

Power Systems

*Managing Power Systems servers by  
using DMTF Redfish APIs*

**IBM**



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**Note**

Before using this information and the product it supports, read the information in “Safety notices” on page v, “Notices” on page 7, the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

This edition applies to IBM Power Systems servers that contain the POWER8® processor and to all associated models.

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## Safety notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

## World Trade safety information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, safety information documentation is included in the publications package (such as in printed documentation, on DVD, or as part of the product) shipped with the product. The documentation contains the safety information in your national language with references to the U.S. English source. Before using a U.S. English publication to install, operate, or service this product, you must first become familiar with the related safety information documentation. You should also refer to the safety information documentation any time you do not clearly understand any safety information in the U.S. English publications.

Replacement or additional copies of safety information documentation can be obtained by calling the IBM Hotline at 1-800-300-8751.

## German safety information

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

## Laser safety information

IBM® servers can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

### Laser compliance

IBM servers may be installed inside or outside of an IT equipment rack.

**DANGER:** When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
  - For AC power, disconnect all power cords from their AC power source.
  - For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected.

- For racks with AC power, connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements.
- Do not continue with the inspection if any unsafe conditions are present.
- Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.

**DANGER:**

- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect:

1. Turn off everything (unless instructed otherwise).
2. For AC power, remove the power cords from the outlets.
3. For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source.
4. Remove the signal cables from the connectors.
5. Remove all cables from the devices.

To Connect:

1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. For AC power, attach the power cords to the outlets.
5. For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP.
6. Turn on the devices.

Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

**(R001 part 1 of 2):**

**DANGER:** Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).





- Each rack cabinet might have more than one power cord.
  - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
  - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

**(R001 part 2 of 2):**

**CAUTION:**

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers.)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.



- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

**CAUTION:**

Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building.

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
  - Remove all devices in the 32U position (compliance ID RACK-001 or 22U (compliance ID RR001) and above.
  - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
  - Ensure that there are little-to-no empty U-levels between devices installed in the rack cabinet below the 32U (compliance ID RACK-001 or 22U (compliance ID RR001) level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
  - Lower the four leveling pads.
  - Install stabilizer brackets on the rack cabinet.
  - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

(L001)



**DANGER:** Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

(L002)



**DANGER:** Rack-mounted devices are not to be used as shelves or work spaces. (L002)

(L003)



or



or



or



or



**DANGER:** Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

(L007)



**CAUTION:** A hot surface nearby. (L007)

(L008)



**CAUTION:** Hazardous moving parts nearby. (L008)

All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

**CAUTION:**

This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

(C026)

**CAUTION:**

Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. Although shining light into one end and looking into the other end of a disconnected optical fiber to verify the continuity of optic fibers may not injure the eye, this procedure is potentially dangerous. Therefore, verifying the continuity of optical fibers by shining light into one end and looking at the other end is not recommended. To verify continuity of a fiber optic cable, use an optical light source and power meter. (C027)

**CAUTION:**

This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

**CAUTION:**

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

**CAUTION:**

The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

*Do Not:*

- \_\_\_ Throw or immerse into water
- \_\_\_ Heat to more than 100°C (212°F)
- \_\_\_ Repair or disassemble

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

## CAUTION:

Regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only.
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers).
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's web site.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads.
- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against LIFT TOOL.
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning LIFT TOOL machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave LIFT TOOL machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048)

## **Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE**

The following comments apply to the IBM servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE:

The equipment is suitable for installation in the following:

- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metalically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metalically to OSP wiring.

**Note:** All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

The dc-powered system is intended to be installed in a common bonding network (CBN) as described in GR-1089-CORE.





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# Managing Power Systems servers by using DMTF Redfish APIs

The FSP-based Power Systems™ servers can be managed by using the DMTF Redfish APIs.

## Overview

Redfish is a REST API used for platform management and is standardized by the Distributed Management Task Force, Inc. (<http://www.dmtf.org/standards/redfish>).

Redfish enables platform management tasks to be controlled by client scripts that are developed by using secure and modern programming paradigms.

The Redfish API enables provisioning of tunable parameters for better utilization of power.

IBM Power Systems servers support DMTF Redfish API (DSP0266, version 1.0.3, published on 17 June 2016) for systems management.

A copy of the Redfish schema files that are in JSON format are published by DMTF (<http://redfish.dmtf.org/schemas/v1/>) and are packaged in the firmware image.

The schema files that are distributed in the chip enable proper functioning of the APIs in deployments that have no wide area network (WAN) connectivity.

