_errors w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/errors/inject_error w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/fme-errors/clear w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/enable w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/freeze w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1/dperf/fabric/port0/enable w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap1_event w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/ap2_event w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqcmd w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/userclk_freqntrcmd w",
    "0000:23:00.0/intel-fpga-dev.1/intel-fpga-port.1/errors/clear w",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold1 w",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold2 w",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/thermal_mgmt/threshold1_policy w",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie0_errors w",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/pcie1_errors w",
    "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/errors/inject_error w",
  ]
}

```

```

"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/fme-errors/clear w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/enable w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/freeze w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0/dperf/fabric/port0/enable w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap1_event w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/ap2_event w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqcmd w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/userclk_freqntrcmd w",
"0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0/errors/clear w",
""
]
}

```

➤ FPGAINFO(/opt/intel/fpgainfo):

SYNOPSIS

```
fpgainfo [-h] [-t target] [--json] [{errors}]
{bmc,fme,port,temp,power,mac,phy}
```

DESCRIPTION

Fpgainfo displays FPGA information derived from ESXi SYSFS key value entries registered during driver load. The command argument is one of the following: `errors`, `power`, `temp`, `port`, `mac`, `phy` or `fme`. Some commands may also have other arguments or options that control their behavior.

For systems with multiple FPGA devices, you can specify the BDF embedded target string to limit the output to the FPGA resource with the corresponding PCIe configuration. If not specified, information displays for all resources for the given command.

FPGAINFO COMMANDS

errors

Show/clear errors of an FPGA resource that the first argument specifies. `fpgainfo` displays information in human readable form.

power

Show total the power in watts that the FPGA hardware consumes.

temp

Show FPGA temperature values in degrees Fahrenheit.

port

Show information about the port such as the AFU ID of currently loaded AFU.

fme

Show information about the FPGA platform including the partial reconfiguration (PR) Interface ID, Boot page and Bitstream Id.

OPTIONAL ARGUMENTS

`--help, -h``

Prints help information and exit.

COMMON ARGUMENTS

The following arguments are common to all commands and are optional.

`-t``

PCIe `'BDF + name'` of resource.

`--json``

Display information in JSON format.

ERRORS ARGUMENTS

The first argument to the `errors`` command specifies the resource type. It must be one of the following:

`fme`,`port``

fme

Show/clear FME errors.

port

Show/clear PORT errors.

FPGAINFO Help Console

```
=====
fpgainfo -h
=====
```

```
usage: fpgainfo [-h] [-t target] [--json]
           [{errors}] {bmc,fme,port,temp,power,mac,phy}

FPGA information utility

positional arguments:
  {errors}             subcommand option
  {bmc,fme,port,temp,power,mac,phy}
                       type of operation

optional arguments:
  -h, --help          show this help message and exit
  -t target           target device e.g:0000:b3:00.0/intel-fpga-
dev.0/intel-
                       fpga-fme.0
  --json              displays output in json format
```

EXAMPLES

This command shows the fme information for all registered target devices
`./fpgainfo fme`

Example Output:

Board Management Controller, MAX10 NIOS FW version D.2.1.23

```

Board Management Controller, MAX10 BUILD version D.2.0.7

//***** FME *****/
Object ID           : 0xed000001
Device ID           : 0xb30
Numa node           : 0x0
Ports Num           : 01
Socket Id           : 0x00
PCIe s:b:d:f        : 0000:23:00.0
Bitstream Id        : 0x23000404000000
Pr Interface Id     : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major            : 0x0
    Minor            : 0x2
    Patch            : 0x3

Boot Page           : user

Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** FME *****/
Object ID           : 0xed000000
Device ID           : 0xb30
Numa node           : 0x0
Ports Num           : 01
Socket Id           : 0x00
PCIe s:b:d:f        : 0000:1b:00.0
Bitstream Id        : 0x23000404000000
Pr Interface Id     : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major            : 0x0
    Minor            : 0x2
    Patch            : 0x3

Boot Page           : user

```

This command shows the Power usage information of all registered FPGA devices along with FME Metadata:

```
./fpgainfo power
```

Example Output:

```

Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** POWER *****/
Object ID           : 0xed000001
Device ID           : 0xb30
Numa node           : 0x0
Ports Num           : 01
Socket Id           : 0x00
PCIe s:b:d:f        : 0000:23:00.0
Bitstream Id        : 0x23000404000000
Pr Interface Id     : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major            : 0x0
    Minor            : 0x2

```



```

Patch : 0x3

Board Power : 49.08 Watts
12V Backplane Current : 2.04 Amps
12V Backplane Voltage : 12.02 Volts
1.2V Voltage : 1.18 Volts
1.8V Voltage : 1.79 Volts
3.3V Voltage : 3.25 Volts
FPGA Core Voltage : 0.90 Volts
FPGA Core Current : 13.76 Amps
QSFP0 Supply Voltage : N/A
12V AUX Current : 2.03 Amps
12V AUX Voltage : 12.09 Volts
QSFP1 Supply Voltage : N/A

Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** POWER *****/
Object ID : 0xed000000
Device ID : 0xb30
Numa node : 0x0
Ports Num : 01
Socket Id : 0x00
PCIe s:b:d:f : 0000:1b:00.0
Bitstream Id : 0x23000404000000
Pr Interface Id : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major : 0x0
    Minor : 0x2
    Patch : 0x3

Board Power : 50.94 Watts
12V Backplane Current : 2.10 Amps
12V Backplane Voltage : 12.01 Volts
1.2V Voltage : 1.18 Volts
1.8V Voltage : 1.80 Volts
3.3V Voltage : 3.25 Volts
FPGA Core Voltage : 0.90 Volts
FPGA Core Current : 14.59 Amps
QSFP0 Supply Voltage : N/A
12V AUX Current : 2.13 Amps
12V AUX Voltage : 12.07 Volts
QSFP1 Supply Voltage : N/A

```

This command shows the current temperature information of registered FPGA devices along with FME metadata.
./fpgainfo temp

Example Output:

```

Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** TEMP *****/
Object ID : 0xed000001
Device ID : 0xb30
Numa node : 0x0

```

```

Ports Num                : 01
Socket Id                 : 0x00
PCIe s:b:d:f             : 0000:23:00.0
Bitstream Id              : 0x23000404000000
Pr Interface Id           : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                 : 0x0
    Minor                 : 0x2
    Patch                  : 0x3

FPGA Die Temperature      : 44.5 Celsius
Board Temperature         : 27.0 Celsius
QSFP0 Temperature        : N/A
QSFP1 Temperature        : N/A
PKVL0 Core Temperature    : 49.5 Celsius
PKVL0 SerDes Temperature  : 49.5 Celsius
PKVL1 Core Temperature    : 49.5 Celsius
PKVL1 SerDes Temperature  : 49.5 Celsius

```

```

Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7

```

```
//***** TEMP *****/
```

```

Object ID                 : 0xed000000
Device ID                  : 0xb30
Numa node                  : 0x0
Ports Num                  : 01
Socket Id                  : 0x00
PCIe s:b:d:f              : 0000:1b:00.0
Bitstream Id               : 0x23000404000000
Pr Interface Id            : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                 : 0x0
    Minor                 : 0x2
    Patch                  : 0x3

FPGA Die Temperature      : 49.5 Celsius
Board Temperature         : 30.5 Celsius
QSFP0 Temperature        : N/A
QSFP1 Temperature        : N/A
PKVL0 Core Temperature    : 53.0 Celsius
PKVL0 SerDes Temperature  : 53.0 Celsius
PKVL1 Core Temperature    : 52.5 Celsius
PKVL1 SerDes Temperature  : 52.5 Celsius

```

This command shows port information for all registered port target devices
./fpgainfo fme

Example Output:

```

Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7

```

```
//***** PORT *****/
```

```

Object ID                 : 0xee000001
Device ID                  : 0xb30
Numa node                  : 0x0
Ports Num                  : 01
Socket Id                  : 0x00

```

```

PCIe s:b:d:f      : 0000:23:00.0
Bitstream Id     : 0x23000404000000
Accelerator Id   : fa00a55cca8c4c4ba013d76f19c4d8d1
Pr Interface Id  : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
  Major          : 0x0
  Minor          : 0x2
  Patch          : 0x3

```

```

Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7

```

```

//***** PORT *****/
Object ID        : 0xee000000
Device ID        : 0xb30
Numa node        : 0x0
Ports Num        : 01
Socket Id        : 0x00
PCIe s:b:d:f     : 0000:1b:00.0
Bitstream Id     : 0x23000404000000
Accelerator Id   : fa00a55cca8c4c4ba013d76f19c4d8d1
Pr Interface Id  : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
  Major          : 0x0
  Minor          : 0x2
  Patch          : 0x3

```

This command shows MAC information of all registered FPGA devices ethernet interface.

```
./fpgainfo mac
```

Example Output:

```

Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7

```

```

//***** MAC *****/
Object ID        : 0xed000001
Device ID        : 0xb30
Numa node        : 0x0
Ports Num        : 01
Socket Id        : 0x00
PCIe s:b:d:f     : 0000:23:00.0
Bitstream Id     : 0x23000404000000
Pr Interface Id  : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
  Major          : 0x0
  Minor          : 0x2
  Patch          : 0x3

Number of MACs   : 0x8
Mac address 0    : 64:4c:36:12:c1:68
Mac address 1    : 64:4c:36:12:c1:69
Mac address 2    : 64:4c:36:12:c1:6a
Mac address 3    : 64:4c:36:12:c1:6b
Mac address 4    : 64:4c:36:12:c1:6c
Mac address 5    : 64:4c:36:12:c1:6d
Mac address 6    : 64:4c:36:12:c1:6e

```

```

Mac address 7                : 64:4c:36:12:c1:6f

Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** MAC *****/
Object ID                    : 0xed000000
Device ID                    : 0xb30
Numa node                    : 0x0
Ports Num                    : 01
Socket Id                    : 0x00
PCIe s:b:d:f                 : 0000:1b:00.0
Bitstream Id                 : 0x23000404000000
Pr Interface Id              : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                    : 0x0
    Minor                    : 0x2
    Patch                    : 0x3

