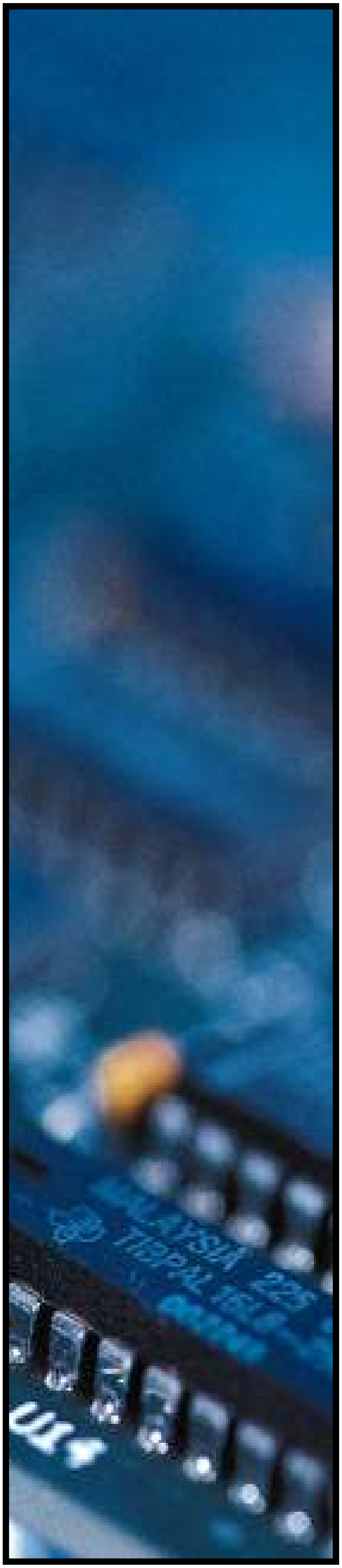


# *AMI MegaRAC® OpenEdition TiogaPass User Guide*

Revision: 0.2

*Published by Software R&D*

power • manage • secure

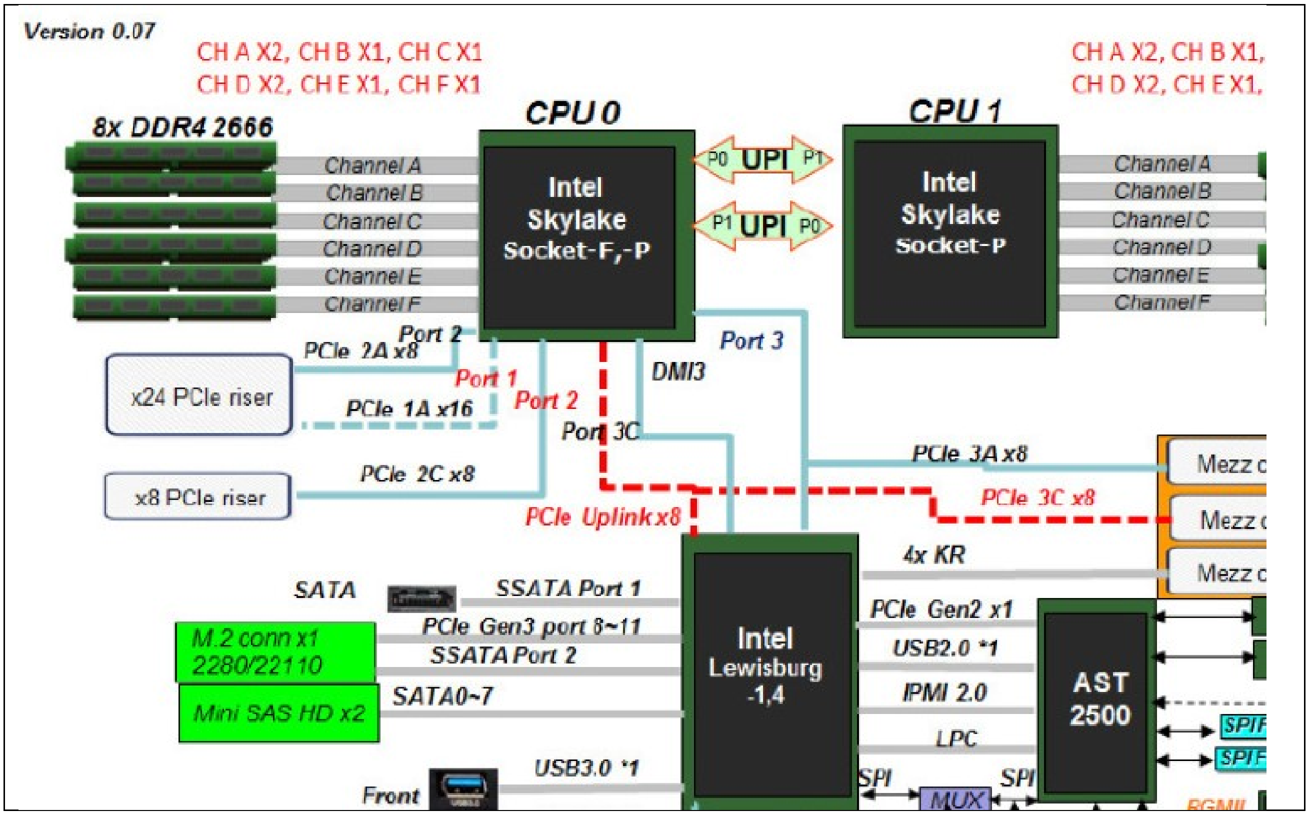
3095 Satellite Boulevard, Building 800 Suite 425,
Duluth,
Georgia 30096,
U.S.A.

# Contents

# 1. Introduction

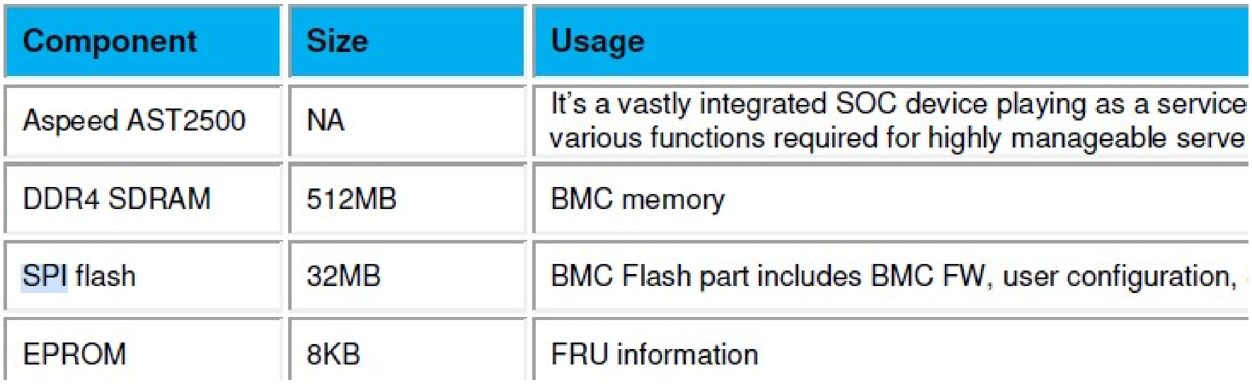
This document describes the supported feature in AMI OpenBMC and how to use the features.

TiogaPass hardware block diagram:



# 2. Supported Features in OpenBMC

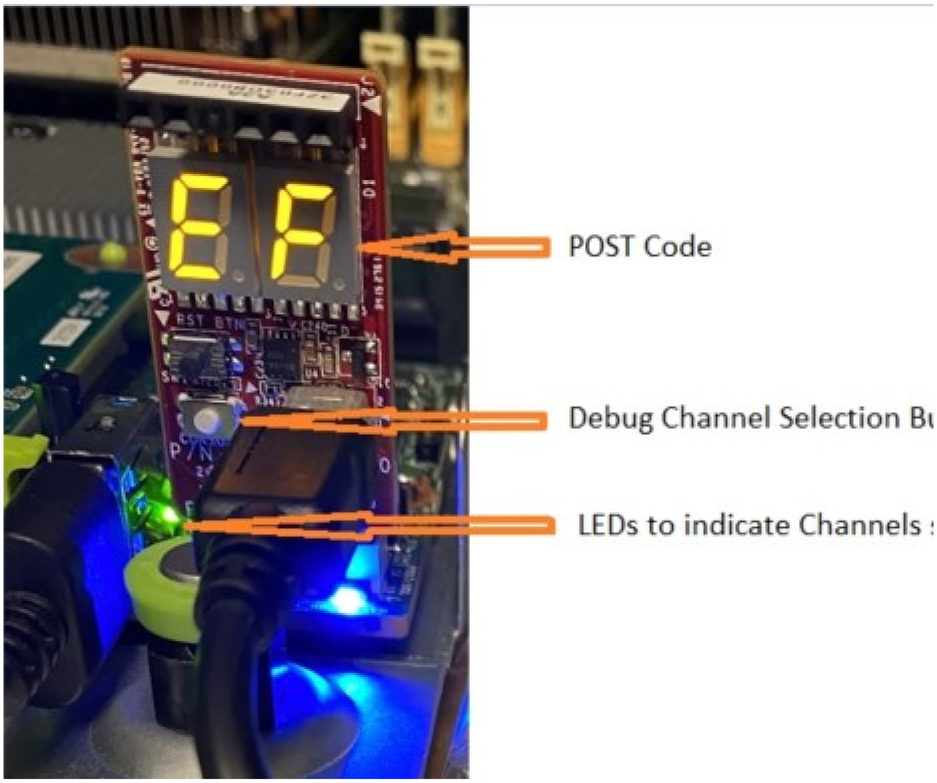
## 2.1. BMC Hardware Component



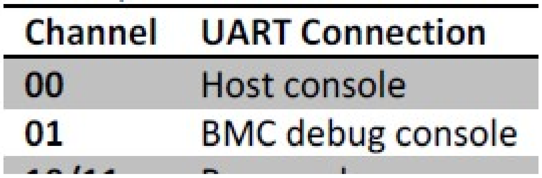
| Component | Size | Usage |
|---|---|---|
| Aspeed AST2500 | NA | It's a vastly integrated SOC device playing as a service various functions required for highly manageable serve |
| DDR4 SDRAM | 512MB | BMC memory |
| SPI flash | 32MB | BMC Flash part includes BMC FW, user configuration, |
| EPROM | 8KB | FRU information |

## 2.2. BMC UART Console Access

TiogaPass uses a 14pin V1 debug card header for both BMC and BIOS/Host-OS serial output channel. There is a LCD on the header to display the BIOS POST Code. By default, TiogaPass selects BIOS/Host-OS output channel on the header. User should use the UART Channel selection button on the debug header to change the channel to be connected to BMC debug console.



Please refer to the following table for UART channel and connection



| Channel | UART Connection |
|---|---|
| 00 | Host console |
| 01 | BMC debug console |
| 10/11 | Reserved |

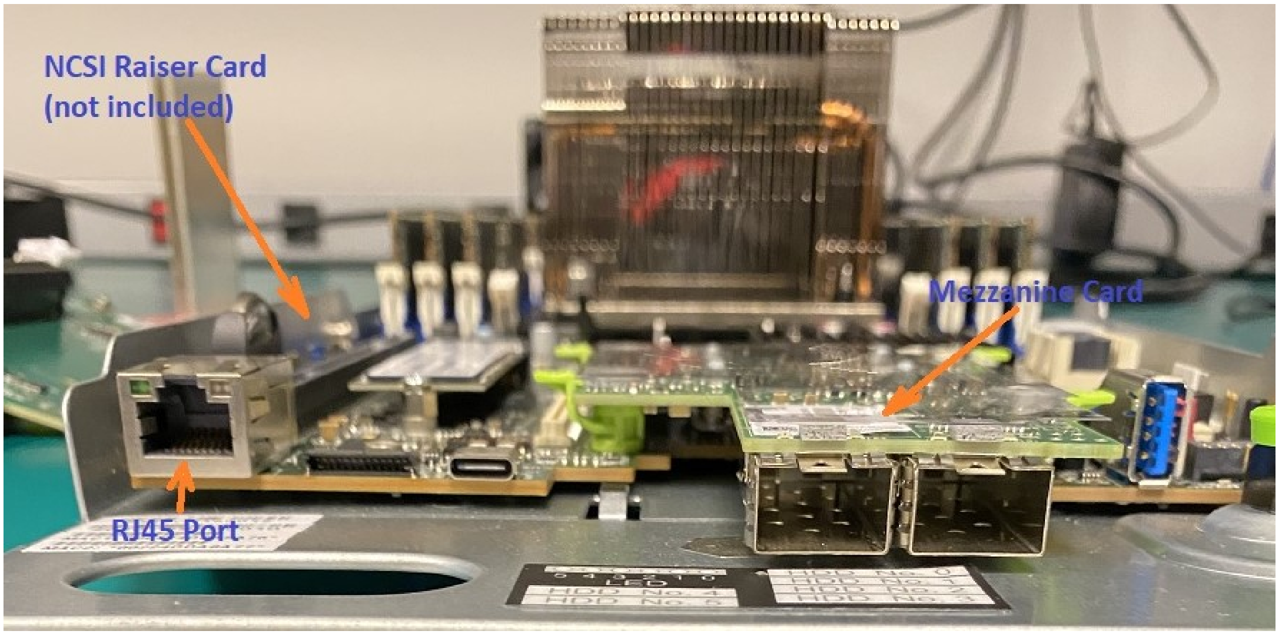
The settings of the UART ports, for both BMC and BIOS, are:

```
baud rate 115200, no flow control, terminal type VT100, 8 data bits, No Parity,
1 Stop Bit.
```

## 2.3. BMC SPI Flash

The three onboard SPI Flash chips are used for holding Primary and Secondary BMC images, and BIOS image. Winbond W25Q256/257 and Numonyx N25Q256 are default supported SPI flashes, other brands are also supported but not fully tested.

