



Dell Power Edge M1000e Chassis Management Controller Version 4.5 - Extended Power Performance Using 3000W AC PSU

This technical brief highlights the Extended Power Performance using 3000W AC PSU in CMC 4.5

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1 Introduction

This whitepaper provides an overview of the Extended Power Performance (EPP) feature enabled on 3000W AC Power Supplies.

1.1 What is Extended Power Performance

The Extended Power Performance (EPP) feature is a new feature released in Chassis Management Controller (CMC) Version 4.5, which allows increased power allocations in the PowerEdge M1000e modular chassis to support high-end servers. This feature enables the power allocated to exceed the redundant power capability of the Grid Redundant power supply configuration by up to 30% with all six 3000W AC power supplies.

1.2 Why EPP - Extended Power Performance on 3000W PSUs

Prior to CMC 4.5, the highest rated Power Supply Unit (PSU) supported in the M1000e chassis is the 2700W PSU. When customers select the Grid Redundancy policy, the M1000e chassis can have up to 7602W of DC power for the servers and infrastructure. Due to power constraints, manufacturing is unable to ship M1000e chassis configurations of more than 16 M420 servers, or more than 7 M910 server configurations to the customer. The redundant power demands of the full configuration of current generation of servers have far exceeded the redundant power capabilities of the M1000e modular power subsystem.

The new 3000W AC PSUs provides a solution to customers to support their high-end server configurations in the M1000e Chassis. The Extended Power Performance (EPP) feature allows power allocations by up to 130% when the Power subsystem is configured for Grid redundancy mode. The EPP feature is applicable only when there are 6 power supply units, all power supply units are 3000W AC, and Redundancy Policy is set to Grid Redundancy.



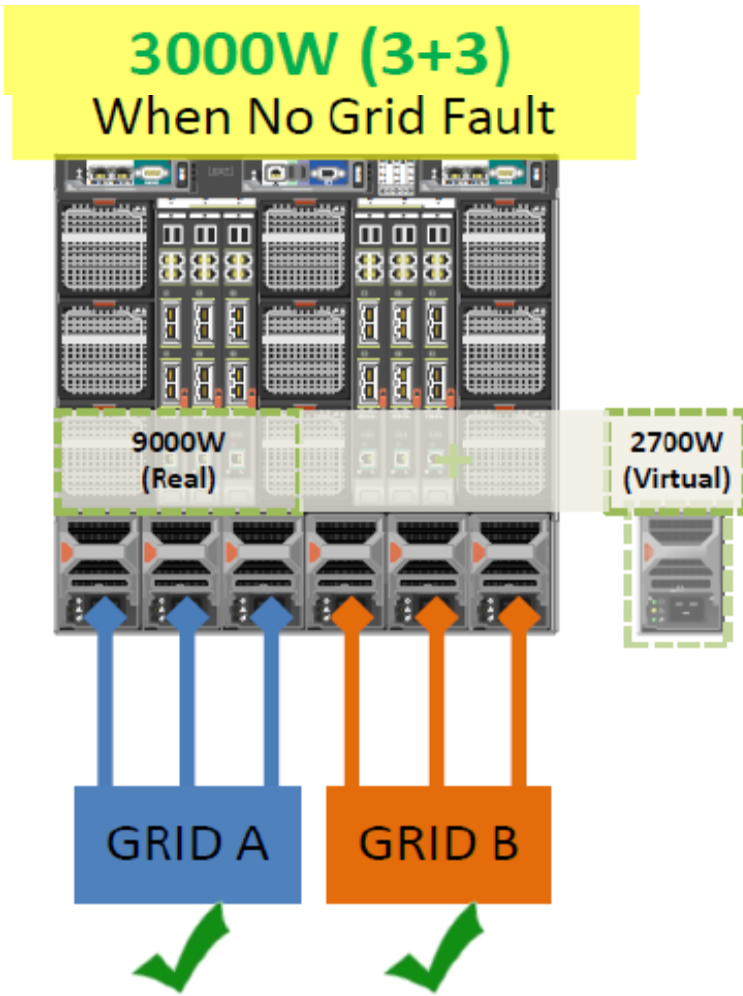


Figure 1 EPP Feature adds 30% Virtual Power in Six PSU Configuration (Extended Power Performance Enabled)

EPP feature shall not allow any additional servers to power up compared to a configuration without EPP enabled on the 3000W AC power supply configuration. The additional power gained by upgrading power supplies from 2360W, or 2700W, to 3000W is available to power on additional servers. The additional EPP power pool is available only to increase the performance of the existing servers.

