Common Configurations

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BlueField Modes of Operation Configuration

Getting Mode of Operation

```
curl -k -u root:'<PASSWORD>' -X GET
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia
```

> **Info**
>
> Current setting appears under `Mode`.

Setting DPU Mode

```
curl -k -u root:'<PASSWORD>' -H "Content-Type: application/json"
-X POST -d '{"Mode":"DpuMode"}'
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia/Actions/Mo
```

Setting NIC Mode

```
curl -k -u root:'<PASSWORD>' -H "Content-Type: application/json"
-X POST -d '{"Mode":"NicMode"}'
```

```
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia/Actions/M
```

BIOS Secure Boot Configuration

The NVIDIA® BlueField® BMC supports the DMTF Secure Boot schema which enables managing the state of the UEFI Secure Boot through the Redfish interface. This allows clients to set whether UEFI should authenticate the OS image during the boot process.

Reading Secure Boot Status

```
curl -k -u root:'<password>' -H 'Content-Type: application/json'
-X GET https://<bmc_ip>/redfish/v1/Systems/Bluefield/SecureBoot
```

Output example:

```
{
  "@odata.id": "/redfish/v1/Systems/Bluefield/SecureBoot",
  "@odata.type": "#SecureBoot.v1_1_0.SecureBoot",
  "Description": "The UEFI Secure Boot associated with this
system.",
  "Id": "SecureBoot",
  "Name": "UEFI Secure Boot",
  "SecureBootCurrentBoot": "Disabled",
  "SecureBootDatabases": {
    "@odata.id":
"/redfish/v1/Systems/Bluefield/SecureBoot/SecureBootDatabases"
  },
  "SecureBootEnable": false,
  "SecureBootMode": "SetupMode"
```

```
}
```

Setting Secure Boot State

The following command enables UEFI Secure Boot through the Redfish interface:

```
curl -k -u root:'<password>' -X PATCH -H "Content-
Type: application/json" https://<bmc_ip>/redfish/v1/Systems/Bluefiel
d '{"SecureBootEnable":true}'
```

The following command disables UEFI Secure Boot through the Redfish interface:

```
curl -k -u root:<password> -H "Content-Type: application/octet-
stream" -X GET https://<BF-BMC-
IP>/redfish/v1/Systems/Bluefield/SecureBoot
{
  "@odata.id": "/redfish/v1/Systems/Bluefield/SecureBoot",
  "@odata.type": "#SecureBoot.v1_1_0.SecureBoot",
  "Description": "The UEFI Secure Boot associated with this
system.",
  "Id": "SecureBoot",
  "Name": "UEFI Secure Boot",
  "SecureBootCurrentBoot": "Enabled",
  "SecureBootEnable": true,
  "SecureBootMode": "SetupMode"
}
curl -k -u root:<BF-BMC-PASSWORD> -X PATCH https://<BF-BMC-
IP>/redfish/v1/Systems/Bluefield/SecureBoot -H 'Content-Type:
application/json' -d '{"SecureBootEnable": false}'
```

After running this command, the BlueField Arm OS must be rebooted twice. The first reboot is for the UEFI redfish client to read the request from the BMC and apply it; the

second reboot is for the setting to take effect.

- From the BlueField BMC using Redfish:

```
curl -k -u root:<BF-BMC-PASSWORD> -X POST https://<BF-BMC-
IP>/redfish/v1/Systems/Bluefield/Actions/ComputerSystem.Reset
-H 'Content-Type: application/json' -d
'{"ResetType":"ForceRestart"}'
```

- From RShim:

```
echo 'SW_RESET 1' > /dev/rshim0/misc
```

- From the BlueField Arm OS:

```
reboot
```

Secure Boot Database Support

The following operations may be performed using Redfish commands. For each operation, a corresponding task is generated within the BMC's Redfish Task Service. During the subsequent BlueField reboot, the UEFI checks for any pending secure boot tasks and executes them in the order of their ascending task ID numbers. After completion, the UEFI then updates the task state to reflect the relevant status.

