Dell Technical Information Note (TIN UPS003)

# VMware vCenter Shutdown Scenarios using Dell UPS Management Software

This Dell Technical Information Note provides ractical examples of implementing shutdown using Dell UPS Management Software Release 2 on VMware vCenter.

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# Scope of this document

This document provides a quick setup guide with practical examples for installing and using Dell Uninterruptible Power Supply (UPS) Management Software, Release 2, 01.04.0010 (A02) [referred to as Dell UPS Management Software], announced July 2012 with VMware® vCenter<sup>M 1</sup>.

This guide is designed for readers who have comprehensive knowledge of and experience with VMware vSphere / vCenter products. It is intended to complement the full user guide that comes with Dell UPS management software.

For full information about Dell UPS Management Software — such as hardware and software prerequisites and details about activating, configuring and using UPS monitoring and management functions — refer to the complete Users' Guides for the software components.

# The two components of Dell UPS Management Software

The Dell UPS power management suite - Release 2, 01.04.0010 (A02) - is compatible with all Dell single-phase UPS products. The software suite includes two complementary and integrated offerings, both managed through a single, Web-based interface:

#### The Dell Multi-UPS Management Console (MUMC):

- Discovers and supervises Dell UPSs and Dell intelligent power distribution units (PDUs) connected to the network.
- Provides a central control point for configuring, monitoring and reporting actions relating to UPS and PDU events.

<sup>&</sup>lt;sup>1</sup> For more information when installing Dell UPS Management Software on VMware vMA 5.0.0.1 or 5.0.0.2, refer to Dell Technical Information Note "Implementing shutdown using Dell UPS Management Software, Release 2 on VMware® vMA 5.0.0.1 and 5.0.0.2." Download from <a href="http://dellups.com/support\_download.asp">http://dellups.com/support\_download.asp</a>

- Provides mass configuration and firmware update for Dell UPS NMCs. The optional NMC is recommended for remote management and required for managing UPSs in virtualized IT environments.
- Provides centralized management of Dell UPS Local Node Manager applications running on remote traditional (Windows/Linux) or virtualized servers (Microsoft<sup>®</sup>, VMware<sup>®</sup>, Citrix<sup>®</sup>, Red Hat<sup>®</sup>).
- Provides an agent-less method for managing multiple hosts in clusters using VMware vCenter™ or Citrix XenCenter<sup>®</sup>.



Figure 1: Dell's Multi-UPS Management Console (MUMC)

The Dell Multi-UPS Management Console (MUMC) does not:

- Control virtual machine (VM) behavior. This is managed by the host and configured through vCenter or other host management interface.
- Assume responsibility for VM startup/shutdown/hibernation/VM migration. This is managed by the host management interface.
- Replace a user's need to understand VM behavior responding to a host entering maintenance mode or shutting down.
- Explain all possible scenarios according to the various virtualization vendors, license types and feature sets.

#### The Dell UPS Local Node Manager (ULNM):

• Acts as a local shutdown agent on local computers using traditional operating systems, for graceful, unattended UPS shutdown and restart.

- Acts as a local shutdown agent in virtualized environments, for virtualization host Hypervisor Agent and vMA Agent type.<sup>2</sup>
- Provides a local interface to view UPS power status, events and configurations.
- Is remotely managed by the Dell UPS supervisory console for simultaneous, centralized configuration and management of multiple ULNM agents.

NUTS	Power source				
Power Source	Information and Status	15	Measures	8	
Events Liat Events Calendar Settings Auto Discovery Auto Discovery Autors Studown Byson Log User Lat	Dell UPS Tower 1920W HV UPS LT     Description     Description     Tower 1920W HV UPS LT     Description     Tower 1920     Power 1920     Description     Description	T 1920 UPS Tower 1920/ HV UPS LIT 1920 1920 USS device USS device On uSS On uSS USS 1920 0 0 uSS 0	Input Input Input voltage Output Satery sated voltage Output respective Output respective Output respective Output contage Output con	55 H2 241 V 76 V 245 V 0 A 0 A 0 A 0 W 12 W 0 W 1.91 KW	
	Graph - 2 hours		Symphic Line Interactive UPS		
Date Input volla Lood level Battery ca Battery ru	0625/12 - 10:50/66 am pe 242 V UIIIIIII 0 % 540 V 1997 - 6 h 92 min 39 s 05/25/12 - 9:30/45 am	05/25/12 - 11:30-45 an		ignent #1 ignent #2	
	Europe -		Statistics - 7 days	H -	
	Status         Date         Mass           Image: Control of the state of the sta	munication with device t	Communication lost	3 t	

#### Figure 2: Dell's UPS Local Node Manager (ULNM)

Both components (MUMC and ULNM) are included in the Dell UPS Management Software download bundle available from support.dell.com (and dellups.com). The focus of this document is the "Agentless" scenario shown in Figure 3.