Number of MACs               : 0x8
Mac address 0                : 64:4c:36:12:c3:c0
Mac address 1                : 64:4c:36:12:c3:c1
Mac address 2                : 64:4c:36:12:c3:c2
Mac address 3                : 64:4c:36:12:c3:c3
Mac address 4                : 64:4c:36:12:c3:c4
Mac address 5                : 64:4c:36:12:c3:c5
Mac address 6                : 64:4c:36:12:c3:c6
Mac address 7                : 64:4c:36:12:c3:c7

```

This command shows Phy transceiver information of all registered FPGA devices

```
./fpgainfo phy
```

Example Output:

```

Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** PHY *****/
Object ID                    : 0xed000001
Device ID                    : 0xb30
Numa node                    : 0x0
Ports Num                    : 01
Socket Id                    : 0x00
PCIe s:b:d:f                 : 0000:23:00.0
Bitstream Id                 : 0x23000404000000
Pr Interface Id              : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                    : 0x0
    Minor                    : 0x2
    Patch                    : 0x3

//***** PHY GROUP 0 *****/
Direction                    :Line Side
Speed                        :25Gbps
Numeber of phys              :4
//***** PHY GROUP 1 NOT FOUND *****/

```

```

//***** Intel C827 Retimer *****/
Port0 25G                :Down
Port1 25G                :Down
Port2 25G                :Down
Port3 25G                :Down
Retimer A Version        :101c:1064
Retimer B Version        :101c:1064

Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** PHY *****/
Object ID                 : 0xed000000
Device ID                 : 0xb30
Numa node                 : 0x0
Ports Num                 : 01
Socket Id                 : 0x00
PCIe s:b:d:f              : 0000:1b:00.0
Bitstream Id              : 0x23000404000000
Pr Interface Id           : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                 : 0x0
    Minor                 : 0x2
    Patch                 : 0x3

//***** PHY GROUP 0 *****/
Direction                 :Line Side
Speed                     :25Gbps
Numeber of phys           :4
//***** PHY GROUP 1 NOT FOUND *****/

//***** Intel C827 Retimer *****/
Port0 25G                :Down
Port1 25G                :Down
Port2 25G                :Down
Port3 25G                :Down
Retimer A Version        :101c:1064
Retimer B Version        :101c:1064

This command shows overall BMC sensor record for the all registered FPGA
devices
./fpgainfo bmc

```

Example Output:

```

Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** BMC SENSORS *****/
Object ID                 : 0xed000001
Device ID                 : 0xb30
Numa node                 : 0x0
Ports Num                 : 01
Socket Id                 : 0x00
PCIe s:b:d:f              : 0000:23:00.0
Bitstream Id              : 0x23000404000000
Pr Interface Id           : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                 : 0x0

```

```

Minor                : 0x2
Patch                : 0x3

Board Power          : 49.90 Watts
12V Backplane Current : 2.10 Amps
12V Backplane Voltage : 12.02 Volts
1.2V Voltage         : 1.18 Volts
1.8V Voltage         : 1.79 Volts
3.3V Voltage         : 3.25 Volts
FPGA Core Voltage    : 0.90 Volts
FPGA Core Current    : 14.02 Amps
QSFP0 Supply Voltage : N/A
12V AUX Current      : 2.04 Amps
12V AUX Voltage      : 12.09 Volts
QSFP1 Supply Voltage : N/A
FPGA Die Temperature : 46.0 Celsius
Board Temperature    : 28.0 Celsius
QSFP0 Temperature    : N/A
QSFP1 Temperature    : N/A
PKVL0 Core Temperature : 51.0 Celsius
PKVL0 SerDes Temperature : 51.0 Celsius
PKVL1 Core Temperature : 51.0 Celsius
PKVL1 SerDes Temperature : 51.0 Celsius
Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7

//***** BMC SENSORS *****/
Object ID            : 0xed000000
Device ID            : 0xb30
Numa node            : 0x0
Ports Num            : 01
Socket Id            : 0x00
PCIe s:b:d:f         : 0000:1b:00.0
Bitstream Id         : 0x23000404000000
Pr Interface Id      : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major            : 0x0
    Minor            : 0x2
    Patch            : 0x3

Board Power          : 51.42 Watts
12V Backplane Current : 2.14 Amps
12V Backplane Voltage : 12.01 Volts
1.2V Voltage         : 1.18 Volts
1.8V Voltage         : 1.80 Volts
3.3V Voltage         : 3.25 Volts
FPGA Core Voltage    : 0.90 Volts
FPGA Core Current    : 14.80 Amps
QSFP0 Supply Voltage : N/A
12V AUX Current      : 2.13 Amps
12V AUX Voltage      : 12.08 Volts
QSFP1 Supply Voltage : N/A
FPGA Die Temperature : 50.5 Celsius
Board Temperature    : 31.5 Celsius
QSFP0 Temperature    : N/A
QSFP1 Temperature    : N/A
PKVL0 Core Temperature : 54.5 Celsius

```