## 2.4. Network Interfaces



The TiogaPass platform uses Option 3 of the Management Network Interface from OCP spec. Intel I210-AT NIC used for RMII/NCSI interfaces, which passes both BMC and management data traffic with a RJ45 port. There is a Mezzanine Card which compatible with Intel v2.0 Motherboard, which holds two SFP interfaces with up to 10G data rate. There is also PCIe slot can be used for NCSI Riser Card, to hold the second NCSI interfaces.

## 2.5. LAN Interface

Supports dedicated and shared LAN interface for Out-of-Band access to the Service Processor.

By default MAC will be auto generated and configured if it is not configured by the user. Supported IPMI commands are listed in section 4.

**Example:**

```
Ipmitool -H <BMC IP> -U root -I lanplus -P 0penBmc raw 0x6 0x1       → Get Device ID
ipmitool -H <BMC IP> -U root -I lanplus -P 0penBmc lan print 1        → Get Lan Info
ipmitool -H <BMC IP> -U root -I lanplus -P 0penBmc chassis power <on/off/cycle/reset/status>
ipmitool -H <BMC IP> -U root -I lanplus -P 0penBmc sensor
ipmitool -H <BMC IP> -U root -I lanplus -P 0penBmc sdr
```

## 2.6. KCS Interface

KCS interface is supported in the firmware for In-band interface for Host to BMC communication. Firmware supports only SMS interface, SMM interface not supported.

**Example:** ipmitool raw 6 1

## 2.7. Sideband Interface

BMC supports the sideband network interface function. Shared lan between BMC and Host. By default the ETH0 is the sideband interface while the ETH1 is the dedicated network interface.It varies based on platform design. The following command can be tested using the either of the IP addresses.
**Example:** ipmitool        -H <BMC IP> -I lanplus -U root -P 0penBmc raw 0x6 0x1

## 2.8. Sensor Support

Sensor configuration and monitoring will be done through entity manager. Temperature, Voltage and Fan sensors are supported. It can be accessible through REST Over D-bus and IPMI.

### Sensor Reading Through IPMI:

# ipmitool -H <IP> -U root -P 0penBmc -I lanplus sensor

```
      Chassis Intrusio | 0x0        | discrete   | 0x0000| na        | na        | na
| na        | na        | na
      ACPI State       | 0x0        | discrete   | 0x0000| na        | na        | na
| na        | na        | na
      SEL              | 0x0        | discrete   | 0x0000| na        | na        | na
| na        | na        | na
      WATCHDOG2        | 0x0        | discrete   | 0x0000| na        | na        | na
| na        | na        | na
      MB FAN0 TACH     | 9212.000   | RPM        | nc    | na        | 490.000   | na
| 8526.000  | 11466.000 | na
      MB FAN1 TACH     | 3332.000   | RPM        | ok    | na        | 490.000   | na
| 8526.000  | 11466.000 | na
      MB INLET REMOTE  | 39.000     | degrees C  | ok    | na        | na        | na
| na        | na        | na
      MB INLET TEMP    | 45.000     | degrees C  | cr    | na        | na        | na
| na        | 40.000    | na
      MB OUTLET REMOTE | 32.000     | degrees C  | ok    | na        | na        | na
| na        | na        | na
```

```
      MB OUTLET TEMP   | 33.000     | degrees C  | ok    | na         | na         | na
| na        | 90.000    | na
      MEZZ SENSOR REMO | 0.000      | degrees C  | ok    | na         | na         | na
| na        | 95.000    | na
      MEZZ SENSOR TEMP | 91.000     | degrees C  | ok    | na         | na         | na
| na        | na        | na
      MB P3V BAT       | 3.138      | Volts      | ok    | na         | 2.735      | na
| na        | 3.731     | na
       MB P1V05        | 1.044      | Volts      | ok    | na         | 0.937      | na
| na        | 1.150     | na
       MB P3V3         | 3.302      | Volts      | ok    | na         | 2.976      | na
| na        | 3.612     | na
       MB P3V3 STBY    | 3.302      | Volts      | ok    | na         | 2.976      | na
| na        | 3.612     | na
       MB P5V          | 4.940      | Volts      | ok    | na         | 4.524      | na
| na        | 5.486     | na
       MB P5V STBY     | 4.940      | Volts      | ok    | na         | 4.524      | na
| na        | 5.486     | na
       MB P12V         | 11.970     | Volts      | ok    | na         | 10.773     | na
| na        | 13.230    | na
       MB PVNN PCH STB | 0.994      | Volts      | ok    | na         | 0.760      | na
| na        | 1.101     | na
```

## 2.9. System Event Log Support

BMC FW supports system event logging. SEL list and add can be done using the standard IPMI commands.

**For example:** ipmitool -U root -P 0penBmc -I lanplus -H <BMC IP> sel list

In the **Server Health** option, click **System log** tab where SEL can be viewed on web UI as shown below.

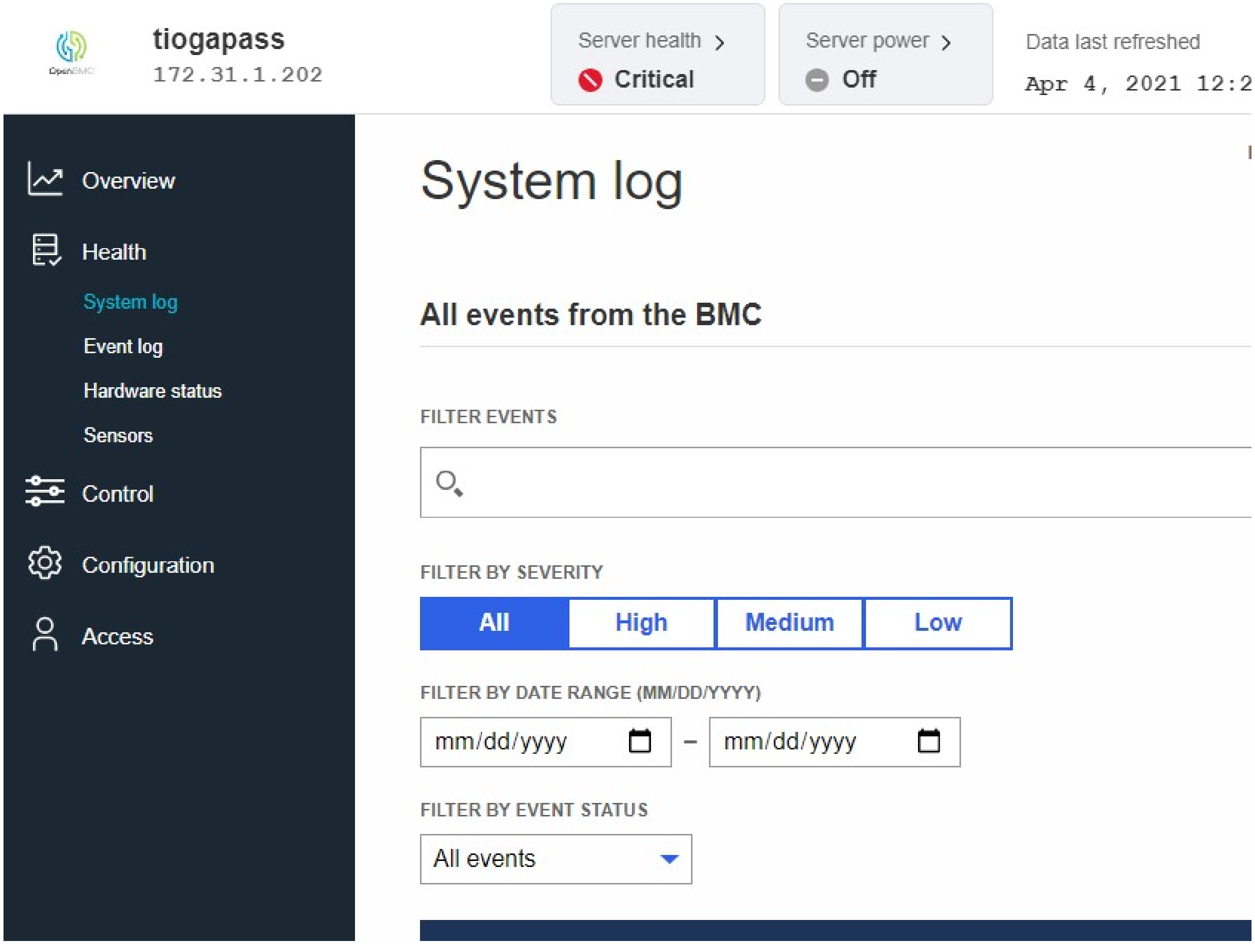
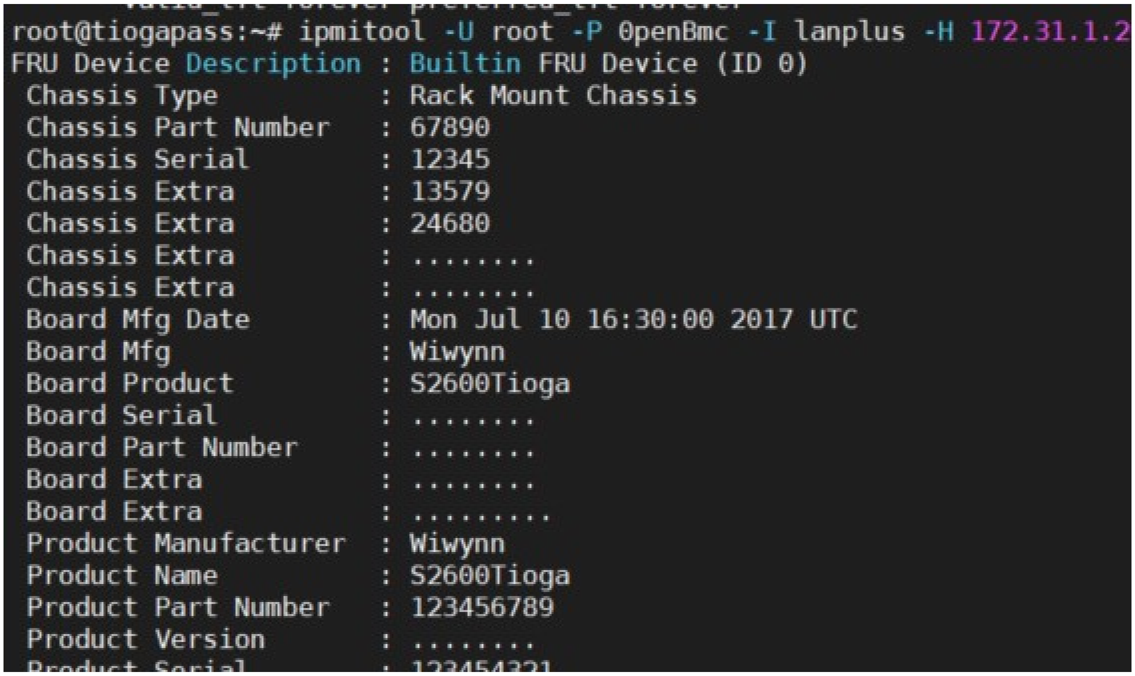


**Figure 1 System Log**

## 2.10. FRU Device Support

BMC FW supports the IPMI FRU devices support. FRU device configuration can be done through Entity manager, read and write FRU data to eeprom are supported.



```
     valid_lft forever preferred_lft forever
root@tiogapass:~# ipmitool -U root -P 0penBmc -I lanplus -H 172.31.1.2
FRU Device Description : Builtin FRU Device (ID 0)
 Chassis Type          : Rack Mount Chassis
 Chassis Part Number   : 67890
 Chassis Serial        : 12345
 Chassis Extra         : 13579
 Chassis Extra         : 24680
 Chassis Extra         : ........
 Chassis Extra         : ........
 Board Mfg Date        : Mon Jul 10 16:30:00 2017 UTC
 Board Mfg             : Wiwynn
 Board Product         : S2600Tioga
 Board Serial          : ........
 Board Part Number     : ........
 Board Extra           : ........
 Board Extra           : .........
 Product Manufacturer  : Wiwynn
 Product Name          : S2600Tioga
 Product Part Number   : 123456789
 Product Version       : ........
 Product Serial        : 123454321
```

**Figure 2 FRU Device Support**

## 2.11. BMC Firmware Upgrade Support

Four types of flashing methods are supported:

1. Soc Flash
2. Dediprog
3. TFTP flash
4. Web UI flash

**Note :** For SOC Flash, Dediprog and TFTP "<image_name>.mtd " image should be used.
For WEB Flash "<image_name>.mtd.tar" or "<image_name>.mtd.tar.all" image should be used.

### 2.11.1 SOC Flash Utility

Download and install the soc flash utility from aspeed website:
https://www.aspeedtech.com/support.php
Socflash utility should be installed on the host OS (Linux) side.

**Run the below command:**
socflash if=<firmware file name> of=<backup filename>

### 2.11.2 Dediprog

**Hardware Tool**: DediProg* SF600 or similar tool
**Software**: DediProg Software latest version
**Following are the steps to perform using Dediprog Software.**

a) Take the BMC EEPROM from the BMC socket and place in DediProg programming socket.

b) Launch the DediProg software and select SPI Device.

c) Upload the firmware image file.

d) Click **Batch** and then the flashing starts.