Figure 2 EPP – Two levels of power gain, illustrates two levels of power gain. The first level of power gain of 1038W is from the aggregate capacity gain from moving from three 2700W PSUs to three 3000W PSUs. This first level of power gain is available for powering on additional servers. The second level is a power gain of 2700W increasing the power gain for server performance by 30%. The two levels when combined give a total power gain of 3738W (1038W + 2700W) in GRID redundancy.



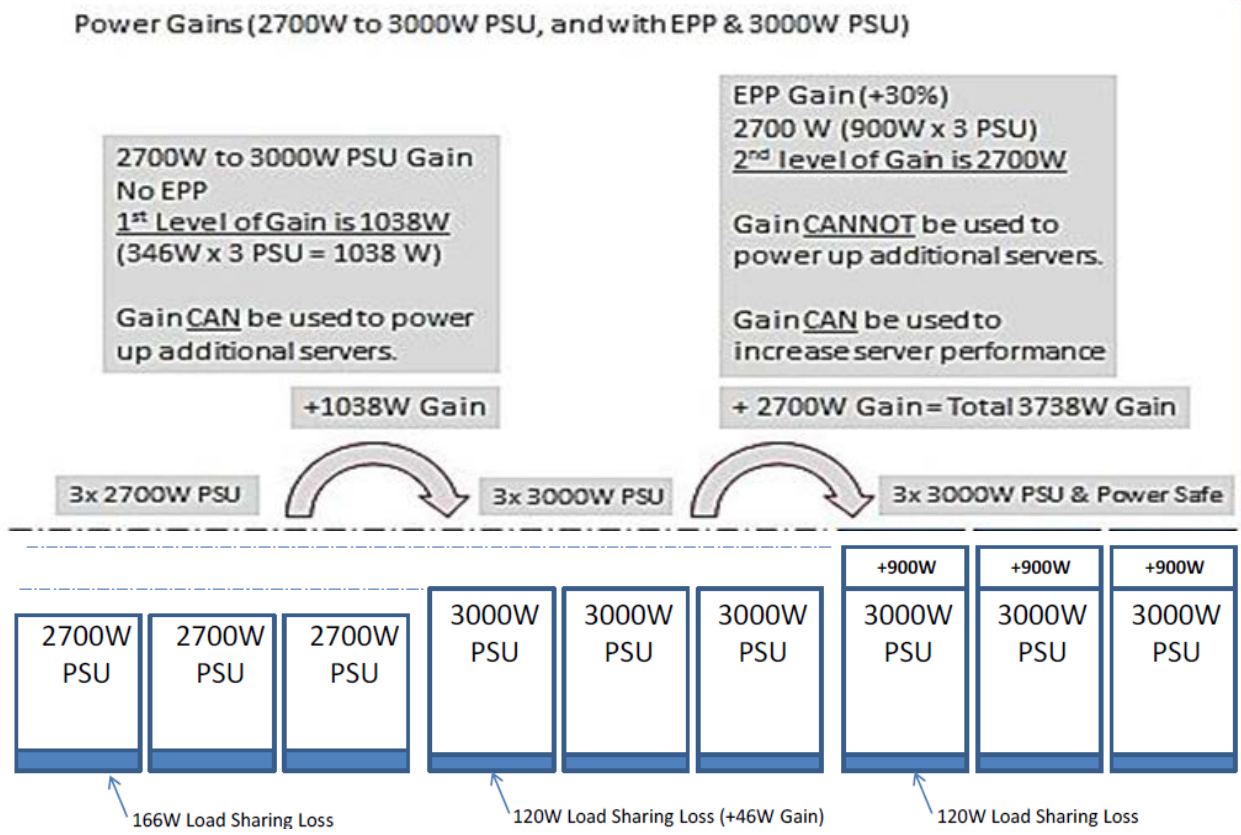


Figure 2 EPP – Two levels of power gain



2 Managing EPP features on CMC interfaces

This feature can be managed through the CMC Web interface and RACADM interface.

