



Remote Power Management of Dell™ PowerEdge™ M1000e with Chassis Management Controller (CMC) Using Windows® Remote Management (WinRM)

A Dell™ Technical White Paper

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Table of contents

- Revisions (required)2
- Executive Summary.....5
- 1 Introduction..... 6
 - 1.1 Problem Statement..... 6
- 2 Solution with WS–Man.....7
- 3 Chassis Power Management 8
 - 3.1 Enabling or Disabling Server Performance Over Power Redundancy..... 8
 - 3.2 Disabling Server Performance Over Power Redundancy..... 10
 - 3.3 Enabling Server Performance Over Power Redundancy..... 11
 - 3.4 Changing the Chassis External Power Cap12
 - 3.5 Avg/Min/Max Input Power.....14
 - 3.6 Resetting Power Metrics16
- 4 Quickview of Major Power Properties 18
- 5 Summary 22
- 6 For More Information 23



Executive Summary

This white paper describes the remote power management of servers using the Windows Remote Management (WinRM) tool, the remote management capabilities available through a secure and standards-based Web Services–Management (WS-MAN) interface of the Chassis Management Controller (CMC) on Dell™ M1000e Chassis. The target audience of this white paper is a Console application developer who has some WS-MAN knowledge to understand terminologies used in this white paper.



1 Introduction

The Dell™ Chassis Management Controller (CMC) provides Chassis monitoring and control, and remote access features for blade servers. CMC software solution is designed to provide secure, simple, scriptable, and standards-based remote management capability through Web Services for Management (WSMAN) for Dell PowerEdge™ M1000e chassis systems.

1.1 Problem Statement

The power required to support a modular or dense server module is very high. Data centers increasing in density and requiring more performance per Watt, more power at a higher efficiency is required. Increasing power costs is a top concern for data center managers. Microsoft's Windows Remote Management(WinRM) tool allows administrators to remotely manage and remotely execute programs on windows machines. WinRM tool is used by Power Console Administrators for remote power management of Dell PowerEdge™ M1000e chassis systems. Administrator need to construct WinRM commands related to all managed power features which demands investment of good amount of time. This white paper offers information about simplifying power management of the Dell Chassis Management Controller using WinRM commands and also troubleshoot commonly occurring errors in using this tool.



2 Solution with WS–Man

Web Services for Management (WS–Man) is a SOAP–XML–based protocol for exchanging system management information. Windows Remote Management (WinRM) tool is a Windows command line utility which allows remote management of servers by using WS–Management protocol. WinRM lets datacenter managers to access, edit, and update data from remote servers. It is possible to obtain hardware data from WS–Management protocol implementations running on non–Windows operating systems such as Linux. This allows operating systems from diverse vendors to function together.

This document provides necessary information to understand power management of Dell PowerEdge™ M1000e chassis systems by using WinRM tool.

Table 1 Benefits

1	Helps in reducing power-related costs with efficient secure remote power management through WS–MAN.
2	Readily available tested WinRM commands for power management of Dell™ M1000e Chassis helps you to save time.
3	Scriptable remote power management through WS–MAN helps in developing Automation framework by Python Scripts and common APIs which can be utilized by management console developers.



3 Chassis Power Management

This white paper covers newly implemented power features in CMC WS–Man software solution. Typical remote management setup is shown in Figure 1. WinRM client on management system remotely connects to WS– Man service running on CMC for remote power management. For WinRM configuration and legacy remote power management features through WS- Man, refer to Chassis Management section of:

<http://en.community.dell.com/techcenter/systems-management/w/wiki/1949.aspx>

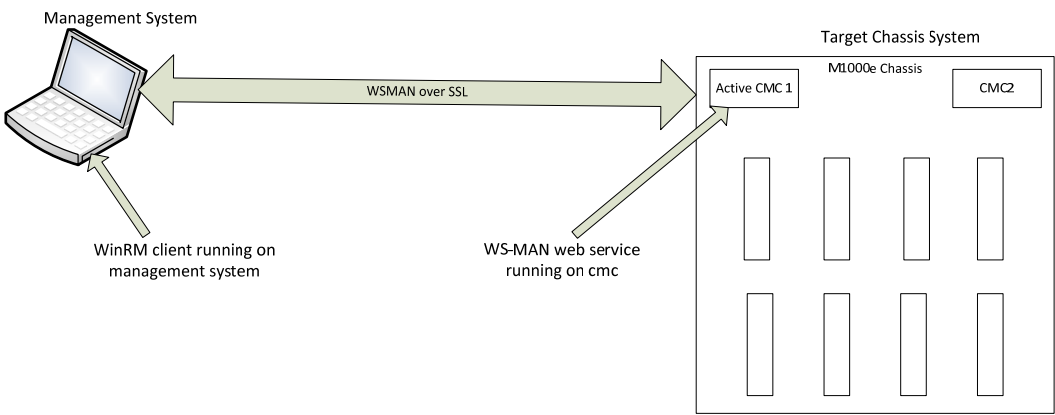


Figure 1 Setup Diagram

3.1 Enabling or Disabling Server Performance Over Power Redundancy

In some scenarios, Power Console admin need to prioritize between power consumption and server performance in data centers. Enable the Server Performance Over Power Redundancy option to prioritize the server performance and server power-up over maintaining the power redundancy policy. If disabled:

- The system prioritizes the power redundancy policy over server performance.
- Some servers are not provided sufficient power for full performance, or are not turned on.

Current status need to be checked before enabling or disabling

ServerPerformanceOverPowerRedundancyEnabled property of the DCIM_ModularChassisView class.

Class name	DCIM_ModularChassisView	Single instance
Property 1	ServerPerformanceOverPowerRedundancyEnabled	The feature is enabled when value is "TRUE", or disabled when value is "FALSE".

```
C:\>winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/<USERNAME>/dell/cmc/DCIM_ModularChassisView -u:<USERNAME> -p:<PASSWORD> -r:https://<IDRAC_IP_ADDRESS>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic
```

Sample Output:



DCIM_ModularChassisView

```
AssetTag = 00000

Caption = null

ChassisDefaultLowerPowerCap = 2715

ChassisDefaultUpperPowerCap = 16685

ChassisExternalPowerCap = 16685

Description = null

ElementName = chassis view

FQDD = System.Chassis.1

FlexFabricState = false, false, false, false

FlexFabricStateDescription = Fabric A, Fabric B, Fabric C, iDRAC

Generation = null

HostName = cmc-5Q1B42S

IPv4Address = <IDRAC_IP_ADDRESS>

InstanceID = dcim:System.Chassis.1

Location = [UNDEFINED]

MgmtControllerFirmwareVersion = 4.40.A00.201305160535

PhysicalLocationAisle

PhysicalLocationChassisName = CMC-5Q1B42S

PhysicalLocationDataCenter

PhysicalLocationDeviceSize = 10U

PhysicalLocationRack

PhysicalLocationRackSlot

PowerState = 2

PrimaryStatus = 3

PwrInputInfrastructureAllocation = 449

PwrInputSystemConsumption = 808
```



```

SNMPCommunityBladeIRAlert

SNMPDestinationBladeIRAlert

ServerBasedPowerMgmtEnableTime = 19691231180000.000000-360

ServerBasedPowerMgmtEnabled = false

ServerPerformanceOverPowerRedundancyEnabled = true

ServiceTag = 5Q1B42S

SystemPSUInputPower = 4444

SystemPSUOutputPower = 3789

UseHostNameForSlotName = true

```

From the sample output shown here, we see that `ServerPerformanceOverPowerRedundancyEnabled` is equal to 'true', which implies that the feature is enabled.