### 2.11.3 TFTP Flash

Reset or power cycle the server and use key presses to stop BMC booting at the U-Boot prompt.

a) Set the environment value:

Set Tftp server ip and ethaddr and Get dynamic ip address

Example:

```
setenv serverip <IP Address>
setenv ethaddr <MAC>
setenv eth1addr <MAC>
setenv ethact ftgmac@1e680000
dhcp
```

b) Download image from tftp server:

**Example:**

```
tftp 0x83000000 <image>
```

c) Probe and flash the image:

**Example:**

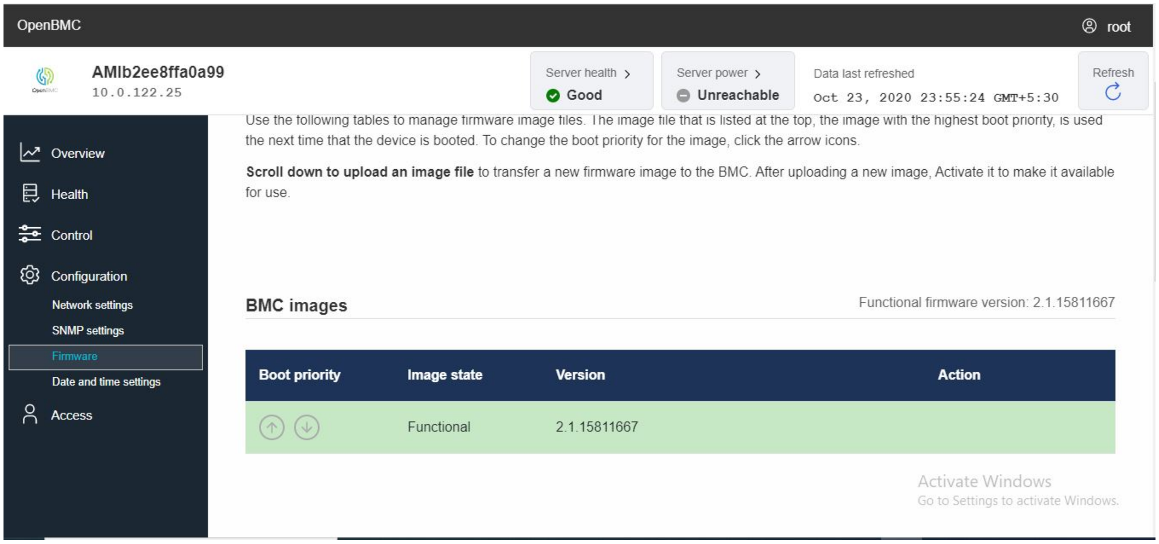
```
sf probe 0
sf update 0x83000000 0x00 0x2000000
saveenv
reset
```

### 2.11.4 Web UI flash

Please refer to section 2.12 for login WebUI and navigate inside the WebUI interface.

a) Login to UI (https://<BMC IP)

**b)** Navigate to **Server Configuration** -> **Firmware**



Use the following tables to manage firmware image files. The image file that is listed at the top, the image with the highest boot priority, is used the next time that the device is booted. To change the boot priority for the image, click the arrow icons.

**Scroll down to upload an image file** to transfer a new firmware image to the BMC. After uploading a new image, Activate it to make it available for use.

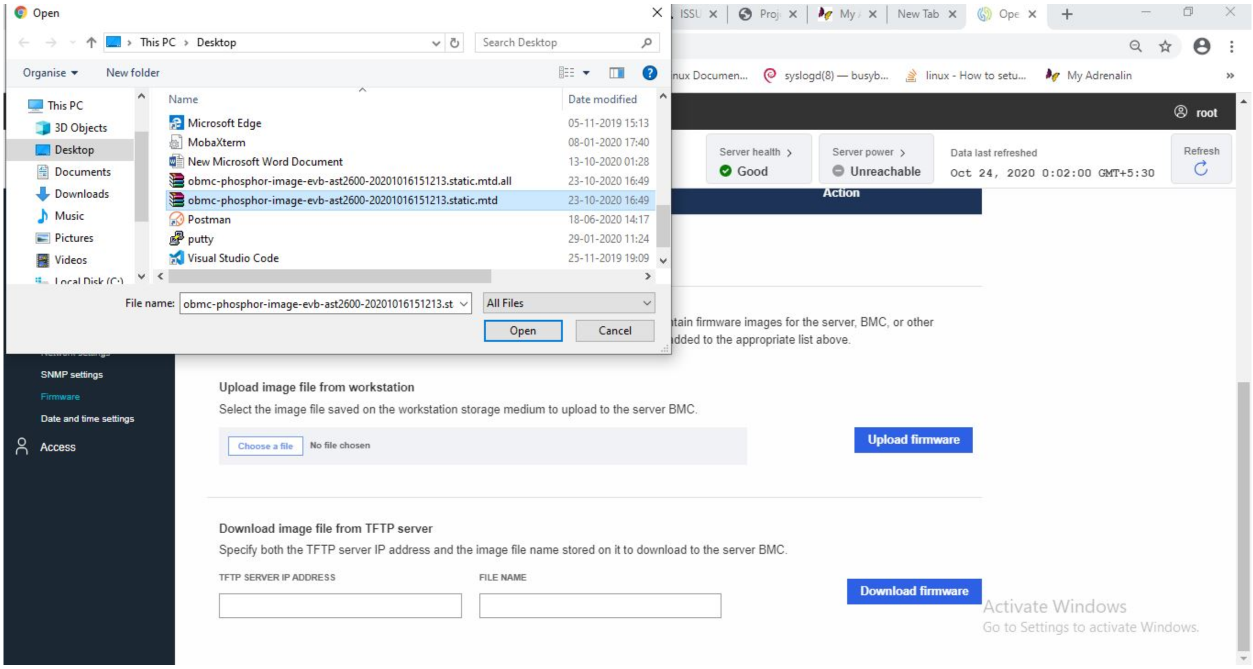
BMC images

Functional firmware version: 2.1.15811667

| Boot priority | Image state | Version | Action |
|---|---|---|---|
| ↑ ↓ | Functional | 2.1.15811667 | |

c) Scroll to the **Upload image from local or download from tftp server.**

d) Click choose a file and locate the tar file to upload. Click **Upload firmware.**



| Name | Date modified |
|---|---|
| Microsoft Edge | 05-11-2019 15:13 |
| MobaXterm | 08-01-2020 17:40 |
| New Microsoft Word Document | 13-10-2020 01:28 |
| obmc-phosphor-image-evb-ast2600-20201016151213.static.mtd.all | 23-10-2020 16:49 |
| obmc-phosphor-image-evb-ast2600-20201016151213.static.mtd | 23-10-2020 16:49 |
| Postman | 18-06-2020 14:17 |
| putty | 29-01-2020 11:24 |
| Visual Studio Code | 25-11-2019 19:09 |

File name: obmc-phosphor-image-evb-ast2600-20201016151213.st

All Files

tain firmware images for the server, BMC, or other
dded to the appropriate list above.

Upload image file from workstation

Select the image file saved on the workstation storage medium to upload to the server BMC.

Choose a file No file chosen

Upload firmware

Download image file from TFTP server

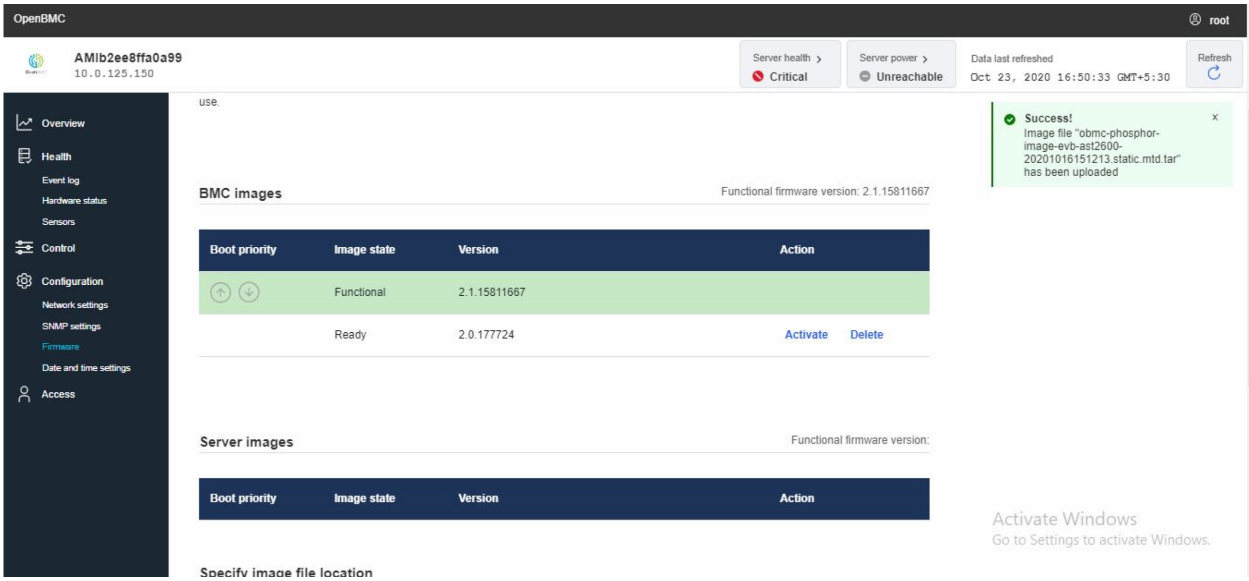
Specify both the TFTP server IP address and the image file name stored on it to download to the server BMC.

TFTP SERVER IP ADDRESS

FILE NAME

Download firmware

e) Scroll back up to the top and the user can view another image with actions **Activate** and **Delete.** Choose **Activate** to activate the recently flashed image.



use.

Success!
Image file "obmc-phosphor-image-evb-ast2600-20201016151213.static.mtd.tar" has been uploaded

BMC images

Functional firmware version: 2.1.15811667

| Boot priority | Image state | Version | Action |
|---|---|---|---|
| | Functional | 2.1.15811667 | |
| | Ready | 2.0.177724 | Activate Delete |

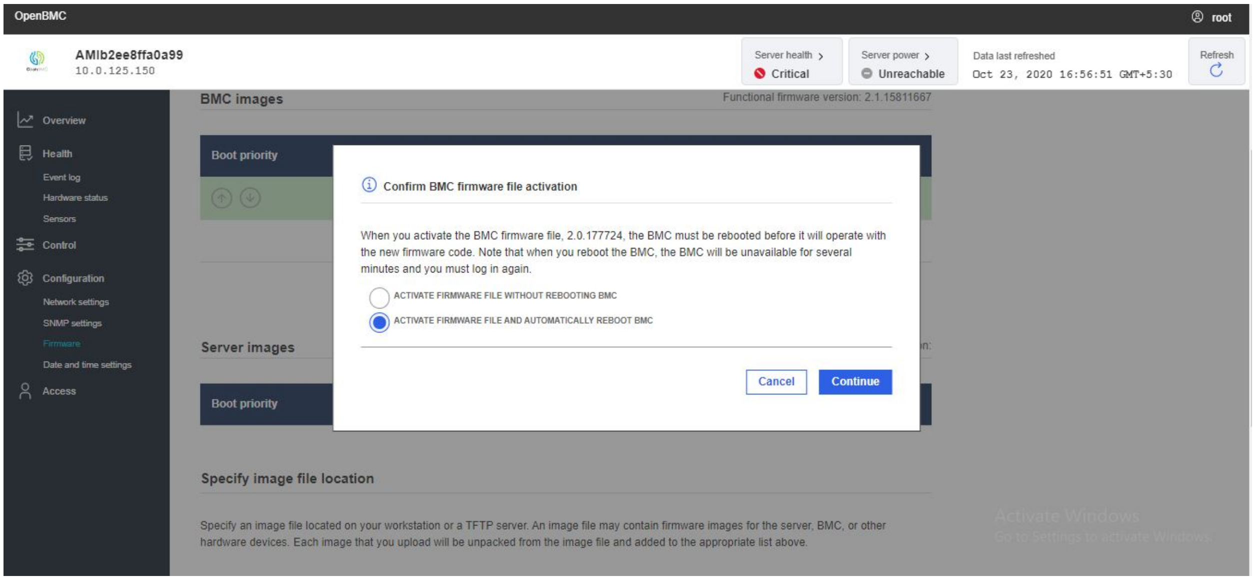
Server images

Functional firmware version:

| Boot priority | Image state | Version | Action |
|---|---|---|---|

Specify image file location

f) Choose the option as restart the BMC. A sample screenshot is displayed below.



Confirm BMC firmware file activation

When you activate the BMC firmware file, 2.0.177724, the BMC must be rebooted before it will operate with the new firmware code. Note that when you reboot the BMC, the BMC will be unavailable for several minutes and you must log in again.