<sup>2</sup> Hypervisor Agent type: A host on which applications can be directly installed (such as Win2k8). vMA Agent type: A host on which applications cannot be directly installed and instead use a management assistant to load applications (such as vMA), refer to Figure 3. For more information on Dell ULNM and MUMC interaction with virtualized hypervisors, contact your local Dell representative or refer to the appropriate User's Guide at <u>dellups.com/soft-tech-doc.asp</u>.



#### Figure 3: Dell UPS management software connectivity scenarios

#### Figure 4: UPS management architecture in a virtualized environment



# Prerequisites

### Prerequisites: Software download from Dell

- 1. Get the latest version of the Dell UPS Management Software consisting of the MUMC client and ULNM from support.dell.com or from <u>www.dellups.com</u>:
  - Software & Technical Documentation
    - Software Downloads

Dell Multi-UPS Management Console and UPS Local Node Manager Software, Release 2, 01.04.0010 (A02)

- 2. Install the MUMC client.
- 3. Get the latest version of User's Guides for Dell UPS Management Software from support.dell.com or from <a href="http://www.dellups.com">www.dellups.com</a>:

Software & Technical Documentation

- User Manuals and Publications
  - Dell Multi-UPS Management Console User Guide [Release 2, July 2012] and Dell UPS Local Node Manager User Guide [Release 2, July 2012].

The MUMC client passes "Maintenance Mode" or "Shutdown" requests to the host at predetermined intervals after a power outage. The host response to these commands depends on the VMware features and licenses used.

### Prerequisites: VMware licensing

VMware license types (Essentials, Standard, Enterprise, Enterprise Plus) can significantly affect the type of host features that can be used during a power failure event. VM behavior can vary significantly with small changes in vCenter configuration, so you must understand this aspect of the solution. The MUMC and ULNM UPS management products require pay versions of VMware vSphere / vCenter.

### Prerequisites: Hardware and software

Supported operating systems: The MUMC client is installed on a Windows<sup>TM</sup> operating system (Server 2008 R2, Win7 etc). This can be either a physical machine or a virtual machine. If the MUMC client is installed on a VM, make provisions with HA/FT/DRS to ensure that this machine has a persistence priority to make certain that the MUMC client services are available for UPS instructions to be passed to the vCenter. For a full list of supported Windows<sup>TM</sup> platforms, refer to the MUMC client User's Guide.

vSphere Perl SDK: If using Dell UPS Management Software Release 1, this vSphere Perl SDK must be installed on the same operating system as the MUMC client to enable the vCenter interface and commands. (This dependency was removed in Release 2.) Check the documentation accompanying your download to confirm.

Maximum infrastructure limitations: The MUMC client has been tested to >1000 nodes (UPSs, hypervisors, local UPS agents, etc.). There is no theoretical maximum to the number of nodes that can be managed by the MUMC client.

UPS network communication card. The UPSs to be remotely monitored and managed <u>must</u> be equipped with the optional Dell Network (Ethernet) Management Card (NMC), Dell PN H910P.

### Prerequisites: Connectivity

UPS communications: The Dell UPS must be connected to an IP network using the optional Dell Network Management Card (NMC). USB communications are not supported for the virtualized "Agentless" applications discussed in this document.

Survivable network connectivity: The MUMC client must retain IP communications with both the UPS and vCenter at all times. Take care to ensure that network switches and other networking equipment are covered by UPS protection and suitable redundancy built into the network. If network connectivity is considered a weak link in the architecture, the optional ULNM agent can be installed on the local ESXi host to act as a local shutdown agent that can take action even when connectivity to the main MUMC client has been lost. This approach is not discussed in this document.

Network ports: The following table provides protocol, mode and port reference for Dell NMC cards. Shown for reference only are ULNM (Dell's node manager) with a Shutdown Controller agent and Dell ULNM.

Protocol	Mode/Port Dell Other Ethernet cards : NMC PXGX2000, Card PXGX-UPS, Connect UPS BD, Connect UPS XSlot		DELL ULNM with Shutdown Controller	DELL ULNM	
SMTP	TCP/25	OUT	OUT	OUT	OUT
DHCP/BOOTP	UDP/67	OUT	OUT	Х	Х
TFTP	UDP/69	IN	Х	OUT	OUT
http	TCP/80	IN	IN	OUT	OUT
NTP	UDP/123	OUT	OUT	Х	Х
SNMP	UDP/161	IN	IN	OUT	OUT
SNMP Traps	UDP/162	OUT	OUT	Х	Х
UNMP	UDP/200	Х	OUT	IN/OUT	IN/OUT
HTTPS	TCP/443	IN	IN	OUT	OUT
DELL Supervision	TCP/4679	Х	Х	IN/OUT	IN/OUT
DELL Notification Broadcast	UDP/4679	IN/OUT	Х	IN/OUT	IN/OUT
DELL SSL Supervision	TCP/4680	Х	Х	IN/OUT	IN/OUT
DELL Alarms Broadcast	UDP/4680	OUT	Х	IN	IN
DELL Connected Alarms	TCP/5000	IN	X	OUT	OUT
DELL Connected Alarms	TCP/5001	Х	Х	IN	OUT