3.2 Disabling Server Performance Over Power Redundancy

Table 2 Method specification

Class name	DCIM_ModularChassisView
Method Name	SetBIOSAttributes
AttributeName	ServerPerformanceOverPowerRedundancyEnabled
AttributeValue	FALSE
SystemFQDD	System.Chassis.1
FQDD	System.Chassis.1

```

C:\>winrm invoke SetBIOSAttributes http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/<USERNAME>/dell/cmc/DCIM_MgmtControllerService?SystemCreationClassName=
Dell_ChassisMgr+CreationClassName=DCIM_MgmtControllerService+SystemName=systemmc
+Name=mgmtcontrollerservice1 -u:<USERNAME> -p:<PASSWORD> -
r:https://<IDRAC_IP_ADDRESS>:443 -SkipCNcheck -SkipCAcheck -encoding:utf-8 -
a:basic -file:SOPR_Disabled.xml

```

Sample output:

```

SetBIOSAttributes_OUTPUT

ReturnValue = 0

SetResult = 2

```

Sample output:

```

SetBIOSAttributes_OUTPUT

ReturnValue = 0

```



```
SetResult = 2
```

A sample input XML to describe the method input parameters:

```
<p:SetBIOSAttributes_INPUT xmlns:p="http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/<USERNAME>/dell/cmc/DCIM_MgmtControllerService">

  <p:SystemFQDD>System.Chassis.1</p:SystemFQDD>

  <p:FQDD>System.Chassis.1</p:FQDD>
  <p:AttributeName>ServerPerformanceOverPowerRedundancyEnabled</p:AttributeName>

  <p:AttributeValue>FALSE</p:AttributeValue>

</p:SetBIOSAttributes_INPUT>
```

Validate the output by viewing property **ServerPerformanceOverPowerRedundancyEnabled** of the **DCIM_Modularchassisview** class. Property value should be "false".

3.3 Enabling Server Performance Over Power Redundancy

Table 3 Method specification

Class name	DCIM_ModularChassisView
Method Name	SetBIOSAttributes
AttributeName	ServerPerformanceOverPowerRedundancyEnabled
AttributeValue	TRUE
SystemFQDD	System.Chassis.1
FQDD	System.Chassis.1

```
C:\>winrm invoke SetBIOSAttributes http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/<USERNAME>/dell/cmc/DCIM_MgmtControllerService?SystemCreationClassName=
Dell_ChassisMgr+CreationClassName=DCIM_MgmtControllerService+SystemName=systemmc
+Name=mgmtcontrollerservice1 -u:<USERNAME> -p:<PASSWORD> -
r:https://<IDRAC_IP_ADDRESS>:443 -SkipCNcheck -SkipCAcheck -encoding:utf-8 -
a:basic -file:SPOPR_Enabled.xml
```

Sample output:

```
SetBIOSAttributes_OUTPUT
```

```
ReturnValue = 0
```

```
SetResult = 2
```

A sample input XML to describe the method input parameters:

```
<p:SetBIOSAttributes_INPUT xmlns:p="http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/<USERNAME>/dell/cmc/DCIM_MgmtControllerService">

  <p:SystemFQDD>System.Chassis.1</p:SystemFQDD>
```



```

<p:FQDD>System.Chassis.1</p:FQDD>
<p:AttributeName>ServerPerformanceOverPowerRedundancyEnabled</p:AttributeName>

    <p:AttributeValue>TRUE</p:AttributeValue>

</p:SetBIOSAttributes_INPUT>

```

Validate output by viewing property **ServerPerformanceOverPowerRedundancyEnabled** of the **DCIM_Modularchassisview** class. Property value should be "true".

3.4 Changing the Chassis External Power Cap

The Chassis External Power Cap is the Maximum input power that the system is allowed to allocate to servers and chassis infrastructure.