The CMC Web interface supports the EPP feature for the following:

- EPP feature control (Enable/Disable) using **Chassis Power Configuration** page.
- EPP Status using **Chassis Home Page**
- EPP Power Monitoring and Statistics
- EPP status updates captured in CMC Log

CMC RACADM CLI Interface support shall be available for the following:

- EPP feature control (Enable/Disable) using **racadm getconfig/config**
- EPP status using **racadm getpbinfo**
- Error Reporting using **racadm getpbinfo**
- EPP status updates captured in RAC Log

2.1 Managing EPP feature using the Web Interface:

The following sections describe how to manage the EPP feature on the CMC Web Interface.

2.1.1 EPP Configuration and Control

The Power Configuration page on the Web interface allows a user to enable or disable the EPP feature using the check box. Configurations consisting of six 3000W AC PSUs are shipped from the factory with the EPP feature enabled, as factory default.



Properties Setup **Power** Logs Network User Authentication Alerts Troubleshooting Update Security

Power Monitoring Configuration Budget Status Control

Budget/Redundancy Configuration

Information

- Setting changes on this page may not be reflected immediately. Refreshing the page after an appropriate delay will display the new values.
- Remote Power logging requires Remote SysLog to be enabled. See Network Services for more information.
- Extended Power Performance is enabled. This restricts other power options. For full details see [Help](#).

Attribute	Value
Enable Server Based Power Management	<input type="checkbox"/>
System Input Power Cap (0-16% = 2715W - 100% = 16685W)	<input type="text" value="16685"/> W <input type="text" value="56931"/> BTU/h <input type="text" value="100"/> %
Redundancy Policy	<input type="text" value="Grid Redundancy"/> ▾
Enable Extended Power Performance	<input checked="" type="checkbox"/>
Enable Server Performance Over Power Redundancy	<input type="checkbox"/>
Enable Dynamic Power Supply Engagement	<input type="checkbox"/>
Disable Chassis Power Button	<input type="checkbox"/>
Allow 110 VAC Operation	<input type="checkbox"/>
Enable Max Power Conservation Mode	<input type="checkbox"/>
Enable Remote Power Logging	<input checked="" type="checkbox"/> Remote SysLog Configuration
Remote Power Logging Interval (1-1440)	<input type="text" value="5"/> Minutes

Cancel Apply

Figure 3 EPP feature control

2.1.2 EPP Feature Status

The Chassis Health page on the Web interface allows you to view the EPP status. The Power section displays one of the following status states:

- Disabled
- Enabled"(active)
- Enabled"(inactive)
- Enabled"(unsupported)