### Table 1. Protocol, mode/port listing

vCenter IP Ports: The MUMC Client will only communicate with vCenter through the default port 443. When installing vCenter take care to use the standard port. Future software releases may support non-standard communications ports.

# Installing the software

If using Dell UPS Management Software Release 1, install vSphere Perl SDK to the Windows OS where you intend to install the MUMC client (http://www.vmware.com/support/developer/viperltoolkit/). This dependency was removed in Dell UPS Management Software, Release 2, 01.04.0010 (A02). Check the documentation that accompanied the download for your version. If not current, download from support.dell.com or from <a href="https://www.dellups.com">www.dellups.com</a>, as described in "Prerequisites" earlier in this document.

- 1. Install the MUMC client to the same Windows OS.
- 2. Login to the MUMC client (default admin/admin).
- 3. Navigate to Settings C Auto Discovery. Add the Dell UPS node (QuickScan or Range Scan).

Figure 5: MUMC client  $\bigcirc$  Settings  $\bigcirc$  Auto Discovery  $\bigcirc$  Add Node

Node List										
Туре	Status	Name 🔺	Class	Location	Contact					
1	0	192.168.0.100	DELL Network Management Card /	Computer Room	Computer Room Manager					

- 4. Right-click the UPS node and "Set Node Access Parameters" (default is admin/admin).
- 5. Navigate to Settings System Settings, and enable the Virtualization Module.

Note: Only enable the "Shutdown" module if you want the computer hosting the MUMC client to shut down in the event of a power failure. Once the computer hosting the MUMC client has shut down, it is no longer able to control hypervisor function, so care take care to ensure that the computer hosting the MUMC client is shut down in the last possible moment after all hypervisor actions have been taken.

#### Figure 6: MUMC client $\bigcirc$ Settings $\bigcirc$ System $\bigcirc$ Modules Settings $\bigcirc$ Edit Scan Settings

<ul> <li>Dell Multi-UPS Manage</li> <li>← → C (S 127.0.0)</li> </ul>	emer × 0.1:4679/	/default.html		× ☆ ∢	
DØLL	Multi-	UPS Management Console		<u>Loqout'admin'</u>   <u>Help</u>	
Views	* @	System  About 'Dell Mult-UPS Management Console'  Product version: 01.03 build 0004 License: Free Product key: Server system name: Windows NT/6.01.01 Webste link: http://support.dell.com/ @ Contact: Location:	C	Edit system information  Edit language  Edit scan settings  Edit modules settings	
Constant System     C		Language Settings     Language: [en-gb] English (United Kingdom)     Scan settings     Default SNMP community name: *****     Automatic scan: Enabled     Management: Enabled     Shutdown: Disabled     Virtualization (Network Solution Only): Enabled     Redundancy: Disabled			

#### Figure 7: Edit Scan Settings C Virtualization

Edit modules settings	×							
Management								
Shutdown								
Virtualization (Network Solution Only)								
Redundancy								
Save Cancel								

6. A new "Virtualization" menu item is now available in the Settings menu.

#### Figure 8: MUMC client $\bigcirc$ Settings $\bigcirc$ Virtualization menu item added



- 7. Click on the new Virtualization tab.
- 8. Add new Supervisor, entering vCenter IP address and access credentials. Check the vCenter plugin box to enable the vCenter tab for Dell UPS Software.

Figure 9: N	NUMC client 🛢	Settings	Virtualization	⊃ A	dd new	supervisor
-------------	---------------	----------	----------------	-----	--------	------------

Edit Manager or Hype	rvisor List	×
Product:	VMware vCenter	~
Hostname or IP address:	192.168.0.7	
Username:		
Password:	•••••	
vCenter Plugin:		
Save	Cancel	

- 9. The MUMC client will poll the vCenter server and automatically add all available vSphere hypervisors to the MUMC client.
- 10. Switch to the vCenter management console (viewed through vSphere Client) for all further steps. Close the Web browser containing the original MUMC client.