Table 4 Method specification

Class name	DCIM_MgmtControllerService
Method Name	SetChassisExternalPowerCap
PowerCapValue	The external chassis power cap value in Watts.
ForceMode	Enable the force mode when set to "TRUE", or disable the mode when set to "FALSE". Enable force mode limits the Chassis power consumption to the set value regardless of whether or not the Chassis blades need to be throttled to achieve this.

```

C:\>winrm invoke SetChassisExternalPowerCap
http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/<USERNAME>/dell/cmc/DCIM_MgmtControllerService?SystemCreationClassName=
Dell_ChassisMgr+CreationClassName=DCIM_MgmtControllerService+SystemName=systemmc
+Name=mgmtcontrollerservice1 -u:<USERNAME> -p:<PASSWORD> -
r:https://<IDRAC_IP_ADDRESS>:443 -SkipCNcheck -SkipCAcheck -encoding:utf-8 -
a:basic -file:SetPowerCapValue.xml

```

Sample output:

SetChassisExternalPowerCap_OUTPUT

```

    ReturnValue = 0

```

A sample input XML to describe the method input parameters:

```

<p:SetChassisExternalPowerCap_INPUT
xmlns:p="http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/<USERNAME>/dell/cmc/DCIM_MgmtControllerService">

    <p:PowerCapValue>14000</p:PowerCapValue>

    <p:ForceMode>FALSE</p:ForceMode>

</p:SetChassisExternalPowerCap_INPUT>

```



Validate output by viewing property **ChassisExternalPowerCap** of **DCIM_Modularchassisview** class.

```
C:\>winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-  
schema/2/<USERNAME>/dell/cmc/DCIM_ModularChassisView -u:<USERNAME> -p:<PASSWORD>  
-r:https://<IDRAC_IP_ADDRESS>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -  
a:basic
```

Sample output:

DCIM_ModularChassisView

AssetTag = 00000

Caption = null

ChassisDefaultLowerPowerCap = 2715

ChassisDefaultUpperPowerCap = 16685

ChassisExternalPowerCap = 14000

Description = null

ElementName = chassis view

FQDD = System.Chassis.1

FlexFabricState = false, false, false, false

FlexFabricStateDescription = Fabric A, Fabric B, Fabric C, iDRAC

Generation = null

HostName = cmc-5Q1B42S

IPv4Address = <IDRAC_IP_ADDRESS>

InstanceID = dcim:System.Chassis.1

Location = [UNDEFINED]

MgmtControllerFirmwareVersion = 4.40.A00.201305160535

PhysicalLocationAisle

PhysicalLocationChassisName = CMC-5Q1B42S

PhysicalLocationDataCenter

PhysicalLocationDeviceSize = 10U

PhysicalLocationRack



```

PhysicalLocationRackSlot

PowerState = 2

PrimaryStatus = 3

PwrInputInfrastructureAllocation = 449

PwrInputSystemConsumption = 760

SNMPCommunityBladeIRAlert

SNMPDestinationBladeIRAlert

ServerBasedPowerMgmtEnableTime = 19691231180000.000000-360

ServerBasedPowerMgmtEnabled = false

ServerPerformanceOverPowerRedundancyEnabled = false

ServiceTag = 5Q1B42S

SystemPSUInputPower = 13332

SystemPSUOutputPower = 5683

UseHostNameForSlotName = true

```

3.5 Avg/Min/Max Input Power

Average, minimum, or maximum input power consumption reading. The period of measurement extends between reset events. Three instances of the **Dell_AggregationPCPwrMetricValue** classes will provide Average, Minimum and Maximum metrics.