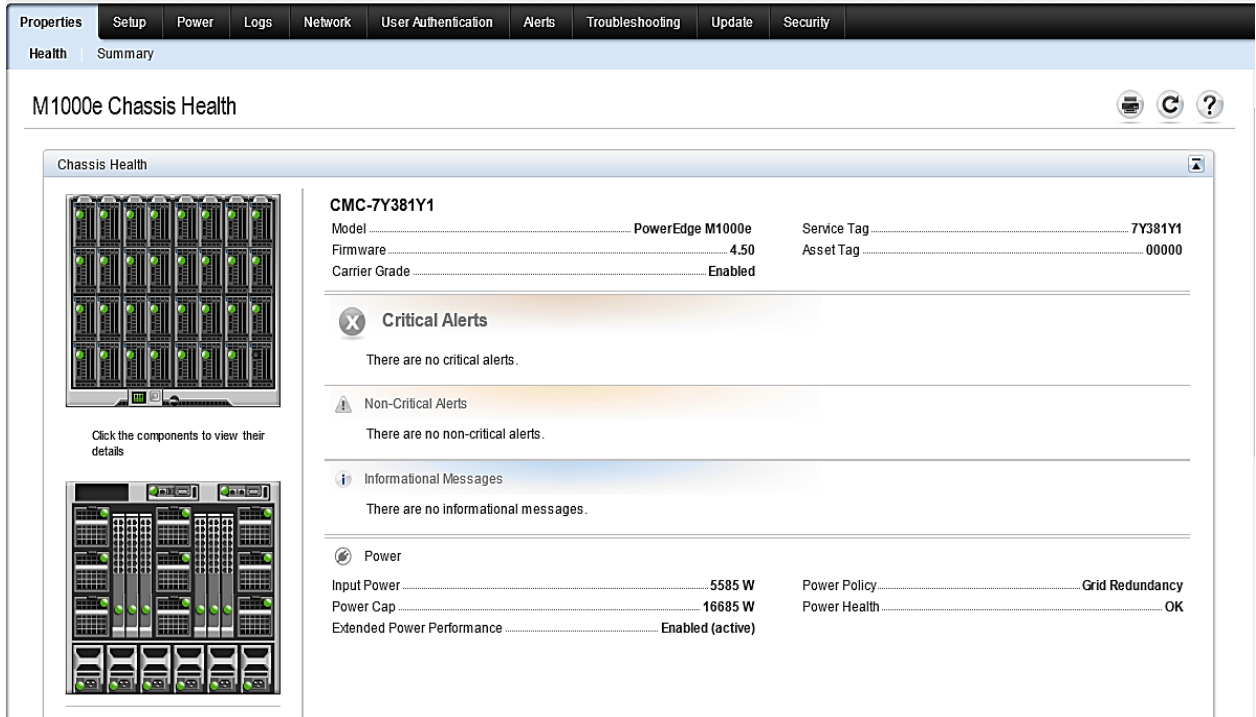


Figure 4 EPP feature status on Chassis Health page

2.1.3 EPP Power Monitoring and Statistics

The Power Monitoring page on the Web interface allows you to monitor the EPP feature statistics. The following figures illustrate the statistics displayed for the various EPP status states:



EPP Disabled:

Power Monitoring		Configuration	Budget Status	Control
Peak System Power	7662 W (26143 BTU/h)			
Peak System Power Start Time	11:28:27 09/03/2013			
Peak System Power Timestamp	17:19:21 09/03/2013			
Minimum System Power	646 W (2204 BTU/h)			
Minimum System Power Start Time	11:28:27 09/03/2013			
Minimum System Power Timestamp	14:04:25 09/03/2013			
System Idle Power	7120 W (24294 BTU/h)			
System Potential Power	12051 W (41119 BTU/h)			
System Input Current Reading	35.1 A			
Reset Peak/Min. Power Statistics				

Real-Time Energy Statistics ▲ Back to top

Attribute	Value
System Energy Consumption	6617.0 kWh
System Energy Consumption Start Time	13:20:47 07/03/2013
System Energy Consumption Timestamp	14:14:23 09/04/2013
Reset Energy Statistics	

Extended Power Performance ▲ Back to top

Status	Available Power in EPP Pool	Used Power in EPP Pool	EPP % Available
Disabled	0 W (0 BTU/h)	0 W (0 BTU/h)	0%

Figure 5 EPP Disabled Status on Power Monitoring Page.



EPP Enabled (active):

The screenshot shows the Power Monitoring page with the following data:

Attribute	Value
Minimum System Power Start Time	11:28:27 09/03/2013
Minimum System Power Timestamp	14:04:25 09/03/2013
System Idle Power	7204 W (24581 BTU/h)
System Potential Power	12051 W (41119 BTU/h)
System Input Current Reading	36.2 A

Real-Time Energy Statistics

Attribute	Value
System Energy Consumption	6615.9 kWh
System Energy Consumption Start Time	13:20:47 07/03/2013
System Energy Consumption Timestamp	14:05:28 09/04/2013

Extended Power Performance

Status	Available Power in EPP Pool	Used Power in EPP Pool	EPP % Available
Enabled (active)	1684 W (5746 BTU/h)	1483 W (5060 BTU/h)	53%

Figure 6 EPP Enabled (active) Status on Power Monitoring Page.