**Note:** The Redfish API is enabled by default and the Redfish service cannot be enabled or disabled by the user.

## Firmware levels

Redfish APIs are supported on Flexible Service Processor (FSP) firmware level FW860.20, and later.

## Communication prerequisites for Redfish on Power Systems servers

Depending on the current firmware level and network deployment, complete the following prerequisite tasks:

- Upgrade the server firmware level to FW860.20.
- Identify the IP address of the FSP (for example, this information can be deciphered from the connected HMC).
- Set up the SSH tunnel to the FSP through the HMC.
- Install and run cURL (<https://curl.haxx.se/>) with the method, Uniform Resource Indicator (URI), and the request body as parameters to communicate with the Redfish service.
- Install Python on the client system (typically a Linux host).
- Optionally, install and run DMTF Redfishtool (<https://github.com/DMTF/Redfishtool>).

## Setting up the SSH tunnel

The following example shows the commands that are used to set up the SSH tunnel (local port forwarding) from a client (IP address 9.193.126.186) to the FSP (IP address 9.3.19.141) through the HMC (IP address 9.126.138.108):

```
Argus$ ssh -L 9000:9.3.19.141:443 hscpe@9.126.138.108
hscpe@9.126.138.108's password:
Last login: Wed Feb 08 11:29:20 2017 from 9.193.126.186
```

For more information about scripting commands over an SSH tunnel, see [Opening and closing an SSH tunnel in a shell script the smart way](#).

Instead of sending the Redfish requests to the IP address of the FSP, set up the SSH tunnel as described in this topic and send the request to the mapped port (9000) on the client (IP address 9.193.126.186). The domain of the URI for the Redfish requests must be 9.193.126.186:9000 for this example.

## Interacting with the Redfish service

To interact with the Redfish service, complete the following steps.

1. Create an authenticated login session (POST method on the `/redfish/v1/SessionService/Sessions` resource).
2. Extract and save the following details:
  - Authentication token (found in the **X-Auth-Token** header of the response)
  - Session URI (found in the **Location** header of the response)
3. To read the properties of a resource, send a **GET** request with the **X-Auth-Token** header for the URI of the resource.
4. To set a property of a resource, send a **PATCH** request with the **X-Auth-Token** header for the URI of the resource, the property name, type, and value encoded as a JSON body.
5. Extract and parse the response from the Redfish service containing the JSON body.

## Redfish service home page URI

The Redfish service home page URI (also known as the service ROOT) can be accessed by retrieving the URI: `https://<ip:port>/redfish/v1`. The response to this URI is a high-level site map that enables a traversal of the Redfish service by using a hypermedia API paradigm.

## Interpreting the data returned by the Redfish service

The format and structure of the data is defined in the schema files. Schema files are JSON files that describe the data that is sent by the Redfish service. You can use the schema files to understand the data that is sent by the Redfish service and to validate the response that is sent by the Redfish service.

## Location of the schema files

DMTF publishes the schema files for the standard data that is used in Redfish.

The Redfish schema files in JSON format are hosted in the DMTF schema repository at <http://redfish.dmtf.org/schemas/v1/>

IBM publishes the schema files for original equipment manufacturer (OEM) extensions to the Redfish schema (for example, the EnergyScale™ extension for better utilization of power).

The OEM schema files that are published by IBM are identified by the file name prefix of `IBMEnterprise` in the namespace of the schema. For example, `IBMEnterpriseEnergyScale.v1_0_0.json`.

OEM schema files that are published by IBM can be downloaded from the IBM Schema repository at <http://public.dhe.ibm.com/systems/power/redfish/schemas/v1/>.

## Validating the response (JSON body) returned by the Redfish service

Response that is returned by the Redfish service contains the `@odata.type` property. The value of the property `@odata.type` in the response is a string of the format `*#<namespace>.<type>`, where the `<namespace>` is of the format `<name>.<ver>`.

When the namespace contains the prefix `IBMEnterprise`, the namespace is an OEM type that is defined by IBM and its schema file can be downloaded from the IBM schema repository.

When the namespace does not contain the prefix `IBMEnterprise`, the namespace is a standard type that is defined by DMTF and its schema file can be downloaded from the DMTF schema repository.