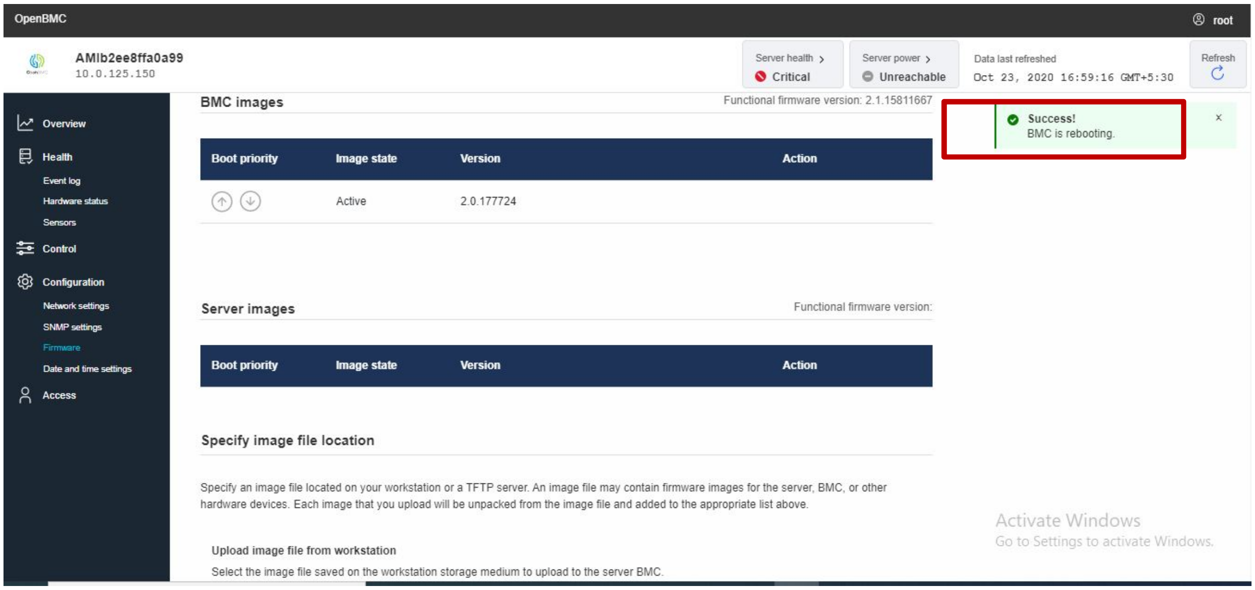
○ ACTIVATE FIRMWARE FILE WITHOUT REBOOTING BMC
● ACTIVATE FIRMWARE FILE AND AUTOMATICALLY REBOOT BMC

Cancel Continue

Specify image file location

Specify an image file located on your workstation or a TFTP server. An image file may contain firmware images for the server, BMC, or other hardware devices. Each image that you upload will be unpacked from the image file and added to the appropriate list above.

g) User can view the message stating that "BMC is resetting" as shown in the below screenshot.



Server health: Critical

Server power: Unreachable

Data last refreshed Oct 23, 2020 16:59:16 GMT+5:30

Success!
BMC is rebooting.

BMC images

Functional firmware version: 2.1.15811667

| Boot priority | Image state | Version | Action |
|---|---|---|---|
|  | Active | 2.0.177724 |  |

Server images

Functional firmware version:

| Boot priority | Image state | Version | Action |
|---|---|---|---|

Specify image file location

Specify an image file located on your workstation or a TFTP server. An image file may contain firmware images for the server, BMC, or other hardware devices. Each image that you upload will be unpacked from the image file and added to the appropriate list above.

Upload image file from workstation

Select the image file saved on the workstation storage medium to upload to the server BMC.

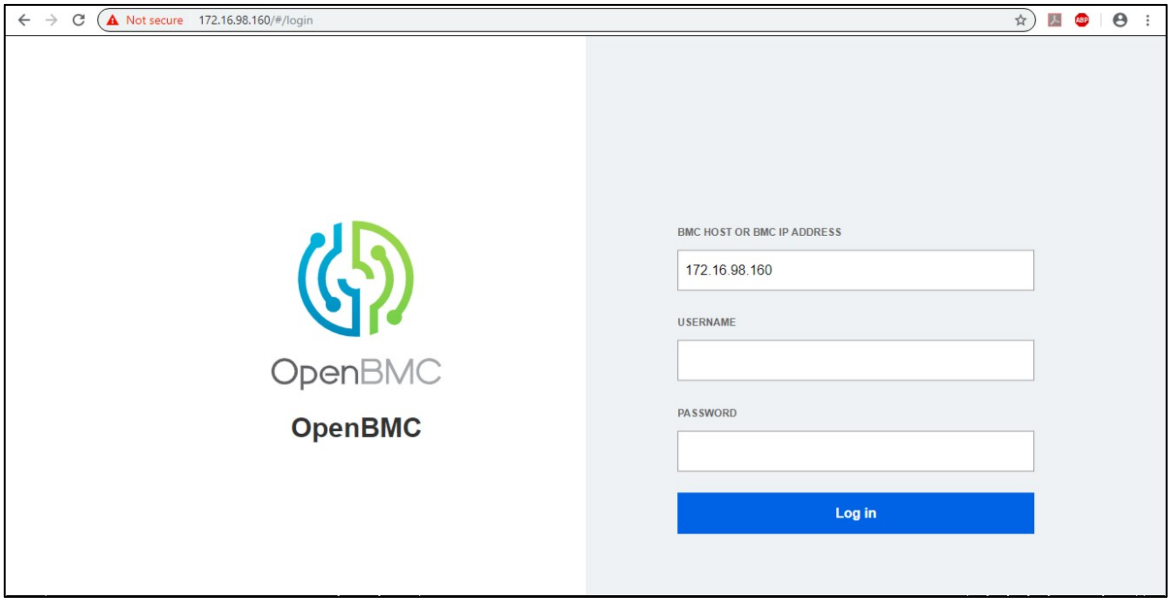
h) Now, UI gets logout and BMC will reboot it.

i) 5-10 minutes for the BMC to flash and reset.

## 2.12. WebUI Support

BMC FW supports a web server based on the bmcweb implementation and phosphor web UI front end. This can be accessed using the BMC IP address. A sample screenshot of the login page is given below.

1. Use valid user credentials (default are root/0penBmc, note it's not O, it's zero :) to login.



Not secure 172.16.98.160/#/login

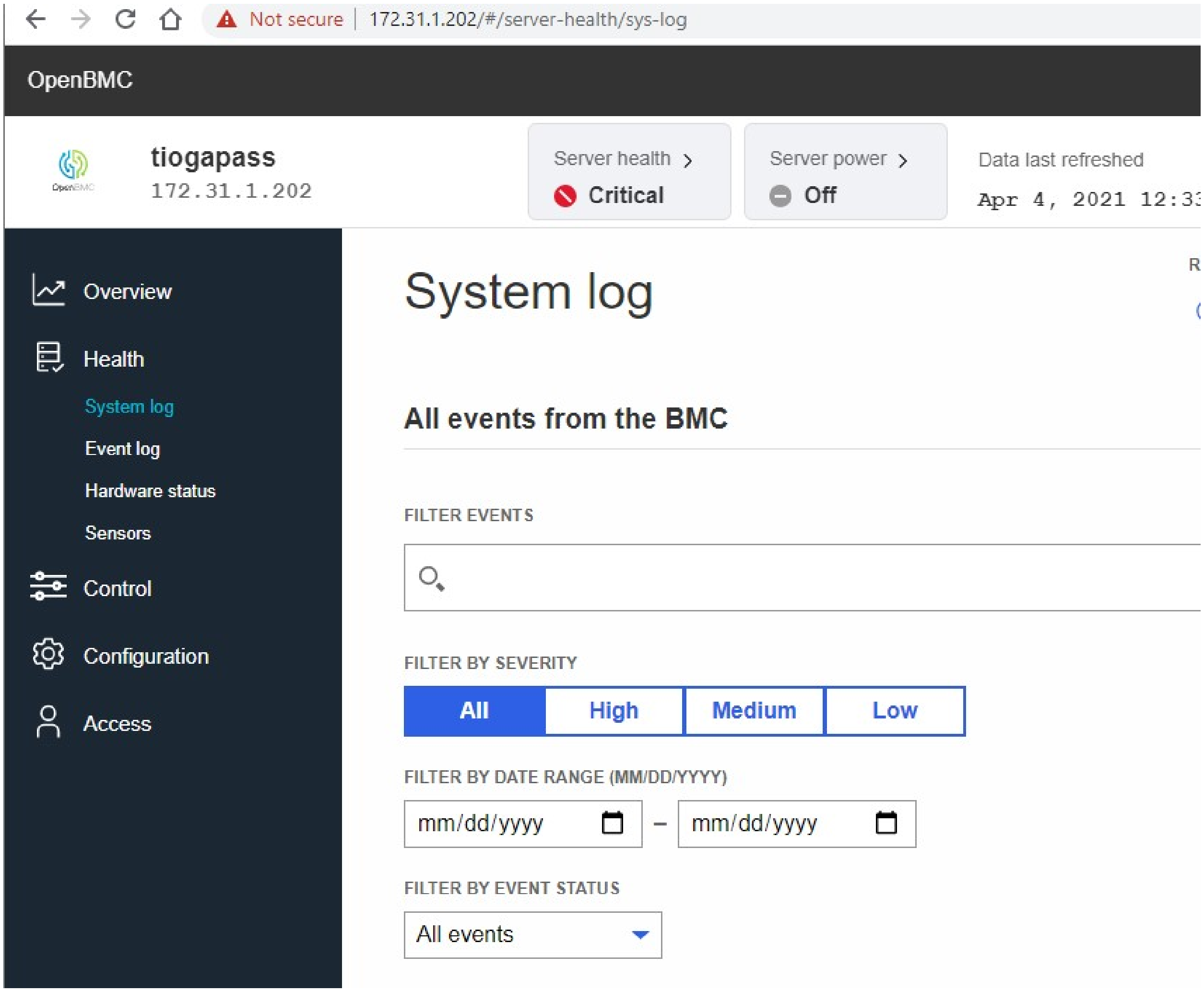
BMC HOST OR BMC IP ADDRESS: 172.16.98.160

USERNAME:

PASSWORD:

**Figure 3 Web UI support**

2. Once logged in the default idle screen as shown below.



Server health: Critical

Server power: Off

Data last refreshed: Apr 4, 2021 12:3

System log

All events from the BMC

FILTER EVENTS

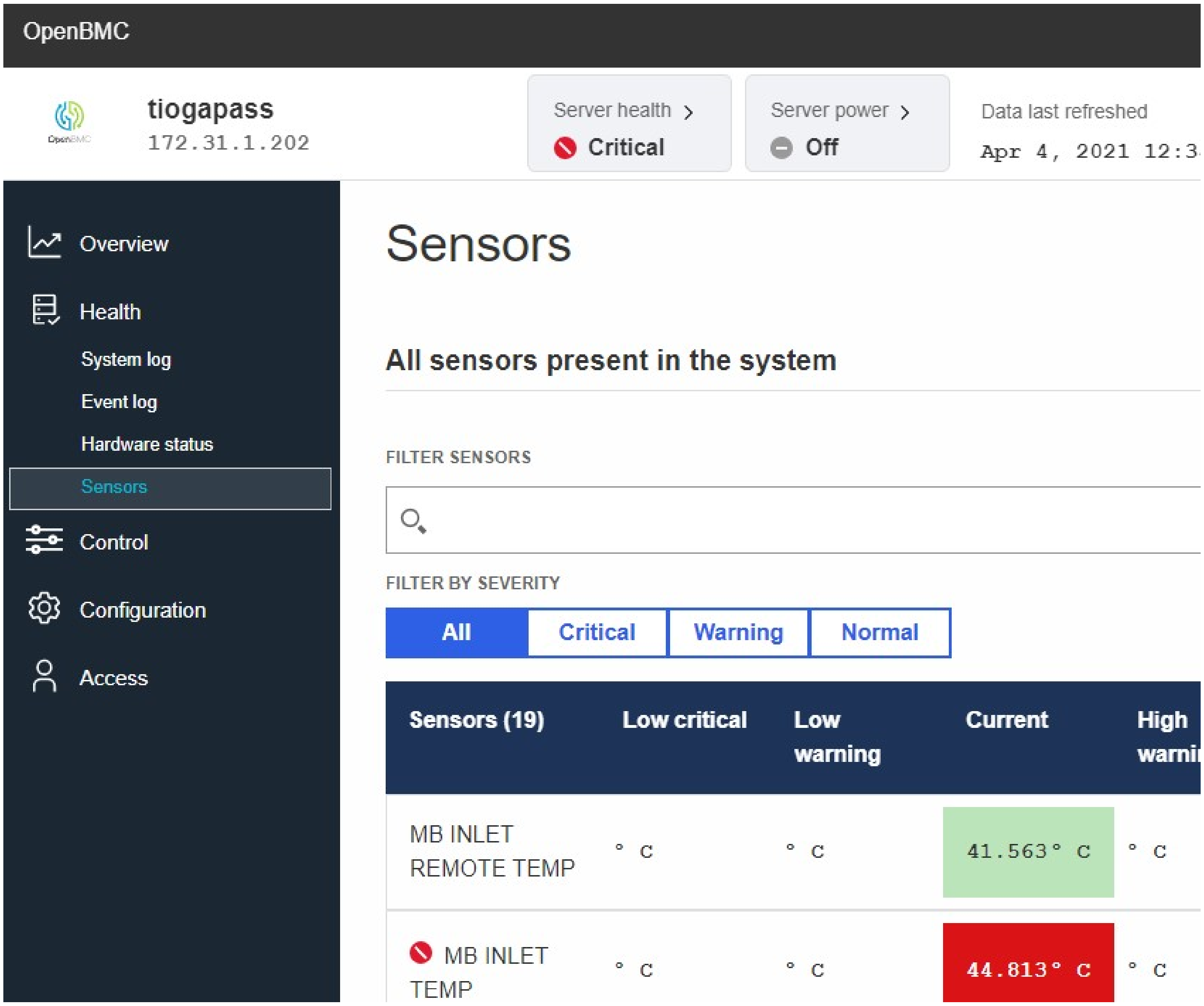
FILTER BY SEVERITY: All

FILTER BY DATE RANGE (MM/DD/YYYY)

FILTER BY EVENT STATUS: All events

**Figure 4 Default Idle Screen**

3. Each of the options on the left panel opens up multiple other related options for the user. For example **Server Health** option displays the Event log, Hardware status, Sensors and System logs. For instance, Sensor page is displayed as below. This has all the sensors showing with their current readings and status.



tiogapass
172.31.1.202

Server health
🚫 Critical

Server power
⊖ Off

Data last refreshed
Apr 4, 2021 12:3

Sensors

All sensors present in the system

| Sensors (19) | Low critical | Low warning | Current | High warni |
|---|---|---|---|---|
| MB INLET REMOTE TEMP | ° C | ° C | 41.563° C | ° C |
| 🚫 MB INLET TEMP | ° C | ° C | 44.813° C | ° C |

**Figure 5 Sensor**

## 2.13. KVM Support

BMC FW provides support to access the server console via KVM. Click **Server Control → KVM**, to access the KVM. A sample screenshot is displayed below.