```
PKVL0 SerDes Temperature      : 54.5 Celsius
PKVL1 Core Temperature       : 54.0 Celsius
PKVL1 SerDes Temperature     : 54.0 Celsius
```

This command shows errors information reported for FME interface of all registered devices:

```
./fpgainfo errors fme
```

Example Output:

```
Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7
```

```
//***** FME ERRORS *****/
Object ID                : 0xed000001
Device ID                : 0xb30
Numa node                : 0x0
Ports Num               : 01
Socket Id               : 0x00
PCIe s:b:d:f            : 0000:23:00.0
Bitstream Id            : 0x23000404000000
Pr Interface Id         : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                : 0x0
    Minor                : 0x2
    Patch                : 0x3
Errors                  : 0x0
First Error             : 0x0
Next Error              : 0x0
PCIe0 Errors           : 0x0
PCIe1 Errors           : 0x0
Inject Errors          : 0x0
Nonfatal Errors        : 0x0
Catfatal Errors        : 0x0
```

```
Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7
```

```
//***** FME ERRORS *****/
Object ID                : 0xed000000
Device ID                : 0xb30
Numa node                : 0x0
Ports Num               : 01
Socket Id               : 0x00
PCIe s:b:d:f            : 0000:1b:00.0
Bitstream Id            : 0x23000404000000
Pr Interface Id         : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major                : 0x0
    Minor                : 0x2
    Patch                : 0x3
Errors                  : 0x0
First Error             : 0x0
Next Error              : 0x0
PCIe0 Errors           : 0x0
PCIe1 Errors           : 0x0
Inject Errors          : 0x0
Nonfatal Errors        : 0x0
```

```
Catfatal Errors : 0x0
```

This command shows errors information reported for Port interface of all registered FPGA devices.

```
./fpgainfo errors port
```

Example Output:

```
Board Management Controller, MAX10 NIOS FW version D.2.1.23
Board Management Controller, MAX10 BUILD version D.2.0.7
```

```
//***** PORT ERRORS *****/
Object ID : 0xee000001
Device ID : 0xb30
Numa node : 0x0
Ports Num : 01
Socket Id : 0x00
PCIe s:b:d:f : 0000:23:00.0
Bitstream Id : 0x23000404000000
Accelerator Id : fa00a55cca8c4c4ba013d76f19c4d8d1
Pr Interface Id : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major : 0x0
    Minor : 0x2
    Patch : 0x3
Errors : 0x0
First Error : 0x0
First Malformed Req : 0x0
Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7
```

```
//***** PORT ERRORS *****/
Object ID : 0xee000000
Device ID : 0xb30
Numa node : 0x0
Ports Num : 01
Socket Id : 0x00
PCIe s:b:d:f : 0000:1b:00.0
Bitstream Id : 0x23000404000000
Accelerator Id : fa00a55cca8c4c4ba013d76f19c4d8d1
Pr Interface Id : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
    Major : 0x0
    Minor : 0x2
    Patch : 0x3
Errors : 0x0
First Error : 0x0
First Malformed Req : 0x0
```

This command shows information of the FME on specific registered device bus 0x1b

```
./fpgainfo fme -t 0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0
```

Example Output:

```
Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7
```

```
//***** FME *****/
```



```
Object ID           : 0xed000000
Device ID          : 0xb30
Numa node          : 0x0
Ports Num         : 01
Socket Id         : 0x00
PCIe s:b:d:f      : 0000:1b:00.0
Bitstream Id      : 0x23000404000000
Pr Interface Id   : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
  Major           : 0x0
  Minor           : 0x2
  Patch           : 0x3
Boot Page         : user
```

This command shows information of the port on specific registered device bus 0x1b

```
./fpgainfo -t 0000:1b:00.0/intel-fpga-dev.0/intel-fpga-port.0 port
```

Example Output:

```
Board Management Controller, MAX10 NIOS FW version D.2.1.24
Board Management Controller, MAX10 BUILD version D.2.0.7
```

```
//***** PORT *****/
Object ID           : 0xee000000
Device ID          : 0xb30
Numa node          : 0x0
Ports Num         : 01
Socket Id         : 0x00
PCIe s:b:d:f      : 0000:1b:00.0
Bitstream Id      : 0x23000404000000
Accelerator Id    : fa00a55cca8c4c4ba013d76f19c4d8d1
Pr Interface Id   : a5d72a3cc8b04939912cf715e5dc10ca
Bitstream Version
  Major           : 0x0
  Minor           : 0x2
  Patch           : 0x3
```

This command shows temperature information of requested device bus number 0x1b in json format. The similar way we need to use for all operations with different targets.