Class name	Dell_AggregationPCPwrMetricValue	Three instances for Avg, Min and Max
------------	----------------------------------	--------------------------------------

```

C:\>winrm e http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/<USERNAME>/dell/cmc/Dell_AggregationPCPwrMetricValue -u:<USERNAME> -
p:<PASSWORD> -r:https://<IDRAC_IP_ADDRESS>/wsman -SkipCNcheck -SkipCAcheck -
encoding:utf-8 -a:basic

```

Sample output:

```

Dell_AggregationPCPwrMetricValue

AggregationDuration = null

AggregationTimeStamp = 20130716012600.937960-300

BreakdownDimension = null

```



BreakdownValue = null
Caption = null
ClassId = Dell:LoPCAmv
Description = null
Duration = null
ElementName = null
Generation = null
InstanceID = Dell:LoPCAmv
MeasuredElementName = null
MetricDefinitionId = System Power Consumption: PCLow Watermark
MetricValue = 0
TimeStamp = null
Volatile = false

Dell_AggregationPCPwrMetricValue
AggregationDuration = null
AggregationTimeStamp = 20130717071316.045196-300
BreakdownDimension = null
BreakdownValue = null
Caption = null
ClassId = Dell:HiPCAmv
Description = null
Duration = null
ElementName = null
Generation = null
InstanceID = Dell:HiPCAmv
MeasuredElementName = null



MetricDefinitionId = System Power Consumption: PCHigh Watermark

MetricValue = 1004

TimeStamp = null

Volatile = false

Dell_AggregationPCPwrMetricValue

AggregationDuration = null

AggregationTimeStamp = 20130717083828.050308-300

BreakdownDimension = null

BreakdownValue = null

Caption = null

ClassId = Dell:AvgPCAmv

Description = null

Duration = null

ElementName = null

Generation = null

InstanceID = Dell:AvgPCAmv

MeasuredElementName = null

MetricDefinitionId = System Power Consumption: PCAverage Watermark

MetricValue = 792

TimeStamp = null

Volatile = false

3.6 Resetting Power Metrics

Class name	Dell_PowerMetricService	
Method name	ControlMetrics	
Property 1	MetricCollectionEnabled	uint16 possible values: 4 = Reset
Definitio	Dell_AggregationPCPwrMetricD	Reference to the



n	ef REF	Dell_AggregationPCPwrMetricDef
---	-----------	--------------------------------

```
C:\>winrm invoke ControlMetrics http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/Dell_PowerMetricService?__cimnamespace=<USERNAME>/dell/cmc+Name=MServic
el+CreationClassName=Dell_PowerMetricService+SystemName=systemmodular+SystemCrea
tionClassName=Dell_ComputerSystem -r:https://<IDRAC_IP_ADDRESS>/wsman -
u:<USERNAME> -p:<PASSWORD> -a:basic -skipCNcheck -skipcachecheck -encoding:utf-8 -
file:resetPC_Metrics.xml
```

Sample output:

ControlMetrics_OUTPUT

```
ReturnValue = 0
```

A sample input XML to describe the method input parameters:

```
<p:ControlMetrics_INPUT xmlns:p="http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/Dell_PowerMetricService"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsman="http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd" >

  <p:Definition>

    <wsa:ReferenceParameters>

      <wsman:ResourceURI>http://schemas.dell.com/wbem/wscim/1/cim-
schema/2/Dell_AggregationPCPwrMetricDef</wsman:ResourceURI>

      <wsman:SelectorSet>

        <wsman:Selector
Name="__cimnamespace"><USERNAME>/dell/cmc</wsman:Selector>

      </wsman:SelectorSet>

    </wsa:ReferenceParameters>

  </p:Definition>

  <p:MetricCollectionEnabled>4</p:MetricCollectionEnabled>

</p:ControlMetrics_INPUT>
```



4 Quickview of Major Power Properties

Single instance of the **DCIM_ModularChassisView** class provides quick view of most frequently monitored power properties in data center for power management.