Figure 10: vCenter **C** MUMC client tab



#### Figure 11: vCenter <a> MUMC client </a> Main menu

WIN-I6M6GS3IEOU - vSphere Clie	ent											- 0 <b>- X</b>
Ele Edit Vieg Igventory Administration Plug-ins Help												
🖸 🔯 🏠 Home 🕨 🚮 In	📱 🔯 🔥 Home 🕽 👸 Inventory 🛛 👸 Hosts and Clusters 🖉											
💋 🖬												
WIN-16M6GS31EOU  New Datacenter  Diff Cluster	WIN-I6M6G53IEOU, 192. Getting Started Datacent	168.0.7 VM ers Virtua	lware vCo Il Machines	enter Serv s Hosts	rer, 5.0.0, 455964 Tasks & Events Alarms	Permissions Map & Multi-UPS Managem	ent Console					<b>A</b> 1
192.168.0.111 192.168.0.112 Linux1 Linux2	DØLL	Multi-	-UPS	Manag	ement Console						L	ogout'admin'   Help
	Views	« Ş	Node Li	ist						0	Selection view	» @
	Ciews		Туре	Status	Name	Description	Location	Contact	Link	I	Information	
	Rig Node List			0	MUMC_Host	Windows NT/6.01.01			Þ		MUMC Host	
	Events			0	192.168.0.111	VMware ESXi 5.0.0 build-469512	Computer Room1		$\bigcirc$		Description	Windows NT/6 01 01
	Events List List List List List Management Management Management Management Management			Ø	192.168.0.112	VI/Iware ESXi 5.0.0 build-469512	Computer Room2		۲		Paddress Class Link	192.168.0.3 DELL Muti-UPS Management Console / 01.03.0004
	Settings									5	Status	Ξ
	- Actions										Shutdown duration	2 min 00 s
	() Virtualization										Power source shutoff	Active
	System									F	Power Source	•
	User List									E	Events	
	_										Status Date	Message
											05/03/12-3.14.12	Reported communit
											05/03/12-3:10:12	Reported communi
											05/03/12-3:08:12	Reported communi
											05/03/12-3:08:11	Reported communi
			14 4	Page 1	of 1 🕨 🕅  21	5 🔽 Items per page			Displaying 1 - 3 of	3	05/03/12-3:06:03	Reported communi

11. Within the MUMC client (vCenter plugin), navigate to Views <a>> Node List and verify that all hypervisors are recognized.</a>

<ul> <li>Dell Multi-UPS Manageme</li> <li>← ⇒ C ③ 127.0.0.1:</li> <li>D</li> <li>D</li> <li>Multi-</li> </ul>	r × 0 4679/de	fault.htr Manag	<sup>ml#</sup> jement Con	sole				Logou	t 'admin'   Help
Views 🔍 💩	Node Li	st					۲	Selection view	» @
Views	Туре	Status	Name	Description	Location	Contact		Information	Ξ
Node List		8	disco_work 192.168.252.111	Windows NT/6.01.01 VMware ESXi 5.0.0 build-469512				Ø 192.168.0.111	l.
Events List Events Calendar		8	192.168.252.112 192.168.252.20	VMware ESXi 5.0.0 build-469512 Dell UPS Rack 1000W HV	Computer Room	Computer Room		Descrip	VMware ESXi tion 5.0.0 build- 469512
Management     Modes Settings		0	192.168.252.189	Dell UPS Rack/Tower 2700W HV - 230V	Computer Room	Computer Room		Class Link	VMware
Settings		<b>(</b> )	192.168.0.111 192.168.0.112	VMware ESXi 5.0.0 build-469512 VMware ESXi 5.0.0 build-469512				Status Shutdown duration	- 2 min 00 s
- Actions								Power Source	+
System								St Date	Message
								04/26/12-4:3 04/24/12-10:	Communicati
								04/24/12-9:0	Communicati
								04/24/12-8:5	Communicati

Figure 12: vCenter **Client** Views Node List

- 12. Navigate to Management  $\bigcirc$  Node Settings.
- 13. Left-click each ESXi instance and edit shutdown settings. To edit multiple hosts with the same configuration at the same time, select multiple hosts (Ctrl + click). Click the pencil icon to make changes.

```
Figure 13: vCenter Client Views Node List Node Settings
```

Node List								۲	Node configuration		>>>
Туре	Status	Name	Description	Class	Access		Link		🔄 🗉 192.168.0.112	Synchronize Configur	ations 🔻
	0	disco_work	Windows NT/6.01.01	DELL Multi-UPS Management C	P ac	dmin	Þ		System Settings 🖉 —		_
	Ø	192.168.0.111	VMware ESXi 5.0.0 build-4695	VMware ESXi	P ro	oot	Þ			Select all	
	0	192.168.0.112	VMware ESXi 5.0.0 build-4695	VMware ESXi	P ro	oot	Þ		UPS Contact: UPS Location:		
									Remote Naintenance: Maintenance Timer: Remote Shutdown: Power source: Load segment: Master - Shutdown duration: Master - Shutdown after value:	Maintenance Disabled -1 second(s) Shutdown Disabled Master output 120 second(s) -1 second(s)	

14. Click the check box next to each item that you want to edit. Not all settings must be changed. Edit the shutdown settings according to your needs.