```
./fpgainfo -t 0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0 temp -json
```

Example Output:

```
{
  "0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0": {
    "temp": {
      "Board Management Controller, MAX10 NIOS FW version ":
      "D.2.1.24",
      "Board Management Controller, MAX10 BUILD version ": "D.2.0.7",
      "Object ID": " 0xed000000",
      "Device ID": " 0xb30",
      "Numa node": " 0x0",
      "Ports Num": " 01",
      "Socket Id": " 0x00",
      "PCIe s:b:d:f": " 0000:1b:00.0",
      "Bitstream Id": " 0x23000404000000",
```

```
"Pr Interface Id": " a5d72a3cc8b04939912cf715e5dc10ca",
"Bitstream Version": {
  "Major": " 0x0",
  "Minor": " 0x2",
  "Patch": " 0x3"
},
"FPGA Die Temperature": " 51.0 Celsius",
"Board Temperature": " 31.5 Celsius",
"QSFP0 Temperature": " N/A",
"QSFP1 Temperature": " N/A",
"PKVL0 Core Temperature": " 54.5 Celsius",
"PKVL0 SerDes Temperature": " 54.5 Celsius",
"PKVL1 Core Temperature": " 54.0 Celsius",
"PKVL1 SerDes Temperature": " 54.0 Celsius"
}
}
```

➤ **FPGASTATUS(/opt/intel/fpgastatus)**

SYNOPSIS

fpgastatus -h [-c <clear counters>] [-t <target device>] --json

DESCRIPTION

This tool allows to get/clear status counters of ethernet interface for a specific FPGA target device.

For multi FPGA target devices, this tool should request status counters of specific FPGA target device ethernet interface by providing target device as input.

ARGUMENTS

'-t <target device>'
PCIe 'BDF + name' of resource.

'-c <clear counters>'
Clears status counters of requested target

OPTIONAL ARGUMENTS

'-h, --help'
Print usage information

FPGASTATUS HELP CONSOLE

```
=====
fpgastatus -h
=====
usage: fpgastatus [-c <clear counters>] [-t <target device>]

Intel N3000 FPGA Status

optional arguments:
  -h, --help  show this help message and exit
  -t target   target device e.g:0000:b3:00.0/intel-fpga-dev.0/intel-fpga-
fme.0
  -c          clear status
  --json     prints json format
```

EXAMPLE

This command gets fpga status counters of ethernet interface of device bus number 0x1b

./fpgastatus -t 0000:1b:00.0/intel-fpga-dev.0/intel-fpga-fme.0

Example Output:

```
=====
MAC wrapper 0, Speed 25g          |          mac 0 |          mac 1 |          mac
2 |          mac 3 |
CNTR_TX_FRAGMENTS                |          0 |          0 |
0 |          0 |
CNTR_TX_JABBERS                  |          0 |          0 |
0 |          0 |
CNTR_TX_FCS                      |          0 |          0 |
0 |          0 |
```

CNTR_TX_CRCERR	0	0	0
0	0		
CNTR_TX_MCAST_DATA_ERR	0	0	0
0	0		
CNTR_TX_BCAST_DATA_ERR	0	0	0
0	0		
CNTR_TX_UCAST_DATA_ERR	0	0	0
0	0		
CNTR_TX_MCAST_CTRL_ERR	0	0	0
0	0		
CNTR_TX_BCAST_CTRL_ERR	0	0	0
0	0		
CNTR_TX_UCAST_CTRL_ERR	0	0	0
0	0		
CNTR_TX_PAUSE_ERR	0	0	0
0	0		
CNTR_TX_64B	575	8	
0	0		
CNTR_TX_65to127B	0	0	
0	0		
CNTR_TX_128to255B	0	0	
0	0		
CNTR_TX_256to511B	0	0	
0	0		
CNTR_TX_512to1023B	0	0	
0	0		
CNTR_TX_1024to1518B	0	0	
0	0		
CNTR_TX_1519toMAXB	0	0	
0	0		
CNTR_TX_OVERSIZE	0	0	
0	0		
CNTR_TX_MCAST_DATA_OK	0	0	
0	0		
CNTR_TX_BCAST_DATA_OK	0	0	
0	0		
CNTR_TX_UCAST_DATA_OK	0	0	
0	0		
CNTR_TX_MCAST_CTRL	575	8	
0	0		
CNTR_TX_BCAST_CTRL	0	0	
0	0		
CNTR_TX_UCAST_CTRL	0	0	
0	0		
CNTR_TX_PAUSE	0	0	
0	0		
CNTR_TX_RUNT	0	0	
0	0		
CNTR_RX_FRAGMENTS	4423	6	
0	0		
CNTR_RX_JABBERS	191	4	
0	0		
CNTR_RX_FCS	5044	12	
0	0		
CNTR_RX_CRCERR	621	6	
0	0		

CNTR_RX_MCAST_DATA_ERR 0 0		888		5	
CNTR_RX_BCAST_DATA_ERR 0 0		0		0	
CNTR_RX_UCAST_DATA_ERR 0 0		4156		7	
CNTR_RX_MCAST_CTRL_ERR 0 0		0		0	
CNTR_RX_BCAST_CTRL_ERR 0 0		0		0	
CNTR_RX_UCAST_CTRL_ERR 0 0		0		0	
CNTR_RX_PAUSE_ERR 0 0		0		0	
CNTR_RX_64B 0 0		21		1	
CNTR_RX_65to127B 0 0		69		0	
CNTR_RX_128to255B 0 0		78		1	
CNTR_RX_256to511B 0 0		67		0	
CNTR_RX_512to1023B 0 0		42		0	
CNTR_RX_1024to1518B 0 0		20		0	
CNTR_RX_1519toMAXB 0 0		133		0	
CNTR_RX_OVERSIZE 0 0		191		4	
CNTR_RX_MCAST_DATA_OK 0 0		0		0	
CNTR_RX_BCAST_DATA_OK 0 0		0		0	
CNTR_RX_UCAST_DATA_OK 0 0		21155		0	
CNTR_RX_MCAST_CTRL 0 0		0		0	
CNTR_RX_BCAST_CTRL 0 0		0		0	
CNTR_RX_UCAST_CTRL 0 0		0		0	
CNTR_RX_PAUSE 0 0		0		0	
CNTR_RX_RUNT 0 0		4423		6	
MUX_CDC_FIFO_CNTR_FULL 0 0		0		0	
MUX_CDC_FIFO_CNTR_ERROR 0 0		4059		5	
MUX_CDC_FIFO_CNTR_SOP_MISSED 0 0		7		0	
MUX_CDC_FIFO_CNTR_EOP_MISSED 0 0		150		0	
DEMUX_CDC_FIFO_CNTR_FULL 0 0		0		0	

DEMUX_CDC_FIFO_CNTR_ERROR	4059	5
0 0		
DEMUX_CDC_FIFO_CNTR_SOP_MISSED	7	0
0 0		
DEMUX_CDC_FIFO_CNTR_EOP_MISSED	150	0
0 0		

This command gets fpga status counters of ethernet interface of device bus number 0xb3 in json format