- To read UEFI Secure boot databases:

```
curl -k -u root:'<password>' -H 'Content-Type:
application/json' -X GET
https://<bmc_ip>/redfish/v1/Systems/Bluefield/SecureBoot/Secur
```

Output example:

```
{
  "@odata.id":
"/redfish/v1/Systems/Bluefield/SecureBoot/SecureBootDatabases"
  "@odata.type":
"#SecureBootDatabaseCollection.SecureBootDatabaseCollection",
  "Members": [
    {
      "@odata.id":
"/redfish/v1/Systems/Bluefield/SecureBoot/SecureBootDatabases/
    },
    ..
    {
      "@odata.id":
"/redfish/v1/Systems/Bluefield/SecureBoot/SecureBootDatabases/
    },
..
    {
      "@odata.id":
"/redfish/v1/Systems/Bluefield/SecureBoot/SecureBootDatabases/
    },
..
..
    {
      "@odata.id":
"/redfish/v1/Systems/Bluefield/SecureBoot/SecureBootDatabases/
    },
..
  ],
  "Members@odata.count": 10,
  "Name": "UEFI SecureBoot Database Collection"
}
```

- To add a certificate to the UEFI `db`:

> **Note**
>
> The following certificate is an example only and can not be used as is. `db` certificate must be signed by the public key certificate.

```
curl -k -u root:'<password>' -H 'Content-Type:
application/json' -X POST
https://<bmc_ip>/redfish/v1/Systems/Bluefield/SecureBoot/Secur
-d \
 '{"CertificateString": "-----BEGIN CERTIFICATE-----
\nMIIDbTCCAlWgAwIBAgIUO2MdJt2cTCGr0eO4PiBV5Uk0b/IwDQYJKoZIhvcN
----END CERTIFICATE-----","CertificateType": "PEM":
"5491316d-9694-4639-b72d-b8630ffa7dab"}'
```

Output example:

```
{
  "@odata.id": "/redfish/v1/TaskService/Tasks/0",
  "@odata.type": "#Task.v1_4_3.Task",
  "Id": "0",
  "TaskState": "Pending",
  "TaskStatus": "OK"
}
```

- To add a signature to the UEFI `db`:

```
curl -k -u root:'<password>' -H 'Content-Type:
application/json' -X POST
https://<bmc_ip>/redfish/v1/Systems/Bluefield/SecureBoot/Secur
-d \
'{"SignatureString":
"80B4D96931BF0D02FD91A61E19D14F1DA452E66DB2408CA8604D411F92659
"UEFI","SignatureType": "EFI_CERT_SHA256_GUID": "28d5e212-
165b-4ca0-909b-c86b9cee0112"}'
```

Output example:

```
{
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_4_3.Task",
  "Id": "1",
  "TaskState": "Pending",
  "TaskStatus": "OK"
}
```

- To delete UEFI `db` certificate #1:

```
curl -k -u root:'<password>' -H 'Content-Type:
application/json' -X DELETE
https://<bmc_ip>/redfish/v1/Systems/Bluefield/SecureBoot/Secur
```

Output example:

```
{
  "@odata.id": "/redfish/v1/TaskService/Tasks/2",
  "@odata.type": "#Task.v1_4_3.Task",
```

```
  "Id": "2",
  "TaskState": "Pending",
  "TaskStatus": "OK"
}
```

- To delete all UEFI `db` keys:

```
curl -k -u root:'<password>' -H 'Content-Type:
application/json' -X POST
https://<bmc_ip>/redfish/v1/Systems/Bluefield/SecureBoot/Secur
-d '{"ResetKeysType": "DeleteAllKeys"}'
```

Output example:

```
{
  "@odata.id": "/redfish/v1/TaskService/Tasks/3",
  "@odata.type": "#Task.v1_4_3.Task",
  "Id": "3",
  "TaskState": "Pending",
  "TaskStatus": "OK"
}
```