### Figure 14: vCenter $\supseteq$ MUMC Client $\supseteq$ Views $\supseteq$ Node List $\supseteq$ Node Settings $\supseteq$ Shutdown settings

Shucdown Sectings 🖉		
	Select all	
Remote Maintenance:	Maintenance Disabled	
Maintenance Timer:	-1 second(s)	
Remote Shutdown:	Shutdown Disabled	
Remote Shutdown of the Virtual Machines:	Disabled	
Power source:		
Load segment:	Master output	
Master - Shutdown duration:	120 second(s)	
Master - Shutdown after value:	-1 second(s)	

The color-coded text below corresponds to Figure 13, "UPS battery capacity over time." The following information is from the MUMC client User's Guide, Virtualization section  $\bigcirc$  Configuring Maintenance and Shutdown. Text modified to include examples of settings.

- A. **Remote Maintenance:** Choose "Enabled" to set the host(s) to "Maintenance Mode" in the event of a power outage. If your hosts have vMotion enabled then the VMs will automatically move from this host to another when power fails.
- B. Maintenance Timer: This is the time between power failure and the command to set the host to maintenance mode. -1 = immediate action.
- C. **Remote Shutdown:** Disabled will leave the host in maintenance mode. Enabled will shut down the hypervisor once all VMs have been evacuated.
- D. **Remote Shutdown of Virtual Machines:** Use this setting in HA clusters where the normal host VM Startup/Shutdown settings are disabled. This feature will shut down VMs with VMTools running on an HA host but will not allow preferential VM startup. The MUMC client will poll the host to check the status of VMs, and once all are shut down (no VMTools devices still running), the MUMC client will issue the shutdown command to the host.
- E. Power Source: Enter the IP address of your Dell UPS.
- F. Load Segment: Only use this variable if you are using Load Segments to preferentially control hardware startup/shutdown behaviour (e.g. servers and storage on separate profiles).
- G. Master Shutdown Duration: The time (in seconds) it takes for the host to shut down (including any vMotion activities). Make sure that the time between "Maintenance Timer" and "Master Shutdown After" gives enough time for any VM migrations to occur. Otherwise the migrations will fail and the VM will shut down on the original host location.
- H. Master Shutdown After: The time (seconds) following a power failure that the shutdown command should be sent to the host.



#### Figure 15: UPS Battery capacity over time

#### Figure 16: Shutdown sequence (from ULNM UG)



If there is a ULNM agent (Dell's node manager) installed on the server that is hosting the Hypervisor (VM Host), the shutdown is done by the ULNM agent. NOTE: The ULNM agent shutdown scenario (reference Figure 1: Dell UPS Management Software Connectivity Scenarios, "Hypervisor Agent" and "vMA Agent" columns) is not discussed in this document. Reference ULNM User's Guide for more information.

15. Click "Synchronize" to send the new settings to the hypervisor. Once synchronization is complete the red  $\neq$  will disappear.

Figure 17: Node Settings C Shutdown Settings Node configuration synchronize before and after

Node configuration			<b>&gt;&gt;</b>	Node co	nfiguration		
₩ Ε 192.168.0.112*	Synchronize Co	nfigurati	ions 🔻	5. E	192.168.0.112	Synchronize Config	urations
System Settings 🖉 —					System Settings 🖉 -		
UPS Contact: UPS Location:	Select all			UPS ( UPS L	Contact: .ocation:	Select all	
Shutdown Settings 🖉 🖡	ė				Shutdown Settings 🌶	•	
	Select a	<b>V</b>				Select all	
Remote Maintenance:	Maintenance Enable	d 🗸	≠	Remo	te Maintenance:	Maintenance Enabled	
Maintenance Timer:	15 second(s	) 🗸	≠	Mainte	enance Timer:	15 second(s)	
Remote Shutdown:	Shutdown Enable	d 🗸	≠	Remo	te Shutdown:	Shutdown Enabled	
Power source:	192.168.0.10	0 🗸	≠	Powe	r source:	192.168.0.100	
Load segment:	Master outpu	it 🔽		Load	segment:	Master output	
Master - Shutdown duration:	120 second(s	) 🗸		Maste	er - Shutdown duration:	120 second(s)	
Master - Shutdown after value:	60 second(s	;) 🗸	*	Maste	er - Shutdown after value	e: 60 second(s)	

At this point, the MUMC client configuration and setup are completed!