```
./fpgastatus -t 0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1 -json
```

Example Output:

```
{
  "MAC wrapper 0, Speed 25g": [
    {
      "CNTR_TX_FRAGMENTS": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
      }
    },
    {
      "CNTR_TX_JABBERS": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
      }
    },
    {
      "CNTR_TX_FCS": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
      }
    },
    {
      "CNTR_TX_CRCERR": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
      }
    },
    {
      "CNTR_TX_MCAST_DATA_ERR": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
      }
    },
    {
      "CNTR_TX_BCAST_DATA_ERR": {
        "mac 0": 0,
```

```
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_UCAST_DATA_ERR": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_MCAST_CTRL_ERR": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_BCAST_CTRL_ERR": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_UCAST_CTRL_ERR": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_PAUSE_ERR": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_64B": {  
        "mac 0": 0,  
        "mac 1": 4040,  
        "mac 2": 50433,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_65to127B": {  
        "mac 0": 0,  
        "mac 1": 0,
```

```
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_128to255B": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_256to511B": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_512to1023B": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_1024to1518B": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_1519toMAXB": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_OVERSIZE": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
},  
{  
    "CNTR_TX_MCAST_DATA_OK": {  
        "mac 0": 0,  
        "mac 1": 0,  
        "mac 2": 0,  
        "mac 3": 0  
    }  
}
```



```
        "mac 3": 0
    }
},
{
    "CNTR_TX_BCAST_DATA_OK": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_TX_UCAST_DATA_OK": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_TX_MCAST_CTRL": {
        "mac 0": 0,
        "mac 1": 4040,
        "mac 2": 50433,
        "mac 3": 0
    }
},
{
    "CNTR_TX_BCAST_CTRL": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_TX_UCAST_CTRL": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_TX_PAUSE": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_TX_RUNT": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
}
```

```
    },
    {
        "CNTR_RX_FRAGMENTS": {
            "mac 0": 0,
            "mac 1": 1325,
            "mac 2": 3369195,
            "mac 3": 0
        }
    },
    {
        "CNTR_RX_JABBERS": {
            "mac 0": 0,
            "mac 1": 557,
            "mac 2": 46470,
            "mac 3": 0
        }
    },
    {
        "CNTR_RX_FCS": {
            "mac 0": 0,
            "mac 1": 2108,
            "mac 2": 4167729,
            "mac 3": 0
        }
    },
    {
        "CNTR_RX_CRCERR": {
            "mac 0": 0,
            "mac 1": 783,
            "mac 2": 798534,
            "mac 3": 0
        }
    },
    {
        "CNTR_RX_MCAST_DATA_ERR": {
            "mac 0": 0,
            "mac 1": 40,
            "mac 2": 2436118,
            "mac 3": 0
        }
    },
    {
        "CNTR_RX_BCAST_DATA_ERR": {
            "mac 0": 0,
            "mac 1": 0,
            "mac 2": 0,
            "mac 3": 0
        }
    },
    {
        "CNTR_RX_UCAST_DATA_ERR": {
            "mac 0": 0,
            "mac 1": 2068,
            "mac 2": 1731611,
            "mac 3": 0
        }
    }
}
```