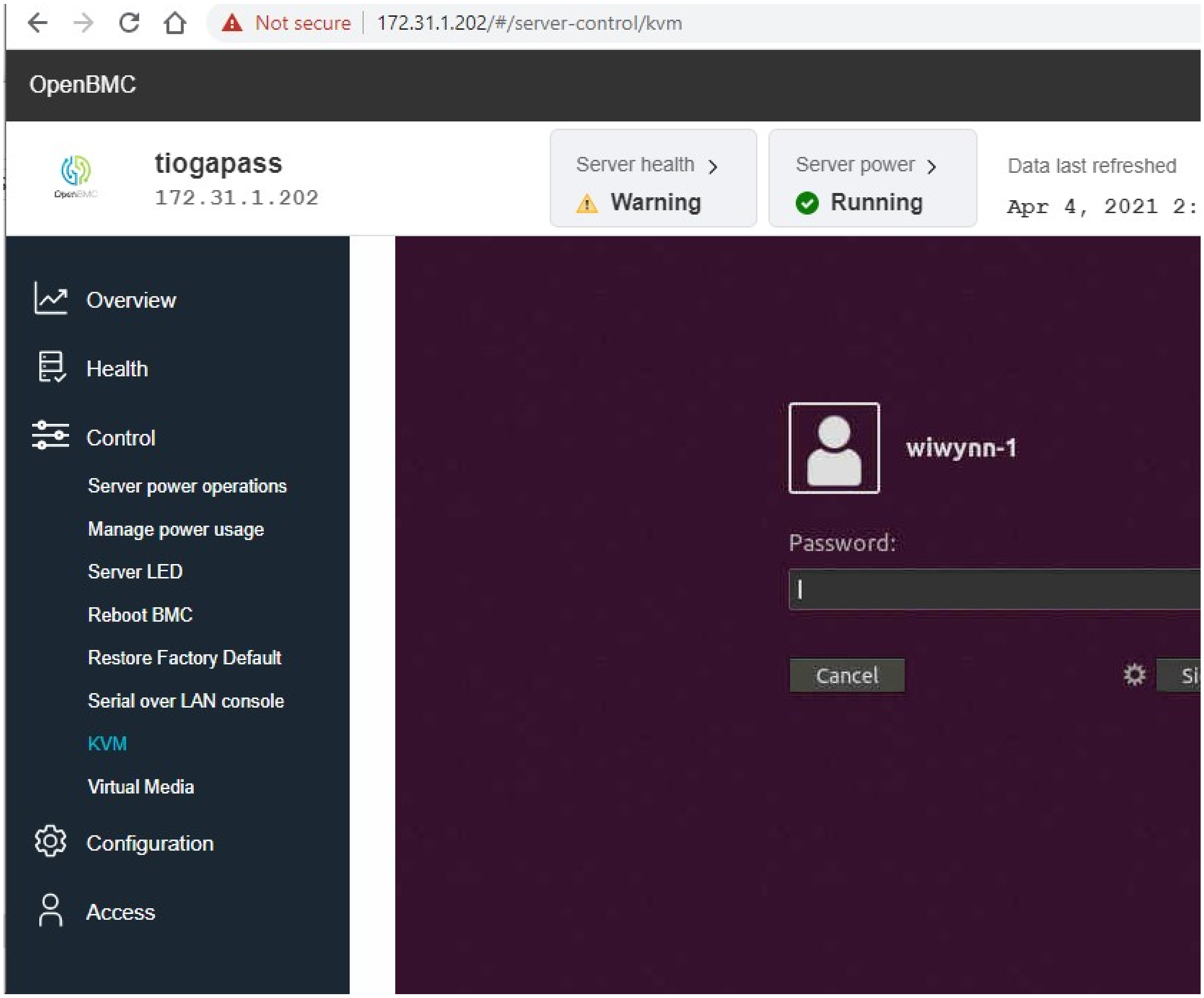
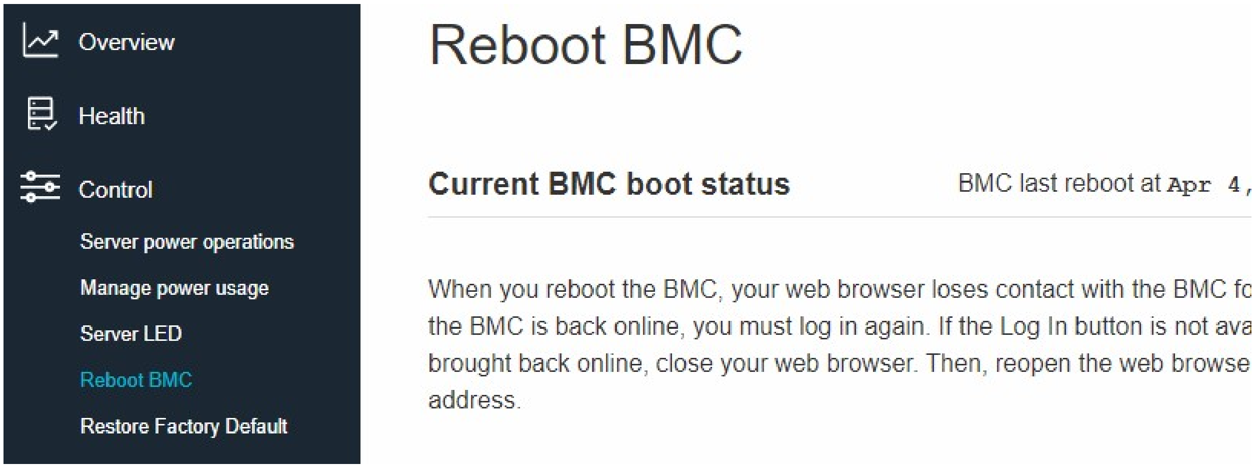


**Figure 6 KVM Support**

## 2.14. Reboot BMC

We can reboot the BMC through web UI. Click **Server Control → Reboot BMC**, to reboot the BMC. A sample screenshot is displayed below.



Reboot BMC

Current BMC boot status

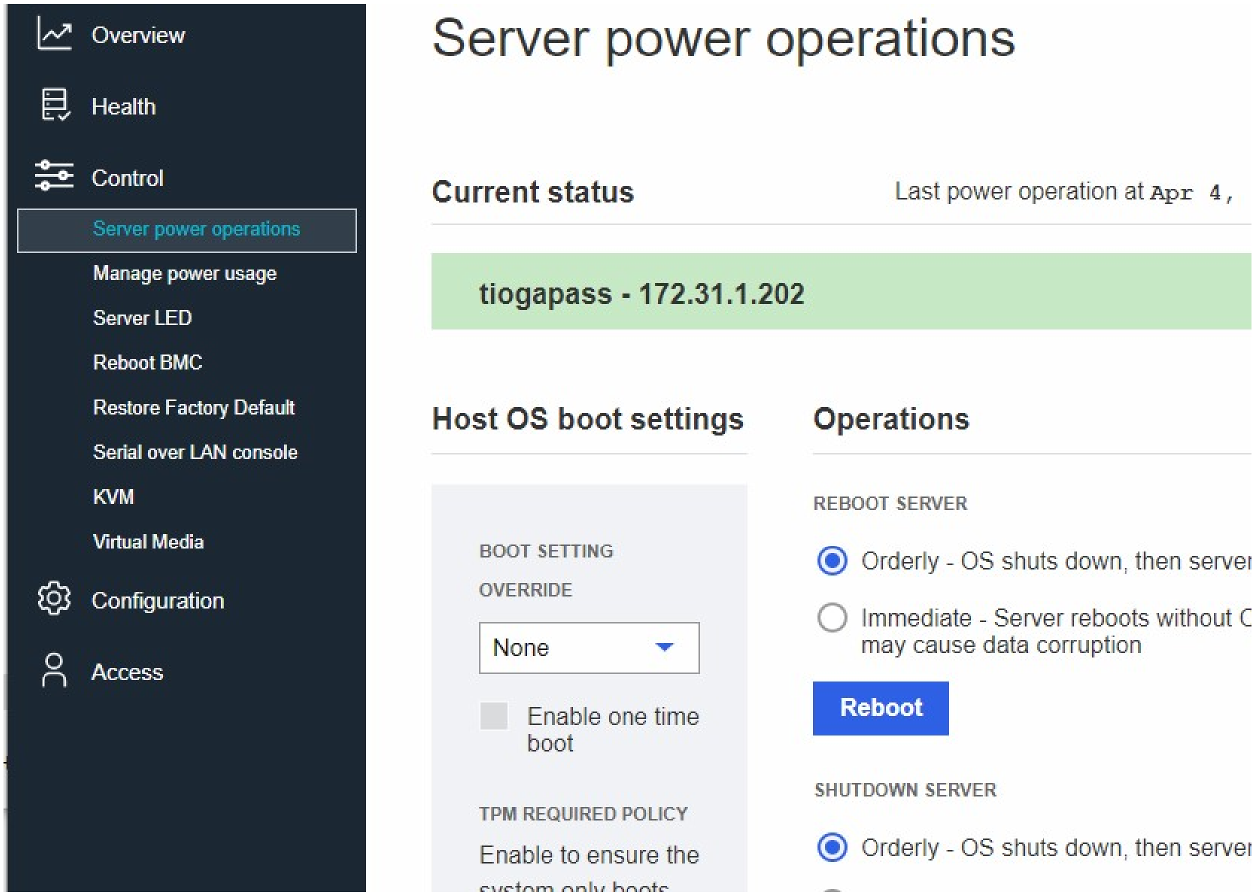
BMC last reboot at Apr 4,

When you reboot the BMC, your web browser loses contact with the BMC fc the BMC is back online, you must log in again. If the Log In button is not ava brought back online, close your web browser. Then, reopen the web browse address.

Figure 7 Reboot BMC

## 2.15. Server Power Operation

Chassis power operation are supported through web UI. Click **Server Control → Server Power Operation**, to reboot the BMC. A sample screenshot is displayed below.



Server power operations

Current status

Last power operation at Apr 4,

tiogapass - 172.31.1.202

Host OS boot settings

BOOT SETTING OVERRIDE

None

☐ Enable one time boot

TPM REQUIRED POLICY

Enable to ensure the system only boots

Operations

REBOOT SERVER

● Orderly - OS shuts down, then server

○ Immediate - Server reboots without C may cause data corruption

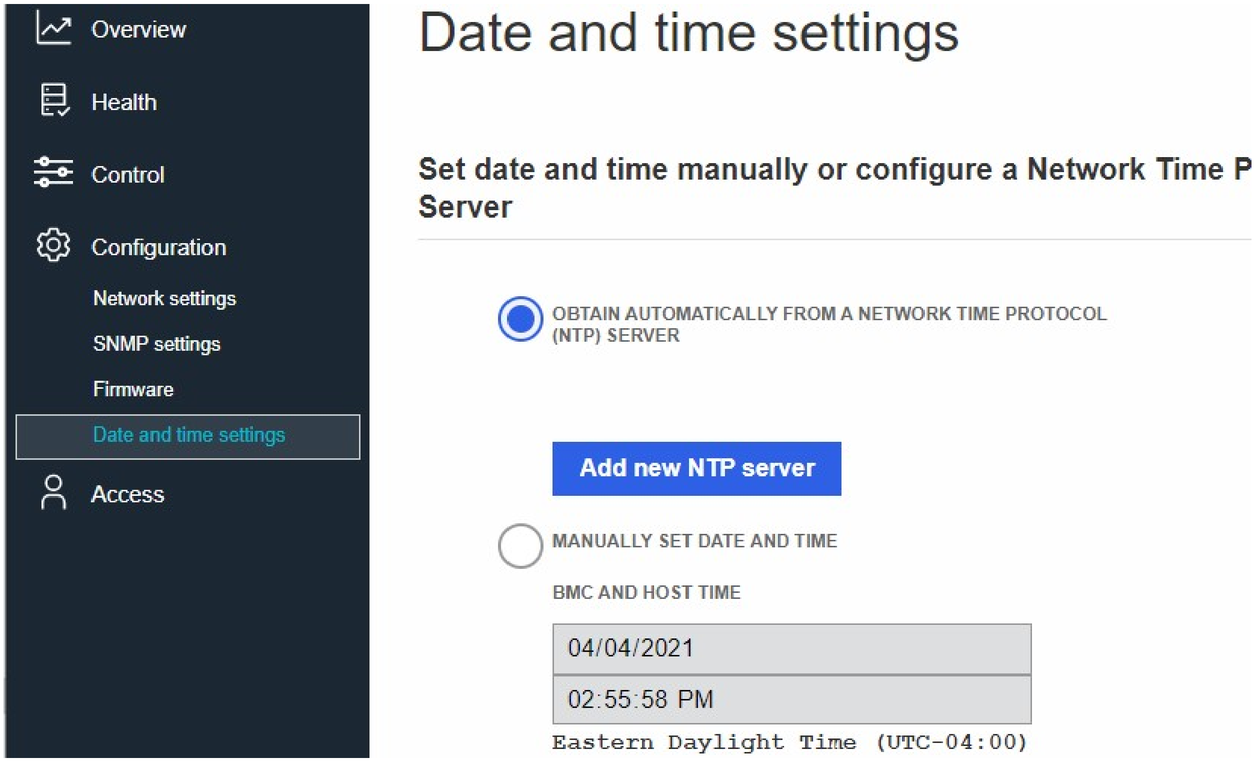
SHUTDOWN SERVER

● Orderly - OS shuts down, then server

**Figure 8 Reboot BMC**

## 2.16. NTP Support

NTP support for time setting is available using the WebUI. After login with the valid user credentials (root/0penBmc), click **Server configuration** > **Date and Time setting** option. BMC time can be set either manually or automatically using NTP and the specified NTP server. One or more servers can be added using the button as shown below.