## Resources supported by the Redfish service

In firmware level that is at level FW860.30, the following resources are modeled in the Redfish implementation:

- Service
  - Service Root: `https://<ip:port>/redfish/v1`
  - Session Service: `https://<ip:port>/redfish/v1/SessionService`
  - Session Collection: `https://<ip:port>/redfish/v1/SessionService/Sessions`
  - Session Resource: `https://<ip:port>/redfish/v1/SessionService/Sessions/<id>`
  - System Collection: `https://<ip:port>/redfish/v1/Systems`
  - System Resource: `https://<ip:port>/redfish/v1/Systems/<server-id>`
  - EnergyScale : `https://<ip:port>/redfish/v1/Systems/<server-id>/EnergyScale`

**Note:** Where:

- *ip* is the IP address of the FSP or the localhost IP address of the SSH tunnel
- *port* is the default HTTPS port (443) or the local port of the SSH tunnel
- *id* is the session identifier
- *server-id* is the server name that is returned by the Redfish service. The server name is a part of the **@odata.id** parameter value that is included in the response to the request for the Systems Collection. In the following example, the server name is `Server-8408-E8E-1067A9V` in the **@odata.id** parameter: `"@odata.id": "/redfish/v1/Systems/Server-8408-E8E-1067A9V"`
- *chassis-id* is the serial number of the CEC enclosure

- Chassis
  - Chassis Collection: `https://<ip:port>/redfish/v1/Chassis`
  - Chassis Resource: `https://<ip:port>/redfish/v1/Chassis/<chassis-id>`
  - Thermal Resource: `https://<ip:port>/redfish/v1/Chassis/<chassis-id>/Thermal`

**Note:** Fan status is available under the Thermal Resource.

- Power Resource: `https://<ip:port>/redfish/v1/Chassis/<chassis-id>/Power`

**Note:** Power supply status is available under the Power Resource.

**Note:** Where:

- *ip* is the IP address of the FSP or the localhost IP address of the SSH tunnel
- *port* is the default HTTPS port (443) or the local port of the SSH tunnel
- *chassis-id* is the serial number of the CEC enclosure

- Processor
  - Processor Collection: `https://<ip:port>/redfish/v1/Systems/<server-id>/Processors`

- Processor Resource: `https://<ip:port>/redfish/v1/Systems/<server-id>/Processors/<proc-id>`
- Core Resource: `https://<ip:port>/redfish/v1/Systems/<server-id>/Processors/<proc-id>/Cores/<core-id>`

**Note:** Where:

- *ip* is the IP address of the FSP or the localhost IP address of the SSH tunnel
- *port* is the default HTTPS port (443) or the local port of the SSH tunnel
- *server-id* is the server name that is returned by the Redfish service. The server name is a part of the **@odata.id** parameter value that is included in the response to the request for the Systems Collection. In the following example, the server name is Server-8408-E8E-1067A9V in the **@odata.id** parameter: `"@odata.id": "/redfish/v1/Systems/Server-8408-E8E-1067A9V"`
- *proc-id* is the unique identifier of the processor
- *core-id* is the unique identifier of the core in the specific processor
- Manager Collection: `https://<ip:port>/redfish/v1/Managers`
- FSP Resource: `https://<ip:port>/redfish/v1/Managers/BMC`
- FSP eth0 Interface: `https://<ip:port>/redfish/v1/Managers/BMC/EthernetInterfaces/ETH_0`

## Accessing the common system management functions on the Redfish service by using cURL command

The following examples show the cURL commands that can be used to access the common functions that are supported by the FSP.

- To log in and create a secure connection with the Redfish service, run the following command:

```
curl -X POST -D headers.txt https://<ip:port>/redfish/v1/SessionService/Sessions
-d '{"UserName":"admin", "Password":"admin"}'
```

Where *ip* is the IP address of the FSP and *port* is the default port of the ASMI. After the user logs in, value of the **X-Auth-Token** header must be saved for requests that might require authentication, and the value **Location** header must be saved because it is the unique URI for the session and these values are required to log off from the session.

- To read the Service Root document, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X GET https://<ip:port>/redfish/v1/
```

- To read the collection of System ID at this instance, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X GET https://<ip:port>/redfish/v1/Systems
```

- To read the System information, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X GET https://<ip:port>/redfish/v1/Systems/<system-id>
```

Where *system-id* is the machine type and model (MTM) of the system and the serial number. The format for *system-id* is *Server-MTM-SerialNumber*. To get the *system-id*, perform the **GET** operation on the System collection resource.

- To modify the number of slots that are enabled for Enlarged Capacity I/O in the node or chassis, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X PATCH https://<ip:port>/redfish/v1/Chassis/
<chassis-id>; -d '{"Oem" : {"IBMEnterpriseChassis" : {"HugeDynamicDMAWindowSlotCount" : "9"}}}'
```

- To modify the power saver parameters for CPU that is in idle state, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X PATCH https://<ip>/redfish/v1/Systems/
<system-id>/EnergyScale -d '{
  "CPUIdlePowerSaver": {
    "DelayTimeEnter": 150,
```