# VMware vCenter example

Here is an example of a VMware configuration. The setup includes:

- Two ESXi5 hosts running in a cluster environment
- A Linux OS running on each ESXi5 host (Linux1 and Linux2)
- Virtual machines stored in an iSCSI shared storage device (required for vMotion)



#### Figure 18: vCenter **C** MUMC client tab example

Cluster settings:

- DRS: Fully automated (to allow VMs to move under maintenance mode request)
- DRS Group Manager: Linux1 is set to prefer ESXi hostA. Linux2 to prefer hostB.
- DRS Rules: Basic rules are set up so that when exiting maintenance mode, each Linux VM will move back to its original host.

Cluster Features /Sphere DRS DRS Groups Manager	Use this page to create rule virtual machines only while virtual machines are moved	es for virtual machines within this d they are deployed to this duster a out of the duster.	uster. Rules will apply to nd will not be retained if the
Virtual Machine Options	Name	Туре	Defined by
Power Management	🖃 🗹 📁 2on2	Run VMs on Hosts	User
Host Options	Mgroup2	Cluster VM Group	
Mware EVC	HostGroup2	Cluster Host Group	
wapfile Location	🖃 🗹 🗯 1on1	Run VMs on Hosts	User
	W VMgroup1	Cluster VM Group	
	HostGroup1	Cluster Host Group	

#### Figure 19: vCenter Cluster Settings Rules

• Virtual Machine Options: Each machine is set to fully automatic.

#### Figure 20: vCenter Cluster Settings Virtual Machine Options

Cluster Features		
vSphere DRS DRS Groups Manager		machine automation levels.
Rules		
Virtual Machine Options	Set individual automation lev	vel options for virtual machines in the cluster.
Host Options		
VMware EVC	Virtual Machin	e or Automation Level contains: - Cle
Swapfile Location		
	Virtual Machine	Automation Level
	📑 Linux1	Default (Fully Automated)
	🔂 Linux2	Default (Fully Automated)

- Power Management is set to "off."
- EVC is not used.
- Swapfile is set to the same directory as the virtual machine.

#### Figure 21: vCenter Cluster Settings Swapfile Location



VM startup/shutdown profiles: Virtual machines were set to automatically start and stop with the host so that if the power failure extends longer than battery life, the host can shut down the VMs before finally shutting itself down.

#### Figure 22: vCenter <a> VM Startup and Shutdown</a>

Default Startup Delay       Default Startup Delay         For each virtual machine, delay startup for:       ID         ID       seconds         Continue immediately if the VMware Tools start       ID         Startup Order       Suspend         Power on the specified virtual machines when the system starts. During shutdown, they will be stopped in the opposite order.         Order       Virtual Machine         Automatic Startup       Startup Delay         I       Enabled       10 seconds         Suspend       10 seconds         Move Up       Move Up         Automatic Startup       Enabled       10 seconds         Manual Startup       Enabled       10 seconds       Suspend         Manual Startup       Edit	<b>ystem S</b> Allow vi	Settings /irtual machines to start a	and stop automa	atically with the sys	tem			
10       seconds         Continue immediately if the VMware Tools start       Shutdown Action:         Startup Order         Power on the specified virtual machines when the system starts. During shutdown, they will be stopped in the opposite order.         Order       Virtual Machine         Startup       Startup Delay         Automatic Startup       10 seconds         Suspend       10 seconds         Move Up       Move Up         1       Enabled       10 seconds         Any Order       Move Up         Manual Startup       Edit	Default S For each	Startup Delay virtual machine, delay s	tartup for:		For each	nutdown Delay — virtual machine, d — .	elay shutdown for:	
Startup Order         Yower on the specified virtual machines when the system starts. During shutdown, they will be stopped in the opposite order.         Order       Virtual Machine         Startup       Startup         Automatic Startup       Image: Startup         1       Image: Linux1         Enabled       10 seconds         Suspend       10 seconds         Move Up       Move Op         Manual Startup       Edit	10	seconds	VMware Tools st	tart	10 Shutdov	seconds vn Action:	Suspend	•
Automatic Startup     Startup Startup Delay     Silutuowin Silutuowin Silutuowin Silutuowin Silutuowin Delay       1	<b>tartup (</b> ower on t	<b>Drder</b> the specified virtual mad	nines when the s	system starts. Duri	ng shutdown,	they will be stopp	bed in the opposite o	rder.
1     Image: Second secon	Order	Maked Markins	Charles	Charters Dalars	Chubdaura	Chutdawa Dala		_
Any Order Manual Startup	Order	Virtual Machine	Startup	Startup Delay	Shutdown	Shutdown Delay	у	
Manual Startup	Order Automa	Virtual Machine atic Startup	Startup Enabled	Startup Delay	Shutdown	Shutdown Delay	У	Move Up
	Order Automa 1 Any Ord	Virtual Machine atic Startup Dinux1 der	Startup Enabled	Startup Delay	Shutdown Suspend	Shutdown Delay	γ	Move Up Move Down
	Order Automa 1 Any Ore Manual	Virtual Machine atic Startup D Linux1 der IStartup	Startup Enabled	Startup Delay	Shutdown Suspend	Shutdown Dela	y	Move Up Move Down Edit
	Order Automa 1 Any Ore Manual	Virtual Machine atic Startup Dinux1 der IStartup	Startup Enabled	Startup Delay	Shutdown	Shutdown Dela	y	Move Up Move Down Edit
	Order Automa 1 Any Ora Manual	Virtual Machine atic Startup Di Linux1 der IStartup	Startup Enabled	Startup Delay	Shutdown Suspend	Shutdown Delay	Y	Move Up Move Down Edit
	Order Automa 1 Any Ore Manual	Virtual Machine atic Startup Linux1 der IStartup	Startup Enabled	Startup Delay	Shutdown Suspend	Shutdown Delay	y	Move Up Move Down Edit
	Order Automa 1 Any Oro Manual	Virtual Machine atic Startup Linux1 der IStartup	Startup Enabled	Startup Delay	Shutdown Suspend	Shutdown Delay	y	Move Up Move Down Edit