Secure Boot Flow Example

The following is an example flow for resetting all `db` certificates using Redfish commands:

1. To reset all `db` keys:

```
root:~# curl -k -u root:'<password>' -H 'Content-Type:
application/json' -X POST
```

```
https://<bmc_ip>/redfish/v1/Systems/Bluefield/SecureBoot/Secur
-d '{"ResetKeysType": "DeleteAllKeys"}'
```

Output example:

```
{
  "@odata.id": "/redfish/v1/TaskService/Tasks/12",
  "@odata.type": "#Task.v1_4_3.Task",
  "Id": "12",
  "TaskState": "Pending",
  "TaskStatus": "OK"
}
```

Tip

Record the returned task ID, in this example the task ID is 12.

2. To read the status of task 12:

```
root:~# curl -k -u root:'<password>' -H 'Content-Type: application/json' -X
GET https://<bmc_ip>/redfish/v1/TaskService/Tasks/12
```

Output example:

```
{
  "@odata.id": "/redfish/v1/TaskService/Tasks/12",
  "@odata.type": "#Task.v1_4_3.Task",
  "Id": "12",
  "Messages": [],
```

```
  "Name": "Task 12",
  "Payload": {
    "HttpHeaders": [
      "Host: <IP>",
      "User-Agent: curl/7.81.0",
      "Accept: */*",
      "Content-Length: 34"
    ],
    "HttpOperation": "POST",
    "JsonBody": "{\n  \"ResetKeysType\":
\"DeleteAllKeys\"\n}",
    "TargetUri":
"/redfish/v1/Systems/Bluefield/SecureBoot/SecureBootDatabases/
  },
  "PercentComplete": 0,
  "StartTime": "2023-09-05T16:47:05+00:00",
  "TaskMonitor": "/redfish/v1/TaskService/Tasks/12/Monitor",
  "TaskState": "Pending",
  "TaskStatus": "OK"
}
```

You can see that `TaskStatus` is `OK` and the `TaskState` is `Pending`. This indicates that the operation has successfully enqueued in the task service and is pending the next BlueField boot.

3. Issue the following graceful reset command to BlueField :

```
root:~# curl -k -u root:"<password>" -H "Content-Type:
application/json" -X POST
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Actions/Computer
-d '{"ResetType" : "GracefulRestart"}'
```

Output example:

```
{
  "@Message.ExtendedInfo": [
    {
      "@odata.type": "#Message.v1_1_1.Message",
      "Message": "The request completed successfully.",
      "MessageArgs": [],
      "MessageId": "Base.1.15.0.Success",
      "MessageSeverity": "OK",
      "Resolution": "None"
    }
  ]
}
```

UEFI reads the pending secure boot tasks and executes them.

4. Following BlueField reset, the UEFI updates the status of the operation on the `TaskState` and `TaskStatus` fields. Poll the task and check the values of `TaskState` and `TaskStatus`.

Success	`"TaskState": "Completed",` `"TaskStatus": "OK"`
Failure	`"TaskState": "Exception","TaskStatus": "OK"`

BIOS Configuration

BMC supports configuring the NVIDIA® BlueField®'s BIOS using Redfish commands.

Getting BIOS Attributes List

```
curl -k -u root:'<password>' -X GET
https://<bmc_ip>/redfish/v1/Registries/BiosAttributeRegistry/BiosA
```

Output example:

> **Info**
>
> In the following output, there is only one BIOS attribute, `UefiPassword`.


```
{
 "@odata.type": "#AttributeRegistry.v1_3_6.AttributeRegistry",
 "Description": "This registry defines a representation of BIOS
attribute instances",
 "Id": "BiosAttributeRegistry",
 "Language": "en",
 "Name": "BF2 BIOS Attribute Registry",
 "OwningEntity": "NVIDIA BlueField",
 "RegistryEntries": {
   "Attributes": [
     {
       "AttributeName": "UefiPassword",
```

```
        "CurrentValue": "",
        "DisplayName": "New UEFI Password",
        "DisplayOrder": 16,
        "HelpText": "Set the UEFI password.",
        "Hidden": false,
        "Immutable": false,
        "MaxLength": 50,
        "MenuPath": "./SystemConfiguration/UefiPassword",
        "MinLength": 0,
        "ReadOnly": false,
        "ResetRequired": false,
        "Type": "String",
        "WriteOnly": false
      }
    ],
    "Dependencies": [],
    "Menus": [
       {
        "DisplayName": "Set the UEFI Password.",
        "DisplayOrder": 18,
        "Hidden": false,
        "MenuName": "UefiPassword",
        "MenuPath": "./SystemConfiguration/UefiPassword",
        "ReadOnly": false
      }
    ]
  },
  "RegistryVersion": "1.0.0",
  "SupportedSystems": [
    {
      "FirmwareVersion": "BlueField:4.2.0-33-gbe969d4",
      "ProductName": "NVIDIA BF2",
      "SystemId": "BF2-DPU"
    }
  ]
}
```

Getting Current BIOS Attributes Value

```
curl -k -u root:'<password>' -X GET
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Bios/
```

Output example:

> **Info**
>
> The current value of `UefiPassword` is an empty string.

```
{
 "@Redfish.Settings": {
   "@odata.type": "#Settings.v1_3_5.Settings",
   "SettingsObject": {
     "@odata.id": "/redfish/v1/Systems/Bluefield/Bios/Settings"
   }
 },
 "@odata.id": "/redfish/v1/Systems/Bluefield/Bios",
 "@odata.type": "#Bios.v1_2_0.Bios",
 ...
 "Attributes": {
   "UefiPassword": ""
 },
 "Description": "BIOS Configuration Service",
 "Id": "BIOS",
 "Name": "BIOS Configuration",
 ...
```

```
}
```

Changing BIOS Attributes Value

The following command example requests changing the `UefiPassword` attribute to `NewPassword123`:

```
curl -k -u root:'<password>' -X PATCH
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Bios/Settings -d
'{Attributes:{<attribute Name> : <attribute Value>}}'
```

At the next boot cycle of the BlueField, the UEFI changes the requested attribute if the requested value is valid.

Getting Pending BIOS Attribute Values

```
curl -k -u root:'<password>' -X GET
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Bios/Settings
```

Pending values are a list of values that that user has requested to change. The list of pending values is purged once the UEFI changes the pending attributes.

Output example:

> **Info**
>
> `UefiPassword` appears in the pending attributes list.

```
{
```

```
 "@odata.id": "/redfish/v1/Systems/Bluefield/Bios/Settings",
 "@odata.type": "#Bios.v1_2_0.Bios",
 "Attributes": {
   "UefiPassword": "NewPassword123"
 },
 "Description": "BIOS Settings",
 "Id": "BIOS_Settings",
 "Name": "BIOS Configuration"
}
```

Info

The active BIOS attribute list is updated only after the UEFI approves the changes during the next reboot cycle.

BIOS Configuration Examples

Changing Default UEFI Password Using Redfish

1. Look for the "Attributes" property to make sure the UEFI version being used has all the necessary attributes. See section "Get BIOS Attributes List" for instructions.
2. Perform PATCH to BIOS pending settings URI as follows:

```
curl -k -u root:<password> -X PATCH -H "Content-Type:
application/json"
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Bios/Settings -
d '{"Attributes":
{"CurrentUefiPassword":"CurrentPassword","UefiPassword":"NewPa
```

3. Reboot BlueField using the Redfish System schema over 1GbE OOB to the BlueField BMC. See section "Reset Control" for instructions.

4. If `CurrentUefiPassword` is correct, then the UEFI password is updated during the UEFI Redfish phase of the boot.

BIOS CA Certificates

Viewing Currently Installed BIOS CA Certificates

> ⚠ **Warning**
>
> The certificates installed on the UEFI may differ from the certificate presented on the BlueField BMC. This discrepancy arises from a distinct certificate validation processed implemented in the UEFI and BlueField BMC.