Date and time settings

Set date and time manually or configure a Network Time P Server

● OBTAIN AUTOMATICALLY FROM A NETWORK TIME PROTOCOL (NTP) SERVER

○ MANUALLY SET DATE AND TIME

BMC AND HOST TIME

04/04/2021

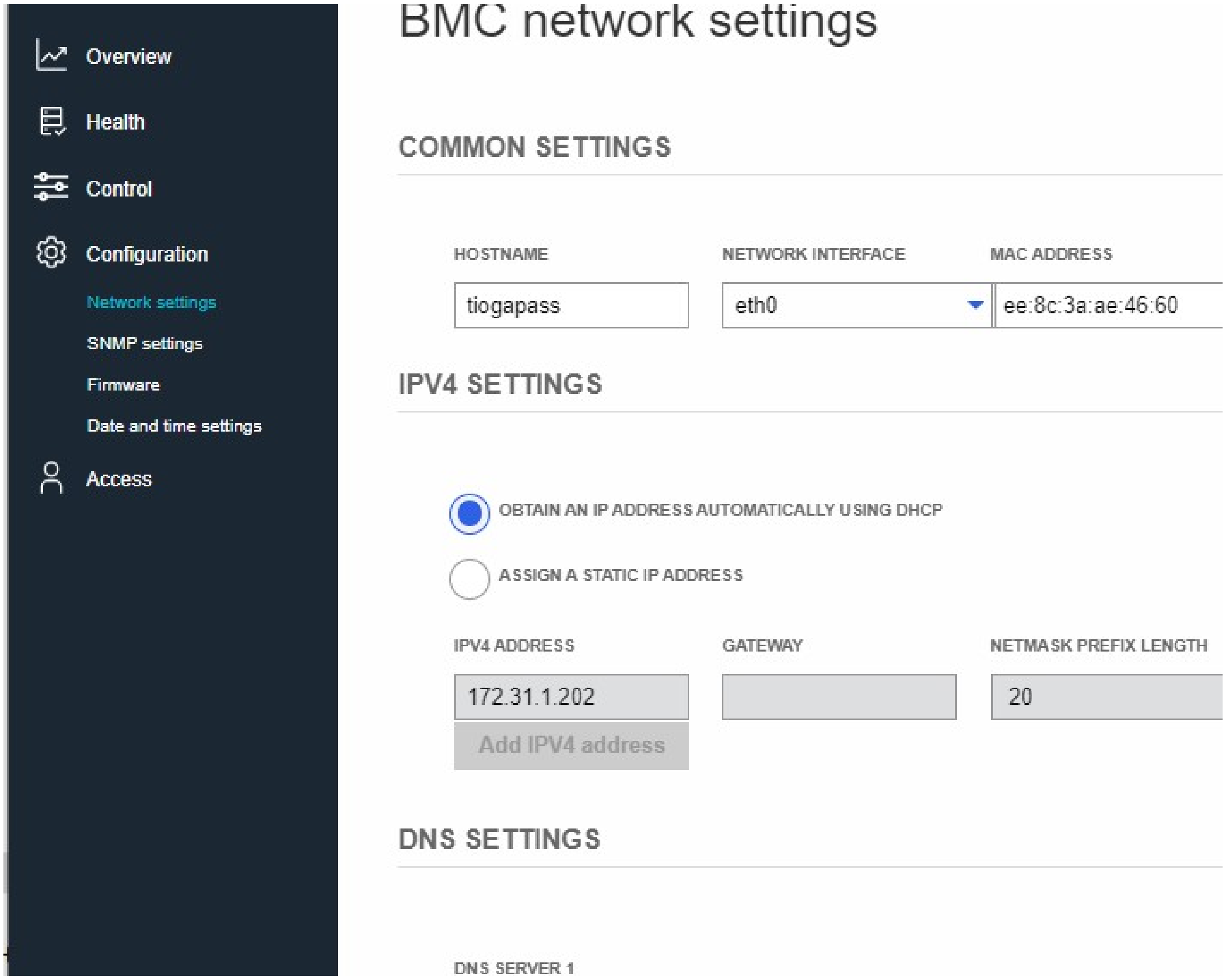
02:55:58 PM

Eastern Daylight Time (UTC-04:00)

**Figure 9 NTP Support**

## 2.17. BMC Network Settings

BMC Web UI supports option to modify and edit the BMC network settings. On the default login page, select the BMC Network Setting option to access this page as shown below. The same can be accessed by clicking **Server configuration → Network Settings**.



BMC network settings

COMMON SETTINGS

HOSTNAME: tiogapass
NETWORK INTERFACE: eth0
MAC ADDRESS: ee:8c:3a:ae:46:60

IPV4 SETTINGS

● OBTAIN AN IP ADDRESS AUTOMATICALLY USING DHCP
○ ASSIGN A STATIC IP ADDRESS

IPV4 ADDRESS: 172.31.1.202
GATEWAY:
NETMASK PREFIX LENGTH: 20

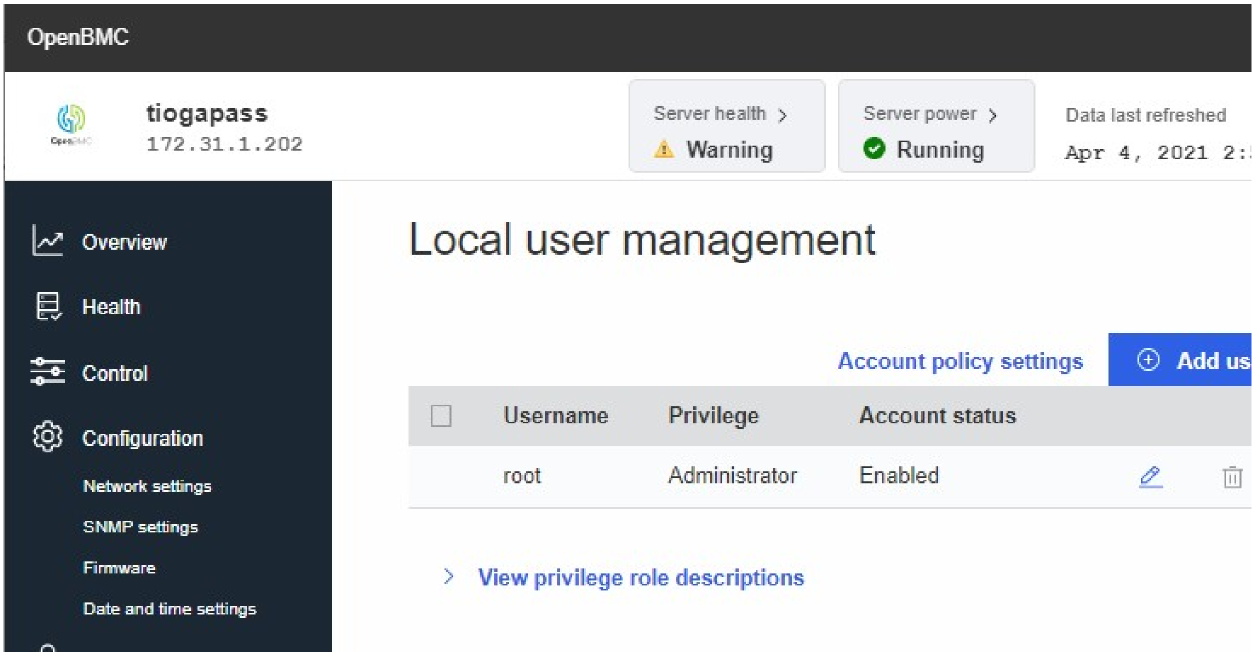
DNS SETTINGS

DNS SERVER 1

**Figure 10 BMC Network settings**

## 2.18. User Management Support

BMC FW supports User management including adding a new user, deleting an existing user, modifying the privileges of an existing user, etc. This can be done using the Access Control option on the left side panel of the BMC web UI. Select Local users on the extended left panel to view the page and manage users.



Local user management

| Username | Privilege | Account status |
|---|---|---|
| root | Administrator | Enabled |

**Figure 11 User Management support**

LDAP support is currently disabled on this release of BMC FW.

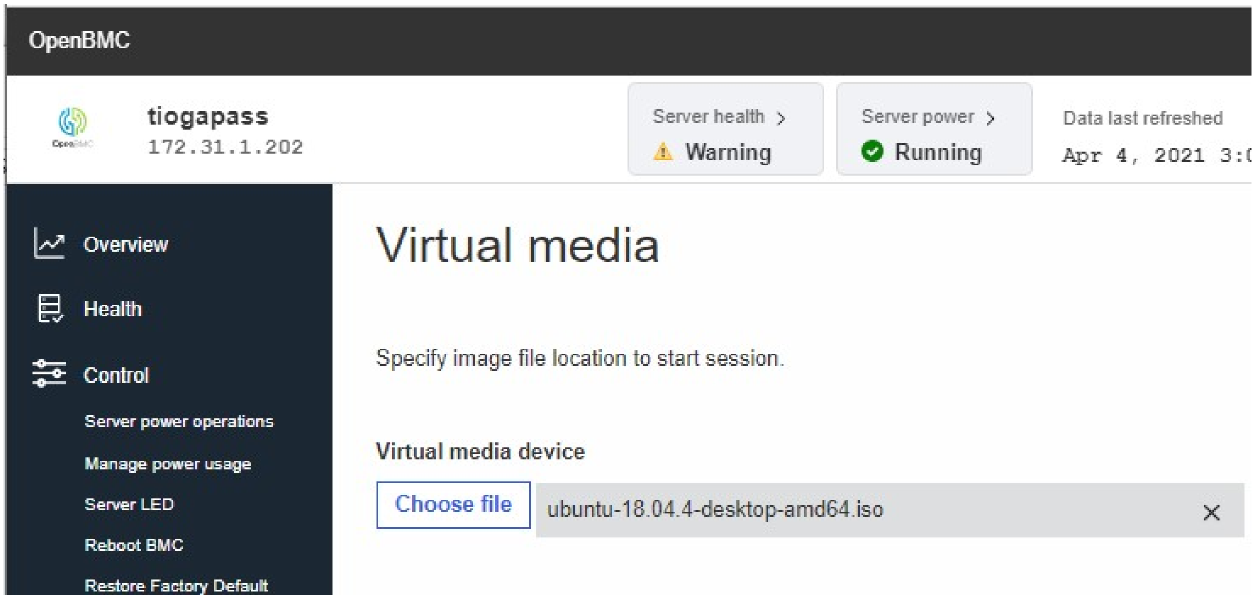
## 2.19. IPMI 2.0 and DCMI 1.5 support:

IPMI 2.0 based implementation is supported on the BMC FW. Not all the mandatory commands are implemented in the current version of the FW. The list of supported commands is listed in section 4. IPMI based host power controls are supported. Please refer release document for known issues.

DCMI 1.5 capability is supported on this release of the BMC FW. The list of supported commands is specified in section 4. Please refer release documentation for details on each of supported commands.

## 2.20. vMedia Support

BMC FW supports virtual media. User navigates to “Server control → Virtual Media” page, after logging in on the webUI. As shown below there will be option to choose a file.



Virtual media

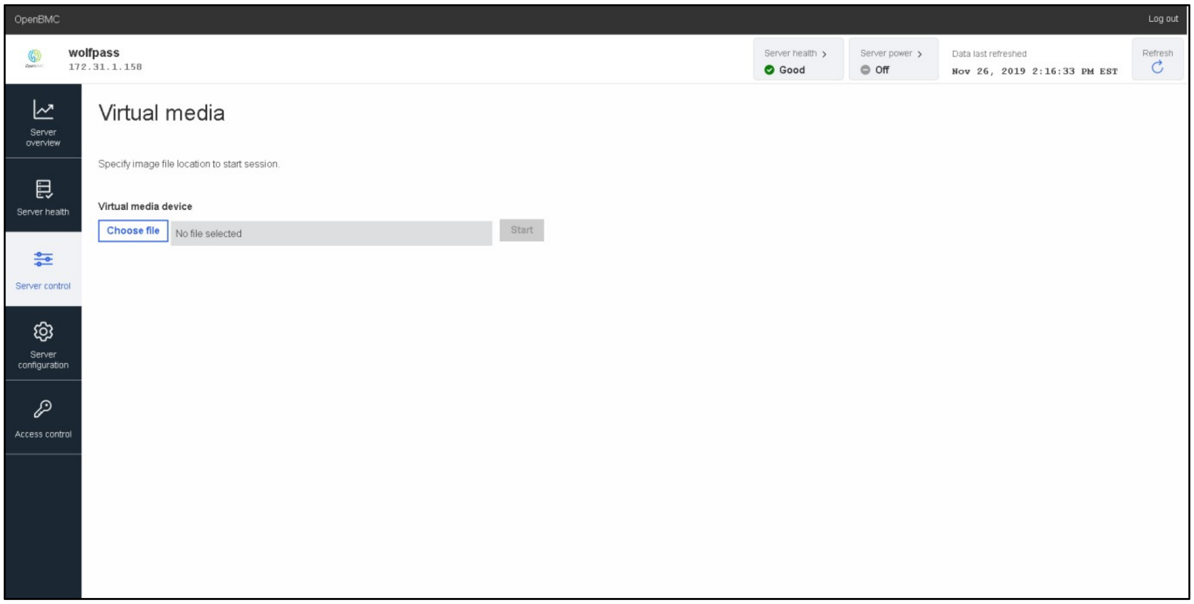
Specify image file location to start session.