EPP Enabled (inactive):

The screenshot shows the Power Monitoring page with the following data:

Attribute	Value
Peak System Power	7662 W (26143 BTU/h)
Peak System Power Start Time	11:28:27 09/03/2013
Peak System Power Timestamp	17:19:21 09/03/2013
Minimum System Power	646 W (2204 BTU/h)
Minimum System Power Start Time	11:28:27 09/03/2013
Minimum System Power Timestamp	14:04:25 09/03/2013
System Idle Power	725 W (2473 BTU/h)
System Potential Power	2658 W (9069 BTU/h)
System Input Current Reading	4.1 A

Real-Time Energy Statistics

Attribute	Value
System Energy Consumption	6617.2 kWh
System Energy Consumption Start Time	13:20:47 07/03/2013
System Energy Consumption Timestamp	14:17:29 09/04/2013

Extended Power Performance

Status	Available Power in EPP Pool	Used Power in EPP Pool	EPP % Available
Enabled (inactive)	3167 W (10806 BTU/h)	0 W (0 BTU/h)	100.0%

Figure 7 EPP Enabled (inactive) Status on Power Monitoring Page



EPP Enabled (unsupported):

The screenshot shows the Power Monitoring page with the following sections:

- Power Monitoring** (Configuration, Budget Status, Control):

Attribute	Value
System Input Power	5087 W (17357 BTU/h)
Peak System Power	5689 W (19411 BTU/h)
Peak System Power Start Time	15:10:37 01/03/2014
Peak System Power Timestamp	15:17:52 01/03/2014
Minimum System Power	5082 W (17340 BTU/h)
Minimum System Power Start Time	15:10:37 01/03/2014
Minimum System Power Timestamp	15:49:12 01/03/2014
System Idle Power	5087 W (17357 BTU/h)
System Potential Power	12124 W (41368 BTU/h)
System Input Current Reading	25.2 A
- Real-Time Energy Statistics** (Back to top):

Attribute	Value
System Energy Consumption	3936.7 kWh
System Energy Consumption Start Time	22:39:16 10/06/2013
System Energy Consumption Timestamp	15:51:45 01/03/2014
- Extended Power Performance** (Back to top):

Status	Available Power in EPP Pool	Used Power in EPP Pool	EPP % Available
Enabled (unsupported)	⚠ This feature is not supported while Max Power Conservation Mode is enabled.		

Figure 8 EPP Enabled (unsupported) Status on Power Monitoring Page

2.1.4 EPP Error Reporting

The Power Monitoring page on the Web interface allows you to view the EPP feature errors for the unsupported EPP status states:

EPP Enabled (unsupported):

Enabled (unsupported)	⚠ This feature is not supported while Max Power Conservation Mode is enabled.
-----------------------	---

Figure 9 Error Message describing why EPP is unsupported

EPP Enabled (unsupported – multiple reasons)

Enabled (unsupported)	⚠ This feature is not supported while Max Power Conservation Mode is enabled. ⚠ This feature is not supported while PSU slot empty: PSU Slot <#>
-----------------------	---

Figure 10 Multiple unsupported reasons describing why EPP is not supported.

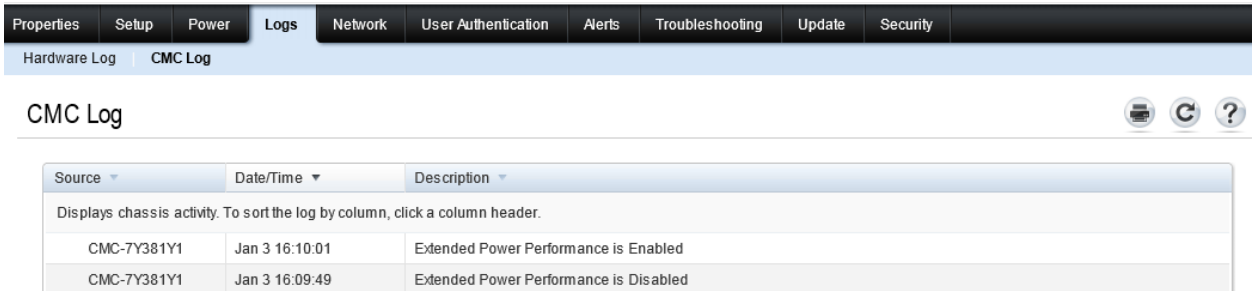


EPP Disabled:

Disabled	0 W (0 BTU/h)	0 W (0 BTU/h)	0%
----------	---------------	---------------	----

Figure 11 When EPP is disabled.