1. Trigger the following GET request to view the content of the system's Truststore:

```
curl -k -u root:<password> -X GET
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia/Truststore/Certificates
```

For example, the following is the response when there are two certificates installed:

```
{
   "@Redfish.SupportedCertificates": [
      "PEM"
   ],
   "@odata.id": "/redfish/v1/Systems/Bluefield/Oem/Nvidia/Truststore/Certificates",
   "@odata.type": "#CertificateCollection.CertificateCollection",
   "Members": [
      {
         "@odata.id": "/redfish/v1/Systems/Bluefield/Oem/Nvidia/Truststore/Certificates/1"
```

```
        },
        {
            "@odata.id": "/redfish/v1/Systems/Bluefield/Oem/Nvidia/Truststore/Certificates/2"
        }
    ],
    "Members@odata.count": 2,
    "Name": "TruststoreBios Certificate Collection"
}
```


2. Trigger the following GET request to view the details of a specific certificate:

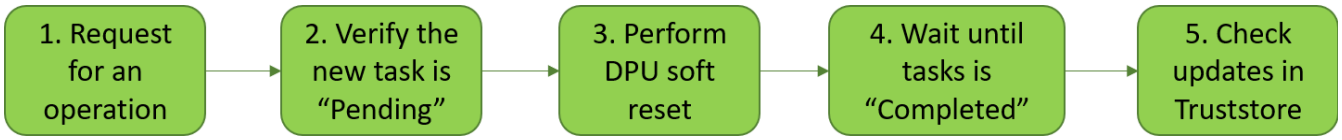
```
curl -k -u root:<password> -X GET
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia/Truststore/Certificates/<cert_num>
```

For example:


```
{
    "@odata.id": "/redfish/v1/Systems/Bluefield/Boot/Certificates/1",
    "@odata.type": "#Certificate.v1_7_0.Certificate",
    "CertificateString": "<cert_str>",
    "CertificateType": "PEM",
    "Id": "1",
    "Issuer": {
        "City": "Santa Clara",
        "CommonName": "Kg639IcpJtYMRzvh.nvidia",
        "Country": "US",
        "Organization": "NVIDIA",
        "OrganizationalUnit": "NBU",
        "State": "California"
    },
    "KeyUsage": [
        "CRLSigning"
    ],
```

```
  "Name" :  "TruststoreBios Certificate",
  "Subject" :  {
      "City" :  "Santa Clara",
      "CommonName" :  "Kg639IcpJtYMRzvh.nvidia",
      "Country" :  "US",
      "Organization" :  "NVIDIA",
      "OrganizationalUnit" :  "NBU",
      "State" :  "California"
  },
  "UefiSignatureOwner" :  "<UEFI_Owner>",
  "ValidNotAfter" :  "2043-01-01T00:00:00+00:00",
  "ValidNotBefore" :  "2023-01-01T00:00:00+00:00"
}
```

BIOS CA Certificates Collection Operations



1. Request for an operation:
    - To install a certificate, trigger the following POST request which contains the certificate string and type in JSON format:

> **Note**
>
> The BMC certificate must be replaced with a CA signed certificate before installing new CA certificates, and after BMC factory reset. See section "Example for CSR Generation, Certificate Creation and Replacement" for instructions.

> **Warning**
>
> If an invalid certificate is installed, the BMC rejects it and does not display it. However, it is still accepted by the UEFI and it must be deleted manually through the UEFI menu.

```
curl -k -u root:<password> -X POST
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia/T
-d @CAcert.json
```

The content of `CAcert.json` must be `{"CertificateString": "<cert_string>", "CertificateType": "<cert_type>"}`. Where:

-
  -
    - `cert_string` – certification string which starts with `-----BEGIN CERTIFICATE-----\n` and ends with `-----END CERTIFICATE-----\n`.

      > **Note**
      >
      > The "\n" at the end are mandatory.