Virtual media device

ubuntu-18.04.4-desktop-amd64.iso

**Figure 12 vMedia Support**

User selects file and pushes 'start' button to establish websocket connection. Then you see the following page showing active session.



Virtual media

Specify image file location to start session.

Virtual media device

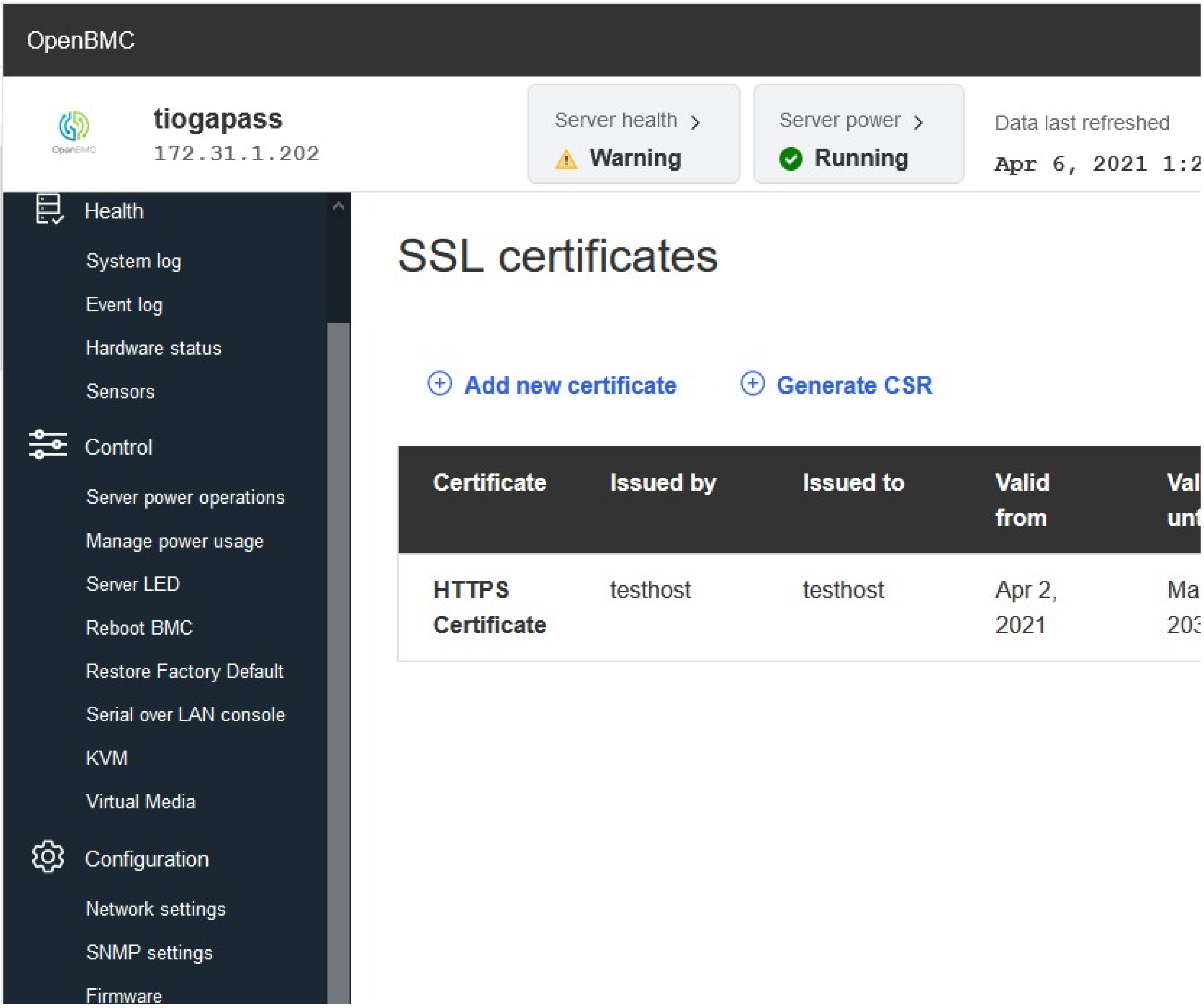
No file selected

**Figure 13 Virtual Media**

The nbdServerService on FW provide ability for user to navigate away from the page and return with the ability to see the current active sessions. For example, you can upload Ubuntu image file and mount virtual media device from host console. Then you will be able to see Ubuntu image file. Finally, when connection is stopped, 'USB disconnect' log would be appear on host console.

## 2.21. SSL Certificate Support

BMC FW supports SSL Certificate. User navigates to “Access → SSL Certificate” page, after logging in on the webUI. As shown below there will be options to add new certificate, generate CSR.



Server health: Warning

Server power: Running

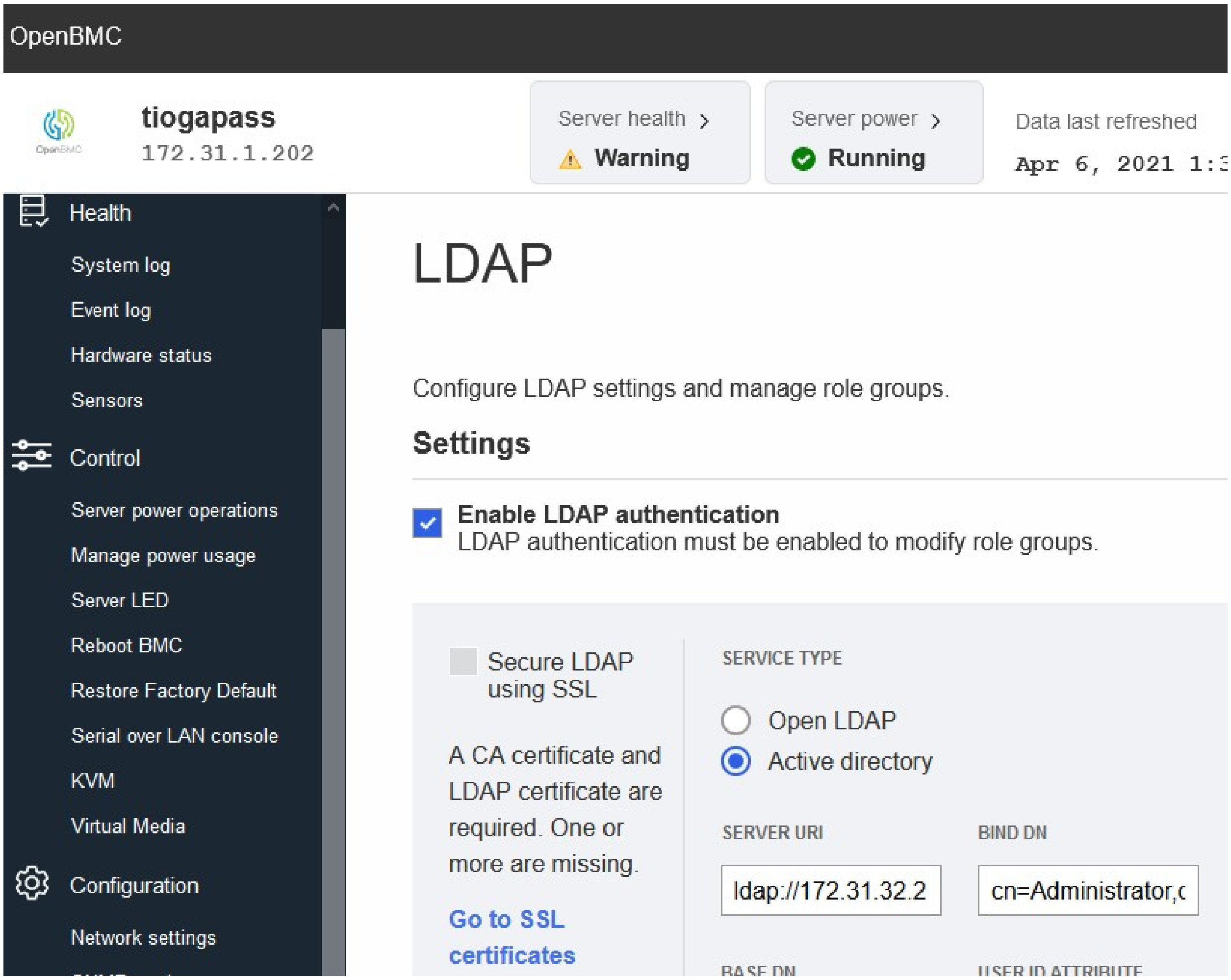
Data last refreshed Apr 6, 2021 1:2

SSL certificates

| Certificate | Issued by | Issued to | Valid from | Val unt |
|---|---|---|---|---|
| HTTPS Certificate | testhost | testhost | Apr 2, 2021 | Ma 203 |

## 2.22. LDAP Support

BMC FW supports configuring LDAP settings and manage role groups.



LDAP

Configure LDAP settings and manage role groups.

Settings

☑ Enable LDAP authentication
LDAP authentication must be enabled to modify role groups.

□ Secure LDAP using SSL

A CA certificate and LDAP certificate are required. One or more are missing.