To view the EPP feature control related logs from CMC Web Interface, go to Logs and CMC logs:



Source	Date/Time	Description
Displays chassis activity. To sort the log by column, click a column header.		
CMC-7Y381Y1	Jan 3 16:10:01	Extended Power Performance is Enabled
CMC-7Y381Y1	Jan 3 16:09:49	Extended Power Performance is Disabled

Figure 12 EPP Log Messages on CMC Web Interface.

2.2 Managing EPP feature using RACADM interface:

The following sections describe how to manage the EPP feature using the RACADM interface.

2.2.1 EPP Configuration and Control

You can enable or disable the EPP feature using the RACADM interface on the chassis with 3000W AC PSU configuration using the following commands:

- To "Enable" EPP:

```
$ racadm config -g cfgChassisPower -o cfgChassisEPPEnable 1
```

Object value modified successfully
- To "Disable" EPP:

```
$ racadm config -g cfgChassisPower -o cfgChassisEPPEnable 0
```

Object value modified successfully

2.2.2 EPP Status Verification

You can verify if the EPP feature is enabled or disabled on a chassis with 3000W AC PSU configuration using the following RACADM commands::

- Execute "following" command "to" check "EPP" status:

```
$ racadm getconfig -g cfgChassisPower -o cfgChassisEPPEnable
```

1 = EPP is Enabled



0 = EPP is Disabled

2.2.3 EPP Feature Status

To view the EPP feature status use the `racadm getpbinfo` command. The following are examples of the EPP status information displayed:

- **Example 1**

```
$ racadm getpbinfo
```

```
Extended Power Performance(EPP) Status      = Enabled (inactive)
Available Power in EPP Pool                  = 3167 W (10806 BTU/h)
Used Power in EPP Pool                       = 0 W (0 BTU/h)
EPP Percent - Available                      = 100.0
```

- **Example 2**

```
$ racadm getpbinfo
```

```
Extended Power Performance(EPP) Status      = Enabled (active)
Available Power in EPP Pool                  = 1698 W (5793 BTU/h)
Used Power in EPP Pool                       = 1468 W (5009 BTU/h)
EPP Percent - Available                      = 53.0
```

2.2.4 EPP Error Reporting

To view the EPP feature related errors use the `racadm getpbinfo` command. The following are examples of the EPP feature related errors displayed:

- **Example 1**

```
$ racadm getpbinfo
```

```
Extended Power Performance(EPP) Status      = Enabled (unsupported)
Available Power in EPP Pool                  = 0 W (0 BTU/h)
Used Power in EPP Pool                       = 0 W (0 BTU/h)
EPP Percent - Available                      = 0.0
```

```
EPP Error Messages
```

```
The feature is not supported while Max Power Conservation Mode is enabled.
```

- **Example 2**

```
$ racadm getpbinfo
```



```
Extended Power Performance(EPP) Status           = Enabled (unsupported)
Available Power in EPP Pool                       = 0 W (0 BTU/h)
Used Power in EPP Pool                           = 0 W (0 BTU/h)
EPP Percent - Available                          = 0.0
```

EPP Error Messages

```
The feature is not supported with an unsupported PSU : PSU Slot 1.
The feature is not supported with an unsupported PSU : PSU Slot 2.
The feature is not supported with an unsupported PSU : PSU Slot 3.
The feature is not supported with an unsupported PSU : PSU Slot 4.
The feature is not supported with an unsupported PSU : PSU Slot 5.
The feature is not supported with an unsupported PSU : PSU Slot 6.
```

2.2.5 EPP Log Messages and RAC Log

The EPP feature enable or disable control operations performed using the RACADM interface are captured in the RAC logs.