```
},
{
  "CNTR_RX_MCAST_CTRL_ERR": {
    "mac 0": 0,
    "mac 1": 0,
    "mac 2": 0,
    "mac 3": 0
  }
},
{
  "CNTR_RX_BCAST_CTRL_ERR": {
    "mac 0": 0,
    "mac 1": 0,
    "mac 2": 0,
    "mac 3": 0
  }
},
{
  "CNTR_RX_UCAST_CTRL_ERR": {
    "mac 0": 0,
    "mac 1": 0,
    "mac 2": 0,
    "mac 3": 0
  }
},
{
  "CNTR_RX_PAUSE_ERR": {
    "mac 0": 0,
    "mac 1": 0,
    "mac 2": 0,
    "mac 3": 0
  }
},
{
  "CNTR_RX_64B": {
    "mac 0": 0,
    "mac 1": 0,
    "mac 2": 123043,
    "mac 3": 0
  }
},
{
  "CNTR_RX_65to127B": {
    "mac 0": 0,
    "mac 1": 2,
    "mac 2": 1036436,
    "mac 3": 0
  }
},
{
  "CNTR_RX_128to255B": {
    "mac 0": 0,
    "mac 1": 3,
    "mac 2": 964495,
    "mac 3": 0
  }
},
},
```

```
{
  "CNTR_RX_256to511B": {
    "mac 0": 0,
    "mac 1": 7,
    "mac 2": 3631438,
    "mac 3": 0
  }
},
{
  "CNTR_RX_512to1023B": {
    "mac 0": 0,
    "mac 1": 14,
    "mac 2": 1279817,
    "mac 3": 0
  }
},
{
  "CNTR_RX_1024to1518B": {
    "mac 0": 0,
    "mac 1": 12,
    "mac 2": 249104,
    "mac 3": 0
  }
},
{
  "CNTR_RX_1519toMAXB": {
    "mac 0": 0,
    "mac 1": 188,
    "mac 2": 3670127,
    "mac 3": 0
  }
},
{
  "CNTR_RX_OVERSIZE": {
    "mac 0": 0,
    "mac 1": 560,
    "mac 2": 1768106,
    "mac 3": 0
  }
},
{
  "CNTR_RX_MCAST_DATA_OK": {
    "mac 0": 0,
    "mac 1": 0,
    "mac 2": 51193548,
    "mac 3": 0
  }
},
{
  "CNTR_RX_BCAST_DATA_OK": {
    "mac 0": 0,
    "mac 1": 0,
    "mac 2": 0,
    "mac 3": 0
  }
},
{
```

```
"CNTR_RX_UCAST_DATA_OK": {
    "mac 0": 0,
    "mac 1": 12412,
    "mac 2": 48583774,
    "mac 3": 0
},
{
    "CNTR_RX_MCAST_CTRL": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_RX_BCAST_CTRL": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_RX_UCAST_CTRL": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_RX_PAUSE": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "CNTR_RX_RUNT": {
        "mac 0": 0,
        "mac 1": 1325,
        "mac 2": 3369195,
        "mac 3": 0
    }
},
{
    "MUX_CDC_FIFO_CNTR_FULL": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "MUX_CDC_FIFO_CNTR_ERROR": {
```

```

        "mac 0": 0,
        "mac 1": 1309,
        "mac 2": 3367995,
        "mac 3": 0
    }
},
{
    "MUX_CDC_FIFO_CNTR_SOP_MISSED": {
        "mac 0": 0,
        "mac 1": 33,
        "mac 2": 8265,
        "mac 3": 0
    }
},
{
    "MUX_CDC_FIFO_CNTR_EOP_MISSED": {
        "mac 0": 0,
        "mac 1": 192,
        "mac 2": 184949,
        "mac 3": 0
    }
},
{
    "DEMUX_CDC_FIFO_CNTR_FULL": {
        "mac 0": 0,
        "mac 1": 0,
        "mac 2": 0,
        "mac 3": 0
    }
},
{
    "DEMUX_CDC_FIFO_CNTR_ERROR": {
        "mac 0": 0,
        "mac 1": 1309,
        "mac 2": 3367995,
        "mac 3": 0
    }
},
{
    "DEMUX_CDC_FIFO_CNTR_SOP_MISSED": {
        "mac 0": 0,
        "mac 1": 33,
        "mac 2": 8265,
        "mac 3": 0
    }
},
{
    "DEMUX_CDC_FIFO_CNTR_EOP_MISSED": {
        "mac 0": 0,
        "mac 1": 192,
        "mac 2": 184949,
        "mac 3": 0
    }
}
]
}

```

➤ **FPGASUPDATE(/opt/intel/fpgasupdate)**

SYNOPSIS

```
fpgasupdate -h -i <image name> -t <target device> [-c 1]
```

DESCRIPTION

fpgasupdate updates the FIM Image securely to the Flash of device.

If there are multiple devices in the system, fpgasupdate must specify a BDF embedded target to select the correct device. If no BDF is specified, fpgasupdate used first listed target.

This tool support abort operation of secure update during staging stage of secure update to user by pressing ctrl+c from keyboard.

ARGUMENTS

`'-i'` <image name>

Pass image file name which is have FIM Image

`'-t'`

PCIe 'BDF + name' of resource.

OPTIONAL ARGUMENTS

`'-h, --help'`

Print usage information.

`'-c'`

Provide -c 1 to clear the any unusual secure update abort happens and use incase no secure update not allowing in a system

Note:

When user performs, This secure update with image successfully. The user must power cycle platform to make effect of updated image.

FPGASUPDATE HELP CONSOLE:

```
=====
fpgasupdate -h
=====
usage: fpgasupdate -i <image name> [-t <target device>] [-b <block size>]
      [-c 1]

VC FPGA Secure Update

optional arguments:
  -h, --help      show this help message and exit
  -t target       target device e.g:0000:b3:00.0/intel-fpga-dev.0/intel-fpga-
                  fme.0
  -i img_file     imagename (e.g:20ww14.5-2x2x25G-5GLDPC-v1.5.7-3.0.0-
                  unsigned.bin
                  )
  -c cancel       cancel request(1:to abort pending/locked secureupdate and
                  allow
                  new command
```

EXAMPLE

This command performs FPGA secure update with provided image on Bus number 0x23 device

```
./fpgasupdate -t 0000:b3:00.0/intel-fpga-dev.0/intel-fpga-fme.0 -i 20ww14.5-2x2x25G-5GLDPC-v1.5.7-3.0.0-unsigned.bin
```

Example Output:

```
[2021-04-05 07:35:47.453093]Update starting please donot interrupt  
[2021-04-05 07:35:47.553934] Uploading file  
/vmfs/volumes/datastore147/Naresh/20ww14.5-2x2x25G-5GLDPC-v1.5.7-3.0.0-unsigned.bin with 45089792
```

```
[2021-04-05 07:35:47.553971]writing to staging area  
100%
```

```
[  
] [45089792/45089792]Elapsed Time: 0:16:53
```

```
100%
```

```
[  
] Elapsed Time: 0:17:30
```

```
[2021-04-05 08:11:41.694352] Total Time:0:35:54.241255
```

Secure Update OK

This command clears if any unexpected state of secure update

```
./fpgasupdate -c 1
```

Do you want to abort secure update: y/n **y**(user inputs)

This command clears if any unexpected state of secure update and allows to perform secure image update on bus number 0xb3 device

```
./fpgasupdate -c 1 -t 0000:b3:00.0/intel-fpga-dev.0/intel-fpga-fme.0 -i 20ww14.5-2x2x25G-5GLDPC-v1.5.7-3.0.0-unsigned.bin
```

Note: This command should use if user observes following message

8. FAQ's (Frequently Asked Questions)

Q1. Can we abort started secure image update?

Yes, it can be aborted from the process if secure image update in prepare, start, writing to stage area. Otherwise during applying to update stage we cannot abort secure image update because that will be in hardware control, but we can come out of the tool after abort.

Q2. How do we perform secure image update abort?

It can be done by user issuing "Ctrl +c" to the fpgasupdate tool execution

Q3. Can we abort started secure image update using "fpgasupdate" tool?

Yes, but this tool will abort only during start of secure update phase and writing to staging area stage. Other wise the behavior not effective.

Q3. What is the behavior if secure image update cancels by user during start stage?

At this stage if user presses "ctrl +c" then the following message will be popped up and process will be in background to clear the secure update then it provides interrupted message.

Please wait Cancel under process...don't press ctrl+c again

```
[root@ssgvfo147:/opt/intel]
```

```
[2021-04-05 10:01:28.668055] [ERROR] Secure Update Interrupted
```

Q4. What is the behavior if secure image update cancels by user during writing to staging area stage progress bar?

At this stage if user presses "ctrl +c" then the following message will be popped up system will cancels secure update request.

```
[2021-04-05 10:06:59.043192]Update starting please donot interrupt
```

```
[2021-04-05 10:06:59.344163] Uploading file
/vmfs/volumes/datastore147/Naresh/20ww14.5-2x2x25G-5GLDPC-v1.5.7-3.0.0-
unsigned.bin with 45089792
```

```
[2021-04-05 10:06:59.344188]writing to staging area
```

```
5% [██████]
] [2646016/45089792]Elapsed Time: 0:00:57 [root@ssgvfo147:/opt/intel]
```

```
[2021-04-05 10:08:03.327320] [ERROR] Secure Update Interrupted
```

Q5. What is the behavior if secure image update cancels by user during applying to update flash stage?

[ERROR] Secure Update Interrupted, but in the background HW device secure update module will be updating image to Flash.

Q6. How do we recover the system if we cancel the secure update after HW prepare stage?

Incase secure update is not able to perform by user on specific target, to ensure hardware to be in ready state then issue following command.

```
./fpgasupdate -t <target name> -c 1
```

Q8. What is the behavior if fpgainfo with target and sub operations performed against secure image update progress target?

User will notify with "target busy in doing other operation"

Q9. What is the behavior if fpgastatus with sub operations performed against secure image update progress target?

User will notify with "Target is Busy doing other operation, pleast try after sometime"

Q10. What is the behavior if fpgainfo with sub operations performed against secure image update progress target?

User will get fpgainfo for other target and secure update progress target will notify something like this e.g. "0000:23:00.0/intel-fpga-dev.1/intel-fpga-fme.1: is busy with other operation"

Q11. How do we know driver and tools are compatible build?

Run ifpga-cli version, this should provide compatible and non-compatible information.

Q12. Does this driver support multitenant FPGA device system?

No, it supports single or two target FPGA devices system.