SERVICE TYPE
○ Open LDAP
● Active directory

SERVER URI: ldap://172.31.32.2

BIND DN: cn=Administrator,c

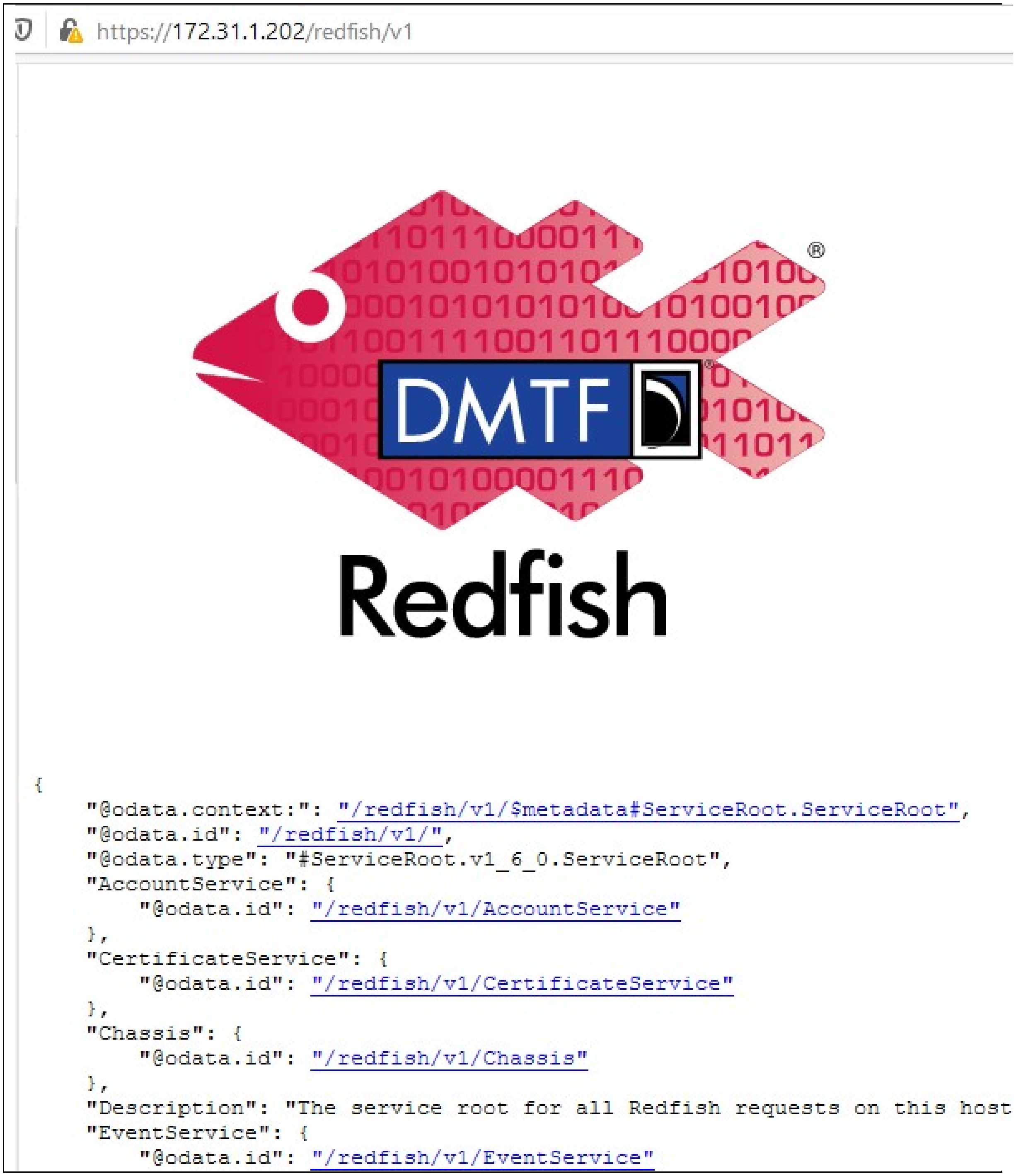
BASE DN

USER ID ATTRIBUTE

## 2.23. Redfish Support

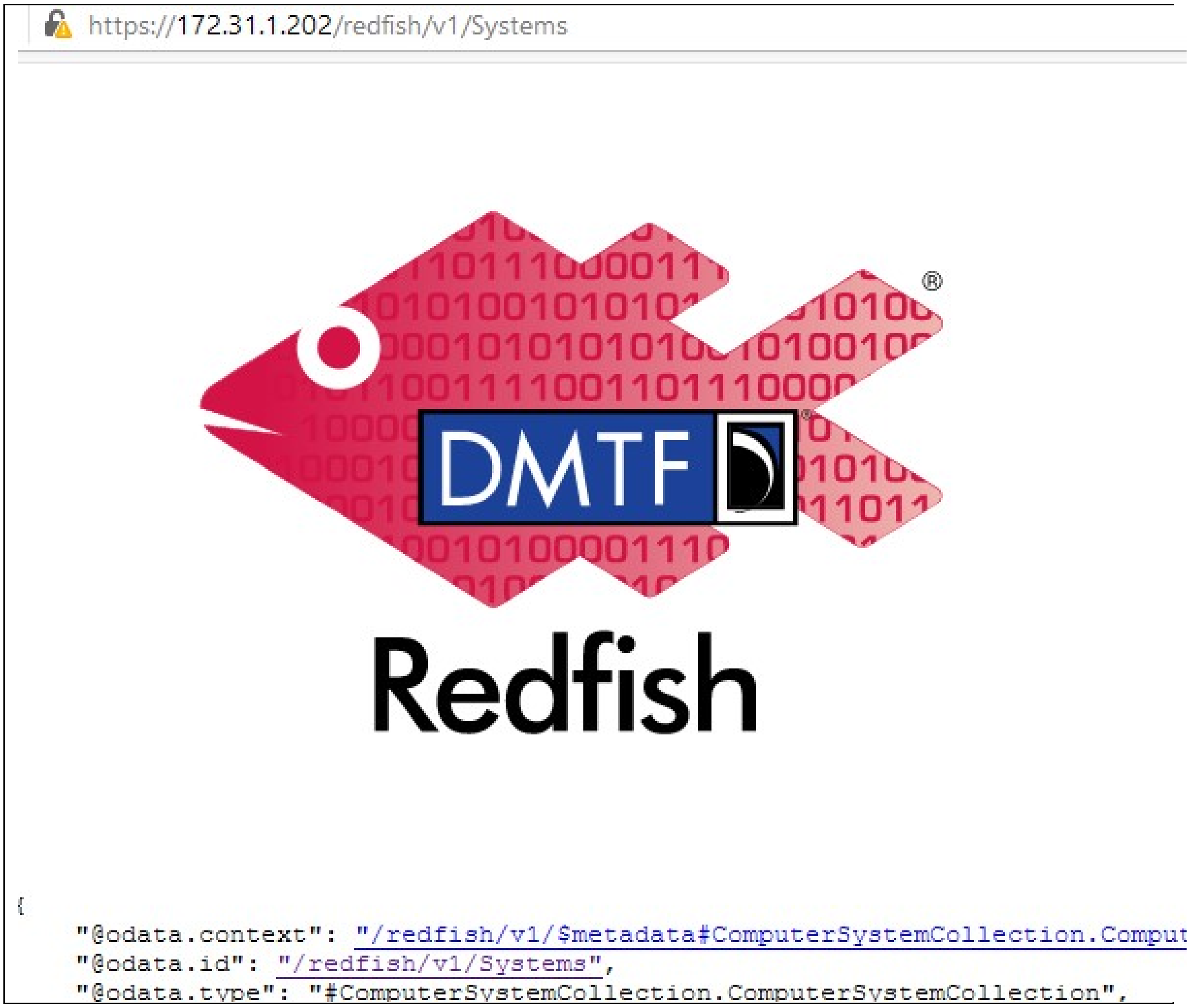
BMC FW supports Redfish, here are some examples:

***GET Schema Init - http://{{ip}}/redfish/v1/***



```
{
    "@odata.context:": "/redfish/v1/$metadata#ServiceRoot.ServiceRoot",
    "@odata.id": "/redfish/v1/",
    "@odata.type": "#ServiceRoot.v1_6_0.ServiceRoot",
    "AccountService": {
        "@odata.id": "/redfish/v1/AccountService"
    },
    "CertificateService": {
        "@odata.id": "/redfish/v1/CertificateService"
    },
    "Chassis": {
        "@odata.id": "/redfish/v1/Chassis"
    },
    "Description": "The service root for all Redfish requests on this host
    "EventService": {
        "@odata.id": "/redfish/v1/EventService"
```

**System Collection - http://{{ip}}/redfish/v1/Systems/**


https://172.31.1.202/redfish/v1/Systems

```
{
    "@odata.context": "/redfish/v1/$metadata#ComputerSystemCollection.Comput
    "@odata.id": "/redfish/v1/Systems",
    "@odata.type": "#ComputerSystemCollection.ComputerSystemCollection",
```

# 3. BMC Internal Tool Usage

## 3.1. GPIO Utilities

There are a few GPIO utilities supported on the BMC FW. They can be used to set/get state on the GPIO lines, set/get direction of a GPIO line etc.

1. **gpiodetect:**

Usage: gpiodetect
List all GPIO chips; print their labels and number of GPIO lines.

**Example:**

```
root@wolfpass:~# gpiodetect
gpiochip0 [1e780000.gpio] (232 lines)
```

2. **gpiofind:**

Usage: gpiofind <name>
Find a GPIO line by name. The output of this command can be used as input for gpioget/set.

**Example:**

```
root@wolfpass:~# gpiofind SIO_S3
gpiochip0 192
```

3. **gpioset:**

Usage: gpioset [OPTIONS] <chip name/number> <offset1>=<value1> <offset2>=<value2> ...
Set GPIO line values of a GPIO chip and maintain the state until the process exits.

**Options:**

```
  -v, --version:        display the version and exit
  -l, --active-low:     set the line active state to low
  -m, --mode=[exit|wait|time|signal] (defaults to 'exit'):
             tell the program what to do after setting values
  -s, --sec=SEC:        specify the number of seconds to wait (only valid for --mode=time)
  -u, --usec=USEC:      specify the number of microseconds to wait (only valid for --mode=time)
  -b, --background:     after setting values: detach from the controlling terminal
```

**Modes:**

```
  exit:     set values and exit immediately
  wait:     set values and wait for user to press ENTER
  time:     set values and sleep for a specified amount of time
  signal:   set values and wait for SIGINT or SIGTERM
```

> ***Note:*** *The state of a GPIO line controlled over the character device reverts to default when the last process referencing the file descriptor representing the device file exits. This means that it's wrong to run gpioset, have it exit and expect the line to continue being driven high or low. It may happen if given pin is floating but it must be interpreted as undefined behavior.*

4. **gpioget:**

**Usage:** gpioget [OPTIONS] <chip name/number> <offset 1> <offset 2> ...
Read line value(s) from a GPIO chip

**Options:**

```
  -v, --version:        display the version and exit
  -l, --active-low:     set the line active state to low
```

**Example:**

```
root@wolfpass:~# gpioget gpiochip0 2
0
```

5. **gpioinfo:**

**Usage:** gpioinfo [OPTIONS] <gpiochip1>..
Print information about all lines of the specified GPIO chip(s) (or all gpiochips if none are specified).

6. **gpiomon:**

**Usage:** gpiomon [OPTIONS] <chip name/number> <offset 1> <offset 2> ...
Wait for events on GPIO lines and print them to standard output

**Options:**

```
  -v, --version:        display the version and exit
  -l, --active-low:     set the line active state to low
  -n, --num-events=NUM: exit after processing NUM events
  -s, --silent:         don't print event info
  -r, --rising-edge:    only process rising edge events
  -f, --falling-edge:   only process falling edge events
  -b, --line-buffered:  set standard output as line buffered
  -F, --format=FMT      specify custom output format
```

**Format Specifiers:**

```
  %o:  GPIO line offset
  %e:  event type (0 - falling edge, 1 rising edge)
  %s:  seconds part of the event timestamp
  %n:  nanoseconds part of the event timestamp
```

## 3.2. I2C Tools

1. **i2cdetect:**

```
Usage: i2cdetect [-y] [-a] [-q|-r] I2CBUS [FIRST LAST]
 i2cdetect -F I2CBUS
 i2cdetect -l
 I2CBUS is an integer or an I2C bus name
```

If provided, FIRST and LAST limit the probing range.

2. **i2cdump:**

```
Usage: i2cdump [-f] [-y] [-r first-last] [-a] I2CBUS ADDRESS [MODE [BANK [BANKREG]]]
 I2CBUS is an integer or an I2C bus name
 ADDRESS is an integer (0x03 - 0x77, or 0x00 - 0x7f if -a is given)
 MODE is one of:
 b (byte, default)
 w (word)
 W (word on even register addresses)
 s (SMBus block)
 i (I2C block)
 c (consecutive byte)
 d (double word)
 Append p for SMBus PEC
```

3. **i2cget:**

```
Usage: i2cget [-f] [-y] [-a] I2CBUS CHIP-ADDRESS [DATA-ADDRESS [MODE] [LENGTH]]
  I2CBUS is an integer or an I2C bus name
  ADDRESS is an integer (0x03 - 0x77, or 0x00 - 0x7f if -a is given)
  MODE is one of:
    b (read byte data, default)
    w (read word data)
    c (write byte/read byte)
    i (read I2C block data)
    Append p for SMBus PEC
  LENGTH is length for block data reads
```

4. **i2cset:**

```
Usage: i2cset [-f] [-y] [-m MASK] [-r] [-a] I2CBUS CHIP-ADDRESS DATA-ADDRESS [VALUE]
... [MODE]
  I2CBUS is an integer or an I2C bus name
  ADDRESS is an integer (0x03 - 0x77, or 0x00 - 0x7f if -a is given)
  MODE is one of:
    c (byte, no value)
    b (byte data, default)
    w (word data)
    i (I2C block data)
    s (SMBus block data)
    Append p for SMBus PEC
```

## 3.3. obmc-console

obmc-console is used to redirect serial (UART) over ssh. We can specify host serial port in obmc-console-server/systemd service. There are two methods to get remote host console:

- Standalone tool from bmc: obmc-console-client
- Using ssh: ssh -p2200 root@<BMC IP>

## 3.4. Accessing Devices from U-boot

1. **Read memory:**
   md <memory register offset address>
   Example: Display USB1.1 HID Controller Function Control and Status
   md 0x1e6e1000

2. **Write memory:**
   mw <memory register offset address> <value>
   Example: Display USB1.1 HID Controller Function Control and Status:
   md 0x1e6e1000 0x00000003 → To enable USB connection and Low speed.

   ***Note:*** *The above command will apply the 32 bit value into memory offset.*

   Please refer AST data sheet for address mapping and register offset.

# 4. Supported IPMI Commands

| Net Function | Command | Command Name | Comments |
|---|---|---|---|
| ***Application*** | | | |
| 0x06 | 0x01 | Get Device ID | |
| 0x06 | 0x02 | Cold Reset | |
| 0x06 | 0x08 | Get Device GUID | |
| 0x06 | 0x38 | Get Channel Authentication Capabilities | |
| 0x00 | 0x01 | Get Chassis Status | |
| 0x00 | 0x09 | Get System Boot Options | Only parameter 5 is supported(as per IPMI Spec ) |
| 0x00 | 0x0F | Get POH Counter | |
| ***SensorEvent*** | | | |
| 0x04 | 0x20 | Get Device SDR Info | |
| 0x04 | 0x21 | Get Device SDR | |
| 0x04 | 0x22 | Reserve Device SDR Repository | |
| 0x04 | 0x2D | Get Sensor Reading | |
| ***Storage*** | | | |
| 0x0a | 0x10 | Get FRU Inventory Area Info | |
| 0x0a | 0x11 | Read FRU Data | |
| 0x0a | 0x12 | Write FRU Data | |
| 0x0a | 0x20 | Get SDR Repository Info | |
| 0x0a | 0x23 | Get SDR | |
| 0x0a | 0x40 | Get SEL Info | |
| 0x0a | 0x44 | Add SEL Entry | |
| 0x0a | 0x43 | Get SEL Entry | |
| 0x0a | 0x42 | Reserve SEL | |
| 0x0a | 0x47 | Clear SEL | |
| 0x0a | 0x48 | Get SEL Time | |
| 0x0a | 0x49 | Set SEL Time | |
| ***Transport*** | | | |

| | | | |
|---|---|---|---|
| 0x0c | 0x01 | Set LAN Configuration Parameters | SUPPORTED [Authentication type, ip-address, ip-address-source, MAC address, subnet-mask] |
| 0x0c | 0x02 | Get LAN Configuration Parameters | SUPPORTED [Authentication type ,ip-address, ip-address-source, MAC address, subnet-mask] |
| 0x0c | 0x21 | Set SOL Configuration Parameters | SOL Payload Port Number, SOL Payload Channel, SOL retry, SOL Authentication not supported |
| 0x0c | 0x22 | Get SOL Configuration Parameters | SOL retry, SOL Authentication not supported |
| ***DCMI*** | | | |
| 0x2c | 0x01 | Get DCMI Capability Info | parameter 5 is not supported, will get default values back |
| 0x2c | 0x03 | Get Power Limit | |
| 0x2c | 0x04 | Set Power Limit | Exception Actions, Correction Time Limit, Sampling period not working |
| 0x2c | 0x05 | Activate Power Limit | |
| 0x2c | 0x06 | Get Asset Tag | |
| 0x2c | 0x08 | Set Asset Tag | |
| 0x2c | 0x09 | Get Management Controller Id String | |
| 0x2c | 0x10 | Get Temperature Reading | |
| 0x2c | 0x12 | Set DCMI Configuration Parameters | SUPPORTED [Activate DHCP] |
| 0x2c | 0x13 | Get DCMI Configuration Parameters | SUPPORTED [Activate DHCP] |

| | |
|---|---|
| lan | print, set, alert print, alert set, stats clear |
| chassis | status, power, policy, poh, bootdev, bootparam |
| power | status, on, off, reset |
| event | |
| mc | reset, cold, info |

| | |
|---|---|
| sdr | |
| sensor | |
| fru | print, read, write |