#### MUMC Settings for ESXi5 HostB:

- Remote Maintenance: Enabled (will provoke VM move to HostA)
- Maintenance Timer: 10 seconds
- Remote Shutdown: Enabled (we want the HostB to power off gracefully to save battery runtime for HostA)
- PowerSource: IP address of Dell UPS

- Master Shutdown Duration: Time taken for HostB to shut down after VMs are evacuated
- Master Shutdown after value: 120seconds. This is the time after Maintenance Mode has been requested that the hypervisor should begin shutdown. This value must be large enough that all VMs have moved before host shutdown begins. If VM migration has not completed before the hypervisor shutdown begins, then the vMotion will fail and the VM will remain on the original host and shut down. There will be no data loss, but there will be a loss in service (the VM will be off).

Shutdown Setting	s Configuration	nent C 🧹	×
Remote Maintenance:	Maintenance Enabled		<b>v</b>
Maintenance Timer:	10	second (s)	<b>v</b>
Remote Shutdown:	Shutdown Enabled		<b>V</b>
Power source:	192.168.0.100		7
Load segment:	Master output		
Master - Shutdown duration:	240	second (s)	<b>V</b>
Master - Shutdown after value:	120	second (s)	✓
	Apply Cancel		

#### Figure 23: MUMC client C Shutdown Settings Shutdown Enabled

#### MUMC Settings for ESXi5 HostA:

- Remote Maintenance: Disabled (there will be no other failover hosts available)
- Maintenance Timer: -1 (not relevant as maintenance is disabled in point1)
- Remote Shutdown: Enabled (since we want the host to shut down VMs and power itself down when UPS battery gets low)
- PowerSource: IP Address of Dell UPS
- Master Shutdown Duration: 240 seconds
- Master Shutdown After Value: 240 seconds (the time since power failed when the hypervisor should begin the shutdown process. Normally you would match this value to your UPS battery runtime, but for testing we used 240 seconds.

Figure 24: MUMC client C Shutdown Settings Shutdown Value of 240 seconds

Shutdown Setting	s Configuration	nent C 🧹	×
Remote Maintenance:	Maintenance Disabled		
Maintenance Timer:	-1	second (s)	
Remote Shutdown:	Shutdown Enabled		<b>V</b>
Power source:	192.168.0.100		<b>v</b>
Load segment:	Master output		
Master - Shutdown duration:	240	second (s)	<b>V</b>
Master - Shutdown after value:	240	second (s)	<b>V</b>
	Apply Cancel		

#### In a simulated power failure:

- Host B receives "Maintenance Mode" Command from MUMC and moves Linux2 to HostA.
- Host B has completed shutdown.
- Host A is running Linux1 and Linux2.
- Host A receives shutdown command from the MUMC client. Based on VM/Host/Cluster settings the host will shutdown/suspend VMs before shutting down as well.