Class name	DCIM_ModularChassisView	Single Instance
Property 1	PwrInputInfrastructureAllocation	UInt32, The total input power the CMC allocates to the chassis infrastructure (fans, IO modules, iKVM, CMC, standby CMC, and iDRAC servers). Unit is in watts.
Property 2	PwrInputSystemConsumption	UInt32, The total input power consumption for all modules in the chassis as measured from the input side of the power supplies. Unit is in watts.
Property 3	ServerBasedPowerMgmtEnabled	Boolean, ServerBasedPowerMgmtEnabled reports whether the power management of modular servers are controlled by software component outside of the chassis management firmware. The feature is enabled when value is "TRUE", or disabled when value is "FALSE".
Property 4	ServerBasedPowerMgmtEnableTime	Datetime, ServerBasedPowerMgmtEnableTime reports the date and time server-based power management was enabled.
Property 5	SystemPSUInputPower	UInt16, The property shall represent the upper bound for the external power consumption by power supply units in Watts.
Property 6	SystemPSUOutputPower	UInt16, The property shall



		represent the upper bound for the internal power production by power supply units in Watts.
Property 7	ServerPerformanceOverPowerRedundancyEnabled	Boolean, This property shall represent whether the blade server performance over the chassis power redundancy (SPOR) feature is enabled.
Property 8	ChassisDefaultLowerPowerCap	UInt32, Default Chassis Lower Power Input capping value
Property 9	ChassisDefaultUpperPowerCap	UInt32, Default Chassis Upper Power Input capping value
Property 10	ChassisExternalPowerCap	UInt32, ChassisExternalPowerCap indicates the current chassis external (wall) power budget cap value. This value can be changed through the DCIM_MgmtControllerService.SetChassisExternalPowerCap() method

```
C:\>winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/<USERNAME>/dell/cmc/DCIM_ModularChassisView -u:<USERNAME> -p:<PASSWORD> -r:https://<IDRAC_IP_ADDRESS>/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8 -a:basic
```

Sample output:

```
DCIM_ModularChassisView
```

```
AssetTag = 00000
```

```
Caption = null
```

```
ChassisDefaultLowerPowerCap = 2715
```

```
ChassisDefaultUpperPowerCap = 16685
```

```
ChassisExternalPowerCap = 14000
```

```
Description = null
```



```

ElementName = chassis view

FQDD = System.Chassis.1

FlexFabricState = false, false, false, false

FlexFabricStateDescription = Fabric A, Fabric B, Fabric C, iDRAC

Generation = null

HostName = cmc-5Q1B42S

IPv4Address = <IDRAC_IP_ADDRESS>

InstanceID = dcim:System.Chassis.1

Location = [UNDEFINED]

MgmtControllerFirmwareVersion = 4.40.A00.201305160535

PhysicalLocationAisle

PhysicalLocationChassisName = CMC-5Q1B42S

PhysicalLocationDataCenter

PhysicalLocationDeviceSize = 10U

PhysicalLocationRack

PhysicalLocationRackSlot

PowerState = 2

PrimaryStatus = 3

PwrInputInfrastructureAllocation = 449

PwrInputSystemConsumption = 760

SNMPCommunityBladeIRAlert

SNMPDestinationBladeIRAlert

ServerBasedPowerMgmtEnableTime = 19691231180000.000000-360

ServerBasedPowerMgmtEnabled = false

ServerPerformanceOverPowerRedundancyEnabled = false

ServiceTag = 5Q1B42S

```



SystemPSUInputPower = 13332

SystemPSUOutputPower = 5683

UseHostNameForSlotName = true



5 Summary

With increasing power costs as a primary issue for data center managers, efficient remote power management by secure, simple, and scriptable WinRM client will directly improve the operating cost and the reduce power consumption in data centers. The software Web service management features provided by CMC enables remote power management capabilities of the Dell™ PowerEdge™ M1000e Chassis.



6 For More Information

About PowerEdge™ M1000e Chassis

<http://www.dell.com/support/Manuals/us/en/19/Product/poweredge-m1000e>

About windows Remote Management

[http://msdn.microsoft.com/en-us/library/windows/desktop/aa384291\(v=VS.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/aa384291(v=VS.85).aspx)