```
"DelayTimeExit": 5,  
"State": "Enabled",  
"UtilizationThresholdEnter": 22,  
"UtilizationThresholdExit": 30  
}}'
```

Where *chassis-id* is the serial number of the CEC enclosure. To get the *chassis-id*, perform the **GET** operation on the Chassis collection resource.

- To power on the system, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X POST https://<ip:port>/redfish/v1/Systems/  
<system-id>/Actions/Reset -d '{"ResetType":"On"}'
```

- To power off the system, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X POST https://<ip:port>/redfish/v1/Systems/  
<system-id>/Actions/Reset -d '{"ResetType":"ForceOff"}'
```

- To log off or terminate the Redfish session, run the following command:

```
curl -k -H "X-Auth-Token: <authtoken>" -X DELETE https://<ip:port>/redfish/v1/SessionService/  
Sessions/<id>;
```

## EnergyScale schema

EnergyScale schema is an OEM extension to Redfish schema that enables the configuration of tunable parameters for better utilization of power in IBM Power Systems servers.



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## Accessibility features for IBM Power Systems servers

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

### Overview

The IBM Power Systems servers include the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

The IBM Power Systems servers use the latest W3C Standard, WAI-ARIA 1.0 ([www.w3.org/TR/wai-aria/](http://www.w3.org/TR/wai-aria/)), to ensure compliance with US Section 508 ([www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards](http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards)) and Web Content Accessibility Guidelines (WCAG) 2.0 ([www.w3.org/TR/WCAG20/](http://www.w3.org/TR/WCAG20/)). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

The IBM Power Systems servers online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the Accessibility section of the IBM Knowledge Center help ([www.ibm.com/support/knowledgcenter/doc/kc\\_help.html#accessibility](http://www.ibm.com/support/knowledgcenter/doc/kc_help.html#accessibility)).



## Keyboard navigation

This product uses standard navigation keys.

## Interface information

The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Power Systems servers web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Power Systems servers web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

## Vendor software

The IBM Power Systems servers include certain vendor software that is not covered under the IBM license agreement. IBM makes no representation about the accessibility features of these products. Contact the vendor for accessibility information about its products.

## Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service  
800-IBM-3383 (800-426-3383)  
(within North America)

For more information about the commitment that IBM has to accessibility, see IBM Accessibility ([www.ibm.com/able](http://www.ibm.com/able)).

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## Electronic emission notices

When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices supplied with the monitor.

## Class A Notices

The following Class A statements apply to the IBM servers that contain the POWER8 processor and its features unless designated as electromagnetic compatibility (EMC) Class B in the feature information.

## Federal Communications Commission (FCC) Statement

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Industry Canada Compliance Statement

CAN ICES-3 (A)/NMB-3(A)

## European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot

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European Community contact:  
IBM Deutschland GmbH  
Technical Regulations, Abteilung M456  
IBM-Allee 1, 71139 Ehningen, Germany  
Tel: +49 800 225 5426  
email: halloibm@de.ibm.com

**Warning:** This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

### VCCI Statement - Japan

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### Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

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This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement explains the JEITA statement for products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 6 (単相、PFC回路付)
- 換算係数 : 0

This statement explains the JEITA statement for products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 5 (3相、PFC回路付)
- 換算係数 : 0

### Electromagnetic Interference (EMI) Statement - People's Republic of China

声 明

此为 A 级产品,在生活环境中,该产品可能会造成无线电干扰。在这种情况下,可能需要用户对其干扰采取切实可行的措施。

Declaration: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may need to perform practical action.

### Electromagnetic Interference (EMI) Statement - Taiwan

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這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

The following is a summary of the EMI Taiwan statement above.

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**IBM Taiwan Contact Information:**

台灣IBM 產品服務聯絡方式：  
台灣國際商業機器股份有限公司  
台北市松仁路7號3樓  
電話：0800-016-888

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**Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten**

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**Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse A**

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New Orchard Road

Armonk, New York 10504  
Tel: 914-499-1900

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Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 / EN 55032 Klasse A.

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The following Class B statements apply to features designated as electromagnetic compatibility (EMC) Class B in the feature installation information.

### **Federal Communications Commission (FCC) Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM-authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Industry Canada Compliance Statement

CAN ICES-3 (B)/NMB-3(B)

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### Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

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仕様ページ参照

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

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This statement explains the JEITA statement for products greater than 20 A, single phase.

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台灣國際商業機器股份有限公司  
台北市松仁路7號3樓  
電話：0800-016-888

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**Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse B**

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Tel: 914-499-1900

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