Figure 25: vCenter C MUMC client Shutdown/suspend VMs task

WIN-I6M6GS3IEOU - vSphere Clie	ent de la companya d					Compared Advanta Print Com					
	nistration Plug-ins Help	usters							Searc	h Inventory	
									00		
WIN-I6M6GS3IEOU  New Datacenter  Cluster  Cluster	WIN-I6M6G53IEOU, 192 Getting Started Datacent	2.168.0.7 VM Iters Virtua	lware vCe I Machines	nter Serv	e <b>r, 5.0.0, 455964</b> Tasks & Events Alarm	Permissions Maps Multi-UPS Manageme	nt Console				4
192.168.0.111 192.168.0.112 Linux1 Linux2	D¢LL	Multi-	UPS	Manag	ement Consol	9					Loqout'admin'   Help
	Views	« @	Node Li	st					6	Selection view	»
	Uiews		Туре	Status	Name	Description	Location	Contact	Link	Information	
	Node List			0	MUMC_Host	Windows NT/6.01.01			$\bigcirc$	MUMC Host	
	🖃 😋 Events			Ø	192.168.0.111	VMware ESXi 5.0.0 build-469512	Computer Room1		(	Description	Windows NT/6.01
	Events List			Ø	192.168.0.112	VMware ESXi 5.0.0 build-469512	Computer Room2		(	IP address	192.168
	Events Calendar			•	192.168.0.100	Dell UPS Tower 500W HV	Computer Room	Computer Room Manager	$\bigcirc$	Class	DELL Multi-UPS Managem Console / 01.03.01
	Nodes Settings									Link	
	Nodes Upgrade									Status	
	G G Settings									Shutdown duration	2 min (
	Actions									Power source shutoff	A
	Virtualization									Power Source	
	System									Events	(
	User List									Status Date	Message
										Ø 05/03/12-3:14:12 p	m Reported communic
										05/03/12-3:10:12 p	m Reported communic
										Ø 05/03/12-3:09:12 p	m Reported communic
										05/03/12-3:08:12 p	m Reported communic
										Ø 05/03/12-3:08:11 p	m Reported communic
			14 4	Page 1	of 1 🕨 🕅 🎥	25 V Items per page		Disp	laying 1 - 4 of 4	05/03/12-3:06:03 p	m Reported communic
	🚫 ОК: 3	() Warnin	g: 1	00	ritical: 0 🚫 Un	known: 0 Last event: () 05/03/12 - 3:	37:41 pm - 192. 168.0. 100 - The sy	stem is powered by the UPS bat	ttery		
t Tacke	,								Name, T	arget or Status contains: •	Cle
	Target St	tatus			Details	Init. vCente	r Server	Requested Start Ti 😴 Sta	rt Time	Completed Time	
Migrate virtual machine Enter maintenance mode	Linux2 4	43% 2%			Migrating the active sta Waiting for all VMs to b	teof Virtual Machine S 같이 V epowered off or migrated. In a M 같이 V	/IN-I6M6GS3IEOU /IN-I6M6GS3IEOU	03/05/2012 15:37:45 03/ 03/05/2012 15:37:44 03/	05/2012 15:37: 05/2012 15:37:	45 44	
Taraha 🖓 Alasara										Lissen Decision 175	Maket
_										License Period: 1/5 c	ays remaining Makata

**Note:** Host Shutdown Failure: In previous versions of the MUMC client, there was an issue that allowed the shutdown of a host with active VMs to fail, as shown in the screenshot below.

Figure 26: vCenter **Center** Recent Tasks

Name	Tar	get	Sta	tus	Details
Initiate host shutdown		192.168.0.111	8	The operationis not allowed in the current state.	
🖄 Initiate host shutdown		192.168.0.112	0	Completed	
Migrate virtual machine	Ð	Linux2	0	Completed	
Enter maintenance mode		192.168.0.112	0	Completed	
Reconfigure AutoStart Manager		192.168.0.111	0	Completed	
Reconfigure AutoStart Manager		192.168.0.112	0	Completed	

An effective work-around is to set Maintenance Mode to "Enabled." This will set the host to maintenance mode and then request shutdown and complete the process. Example screenshot of the failure is below. The problem has been resolved with Dell UPS Management Software, Release 2, 01.04.0010 (A02).

# Summary

Using Dell's console, MUMC, as an agentless plug-in with VMware vCenter provides integrated power management, visibility and control.

### References

#### **Dell Technical Information Notes:**

Available at dellups.com Configure & Technical Documentation Comport FAQ

- Activating Redundancy and Virtualization Modules
- Implementing Shutdown on VMware vMA 5.0.0.1 and 5.0.0.2
- Common Software Installation Scenarios
- Understanding Windows ® Event Log Scripts

#### **Dell Publications:**

Available at dellups.com Software & Technical Documentation SUser Manuals and Publications

- Dell Multi-UPS Management Console Installation and Configuration User's Guide
- Dell UPS Local Node Manager Installation and Configuration User's Guide