To view the EPP feature control related logs, use the `racadm getraclog` command:

```
$ racadm getraclog
```

```
Jul 31 14:16:11 CMC-4C2WXF1 Log Cleared
```

```
Jul 31 14:15:49 CMC-4C2WXF1 Extended Power Performance is Enabled
```

```
Jul 31 14:15:49 CMC-4C2WXF1 Extended Power Performance is Disabled
```



3 EPP with Other Power Configurations:

The following sections describe each power configuration which impacts the EPP Settings:

3.1 EPP and Server Performance Over Power Redundancy (SPOPR)

The two features Extended Power Performance (EPP) and Server Performance Over Power Redundancy (SPOPR) are mutually exclusive. The SPOPR feature has been available for customers since the CMC 3.1 release. CMC 4.45 and earlier versions have shipped with SPOPR Enabled as the default setting. The SPOPR setting is completely superseded by the EPP configuration setting. SPOPR is no longer supported and grayed out on the 3000W AC power supply configuration as Extended Power Performance feature is available to substitute for SPOPR.

3.2 EPP and Allow 110 VAC Operation

Since the 3000W AC power supplies can only operate on 220 VAC, the 110 VAC is not supported. The "Allow 110VAC Operation" field grayed out on the CMC Web interface. The RACADM interface will block the user from setting 110 VAC value if Noble CMC has the six 3000W AC power supply configuration.

3.2.1 EPP and Server Based Power Management (SBPM)

The Server Based Power Management (SBPM) feature is not compatible with EPP. The EPP feature is not supported if SBPM is enabled.

3.3 EPP and Dynamic Power Supply Engagement (DPSE)

The Dynamic Power Supply Engagement (DPSE) feature is not compatible with EPP. The EPP feature is not supported if DPSE is enabled.

3.4 EPP and Max Power Conservation Mode (MPCM)

Max Power Conservation Mode (MPCM) can be enabled on the 3000W AC PSU configuration, as shown below. You are prompted to Click OK to continue, with a pop up message that the feature is not supported while Extended Power Performance is enabled. Enabling MPCM brings down all server power allocations to the respective Static Lower Boundary.



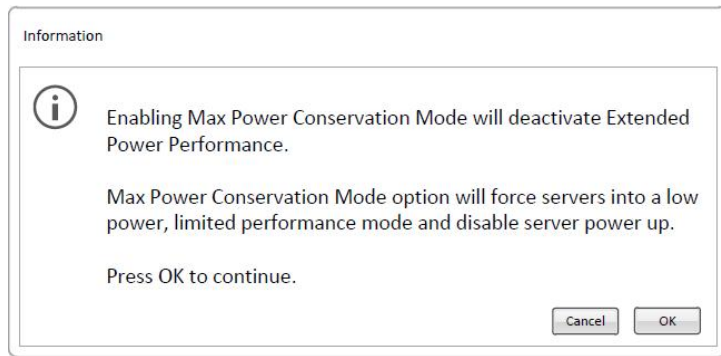


Figure 13 Warning Message when user tries to Enabled MPCM while EPP is Enabled (active).

3.5 EPP and Redundancy Policy

"Power Supply Redundancy" and "No Redundancy" are not compatible with EPP. Modification of the Redundancy Policy from "Grid Redundancy" (factory shipped default setting), to "Power Supply Redundancy" or "No Redundancy" on EPP Enabled configuration is not possible. The incompatible options are grayed out on the Web interface as illustrated in Figure 12.