    - `cert_type` – certification type. Only "PEM" is supported.

1.

- To delete a CA certificate, trigger the following `DELETE` request with the CA certificate URI that should be deleted, this only delete it from the BMC trust store:

```
curl -k -u root:<password> -H "Content-Type:
application/json" -X DELETE
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia/T
```

- To reset all certificates in the Truststore, trigger the following `TruststoreCertificates.ResetKeys` action with the `DeleteAllKeys` option:

```
curl -k -u root:<password> -H "Content-Type: application/json" -
X POST
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Oem/Nvidia/Actions/TruststoreCertificates.Re
-d '{"ResetKeysType":"DeleteAllKeys"}'
```

2. Verify the new task is `Pending`:

   The responses of these requests indicate the creation of a new task for the UEFI:

```
{
  "@odata.id": "/redfish/v1/TaskService/Tasks/<task_id>",
  "@odata.type": "#Task.v1_4_3.Task",
  "Id": "<task_id>",
  "TaskState": "Pending",
  "TaskStatus": "OK"
}
```

3. Perform BlueField soft reset in order for the UEFI to start handling the pending tasks:

```
curl -k -u root:<password> -H "Content-Type:
application/json" -X POST
https://<bmc_ip>/redfish/v1/Systems/Bluefield/Actions/Computer
-d '{"ResetType" : "GracefulRestart"}'
```

4. Wait until task is `Completed`.

   The task details and status can be checked using the following `GET` request:

   ```
   curl -k -u root:<password> -H "Content-Type:
   application/json" -X GET
   https://<bmc_ip>/redfish/v1/TaskService/Tasks/<task_id>
   ```

   The task status can be either:

   - Pending – Initial state.

     ```
     {
       "@odata.id": "/redfish/v1/TaskService/Tasks/<task_id>",
       "@odata.type": "#Task.v1_4_3.Task",
       ...
       "PercentComplete": 0,
       ...
       "TaskState": "Pending",
       "TaskStatus": "OK"
     }
     ```

     If the task remains in a "Pending" state after BlueField reset completes, please check the UEFI-BMC communication.

     If a communication failure occurs, consider either:

- Replacing the BMC certificate with one signed by a CA whose certificate was installed and resetting BlueField
- Removing all CA certificates from the UEFI menu

- Completed – Finished state.

```
{
   "@odata.id":  "/redfish/v1/TaskService/Tasks/<task_id>",
   "@odata.type":  "#Task.v1_4_3.Task",
   . . .
   "PercentComplete":  100,
   . . .
   "TaskState":  "Completed",
   "TaskStatus":  "OK"
}
```

- Exception – Failure state.

```
{
   "@odata.id":  "/redfish/v1/TaskService/Tasks/<task_id>",
   "@odata.type":  "#Task.v1_4_3.Task",
   . . .
   "PercentComplete":  0,
   . . .
   "TaskState":  "Exception",
   "TaskStatus":  "OK"
}
```

  In this case, verify that the certificate is valid.

5. Check updates in Truststore. See section "Viewing Currently Installed BIOS CA Certificates" for details.

BIOS Attributes

For a full list of the BIOS attributes, please refer to the "Redfish" section of the NVIDIA BlueField BSP documentation.

BIOS Debug Mode

BIOS debug mode allows users to view the UEFI debug logs when the BlueField Arm OS is booting up.

- To enable the logs, run:

  ```
  ipmitool raw 0x3e 0x24 0x1
  ```

  Returns 01 if successful.

- To disable debug mode, run:

  ```
  ipmitool raw 0x3e 0x24 0x0
  ```

  Returns 00 if successful.

- To query the current applied mode, run:

  ```
  ipmitool raw 0x3e 0x24 0x2
  ```

  Returns:

  - 00 – Normal (default) mode
  - 01 – Debug mode

After setting your desired mode, reset the BlueField Arm OS to view the logs.

Power cycling the system or hard resetting the BlueField SoC resets the BIOS mode value back to its default normal mode.

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