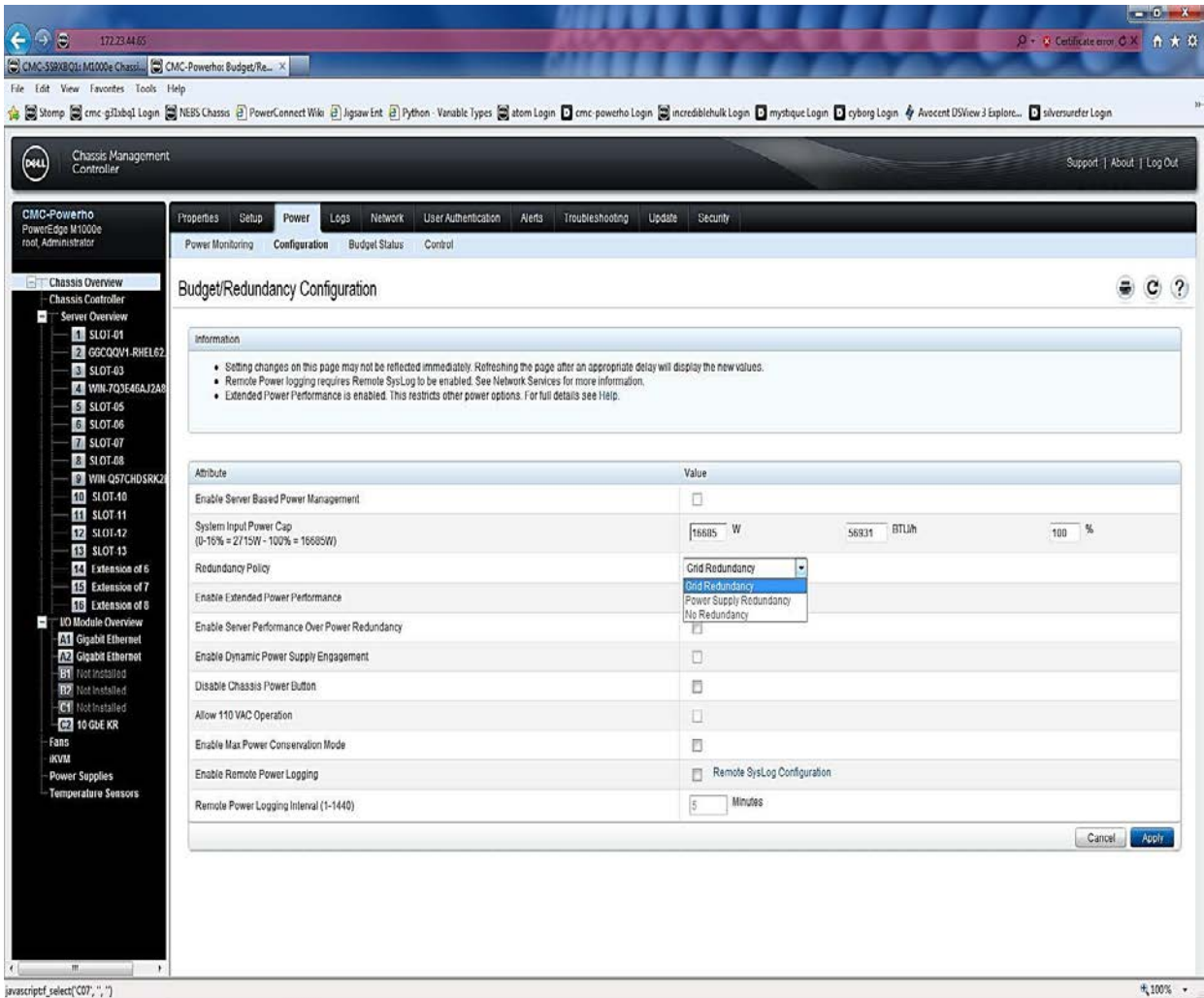


Figure 14 All three Redundancy Policy (Grid Redundancy, Power Supply Redundancy and No Redundancy) options.

3.6 EPP and System Input Power Cap

Reduction of the System Input Power Cap value on an EPP Enabled configuration, to less than or equal to 13300W AC (45381 BTU/h) is not possible when EPP is enabled as it is not supported while EPP is enabled.



4 EPP Feature Constraints

The EPP feature does not operate if:

- Any power supply is reporting loss of Input Voltage.
- Any power supply is in a state other than Online, for example Failed state.
- Any power supply is reporting loss of Output Voltage. This occurs if a power supply is in failed state due to being unable to convert AC to DC power, or if a PSU failed to provide FRU data.
- Power Redundancy Status is lost, for example due to PSU failure.

The EPP feature is not supported if:

- The Redundant policy is set to PSU Redundancy or No Redundancy power policy.
- The chassis has a mixed configuration of power supplies, or a configuration with less than six 3000W AC power supplies.
- The EPP range of available power can be used only for server performance increase, and not for server power on.
- Dynamic Power Supply Engagement is enabled.
- Max Power Conservation Mode is enabled.
- Server Performance Over Power Redundancy is enabled.
- Chassis Management Controller Failover is in progress.
- Chassis Management Controller Firmware update is in progress.
- System Input Power Cap is set to less than or equal to 13300W (45381 BTU/h).

