# Thermal Settings on Dell Latitude Devices managed by VMware Workspace One Intelligence

A common complaint from PC laptop users is that the fan is loud and seems to run most of the time. We know, however, that fans don't run without a reason. Modern mobile CPUs are designed to provide full power at peak usage, but not as a default. Upon investigation, we might find a bad driver, high numbers of agents running on the client and software with problems. In my experience, I've seen Skype consuming more than 20% of CPU, and the highest real-life draw from a single source was a DropBox agent which was taking 60% of CPU.

A CPU running near max capacity requires more cooling than one which is intermittently peaking. A couple of years ago, Dell released the Dell Power Manager to improve battery charging and provide different thermal profiles for users who prefer silent devices and have no problems with small impacts on performance. You can find information on Dell Power Manager here:

https://www.dell.com/support/home/enus/drivers/driversdetails?driverid=kdhhr&oscode=wt64a&productcode=latitude-5420-laptop

For one of my customers, I designed a test to show the differences between the baseline device performance and two Dell Power Manager profiles: Optimized and Quiet.

			max.		
		Score*	GHz	max. Temp	
Base line	N/A	551	3.6		98
Dell Power Manager	Power Manager Profile Quiet	539	3.33		89
Dell Power Manager	Power Manager Profile Optimized	551	3.6		99

\*generated with Intel Extreme Tuning Utility

The Quiet profile measured lower in the overall CPU score, but there was a noticeable difference in the maximum CPU temperature and maximum clock frequency.

Dell Power Manager has four options, each of which impacts performance and fan speed. The Optimized Profile option is the default on all Dell clients, but if you have software running in the background which needs a higher level of performance, it could trigger the fan to run because of the heat being generated. Users are sensitive today to this noise and fan-less devices like smart phones have re-set expectations. To address this, you would normally start with BIOS and driver updates, but the simplest fix may be to change the Profile to improve the user experience.

## **Managing Dell Power Management settings**

The Dell Power Manager has several options for changing settings.

1. User Interface



Figure 1: Dell Power Manager Thermal Management (Version 3.10.0)

2. Register Key

[HKEY\_LOCAL\_MACHINE\SOFTWARE\Policies\Dell\CommandPowerManager] "DoNotRemove"="Null" "TMSettingsGroup"="True" "TMPolicyVersion"="1.0.0" "TMMode"=dword:00000000 "TMModeBalanced"=dword:00000000 "TMModeCool"=dword:00000000 "TMModeQuiet"=dword:00000000 "TMModeUltra"=dword:00000000

## 3. ADMX-Templates for Active Directory Group Policies

Dell-Power-Manager-Service_KDHHR_WIN64_	_3.10.0_A0	00 > PolicyDefinitions ~	୍ ଓ	Search PolicyDefinitions		
^	□ N	ame		Date modified	Туре	Size
		de		12/10/2021 15:58	File folder	
		en		12/10/2021 15:58	File folder	
		es		12/10/2021 15:58	File folder	
		fr		12/10/2021 15:58	File folder	
		it		12/10/2021 15:58	File folder	
		ja		12/10/2021 15:58	File folder	
		nl		12/10/2021 15:58	File folder	
		pt		12/10/2021 15:58	File folder	
		ru		12/10/2021 15:58	File folder	
		zh-cn		12/10/2021 15:58	File folder	
		zh-TW		12/10/2021 15:58	File folder	
		] DellPowerManagerAdvancedChargeSett	ings.admx	30/08/2021 04:41	ADMX File	19 KB
		] DellPowerManagerBase.admx		30/08/2021 04:41	ADMX File	1 KB
		] DellPowerManagerBattery.admx		30/08/2021 04:41	ADMX File	5 KB
		] DellPowerManagerBatteryExtender.adm	x	30/08/2021 04:41	ADMX File	2 KB
		] DellPowerManagerGeneral.admx		30/08/2021 04:41	ADMX File	3 KB
		] DellPowerManagerPeakShiftSettings.ad	mx	30/08/2021 04:41	ADMX File	26 KB
		] DellPowerManagerPowerAlerts.admx		30/08/2021 04:41	ADMX File	29 KB
		DellPowerManagerThermalModes.adm		30/08/2021 04:41	ADMX File	5 KB

Figure 2: Unpacked Dell install file

This is provided for those who need the ability to change settings like these without Dell Power Manager installed on a device.

## **Thermal Management in BIOS**

Dell has added Thermal Management in the BIOS for newer Latitude and Precision mobile devices. Devices like the Latitude 7400 2-in-1 support these settings. If yours does not, it could mean that you need to update BIOS to gain this capability. To check if your device supports this feature, open your BIOS menu directly or through a PowerShell script.



Figure 3: Dell BIOS 7400 2-in-1

If you do not want to check all devices directly in BIOS, you can use Dell Command Configure and Dell Command Monitor to query each device for the availability of these settings.

You can also accomplish this through a Workspace One sensor to generate a dashboard showing which devices support thermal settings in BIOS. I've published a script for this in my Github Repository which you can download and use:

https://github.com/SvenRiebe/DellCommandMonitorSensorsWS1

## Sensor for checking thermal settings available in BIOS

\$thermal\_setting = Get-CimInstance -Namespace root\dcim\sysman -ClassName dcim\_biosenumeration
-Filter "AttributeName='Thermal Management'" | select -ExpandProperty Currentvalue

```
If ($thermal_setting -ge 1)
{$thermal = "supported"
}
else
{$thermal = "unsupported"
}
Write-Output $thermal
```

## Sensor for checking thermal profile value for the device

\$thermal\_mode = switch(Get-CimInstance -Namespace root\dcim\sysman -ClassName
DCIM\_ThermalInformation -Filter "AttributeName='Thermal Mode'" | Select -ExpandProperty
CurrentValue)

```
{
    0 {"Optimized"}
    1 {"Cool"}
    2 {"Quiet"}
    3 {"Performance"}
    }
write-output $thermal_mode
```

## Automated thermal settings through VMware Workspace One Intelligence

In a highly mobile environment, you can manage the thermal settings using Workspace One Intelligence. The idea is that if devices should have the Optimized profile, Workspace One Intelligence will use a workflow to identify which devices have the wrong setting and change it to the correct value in their BIOS. This will work when the client has an internet or VPN connection, and it does require a device reboot.

Two sensors are helpful for this workflow. First, check to ensure that each device has the option to set this value through BIOS. If it's not possible for a device, filter it out. For each device which supports these settings, check the value of the profile and if it is **NOT** set to 'Quiet', then deploy a BIOS setting by app to this device (you need to ignore all devices with the 'Quiet' profile as a change will affect the user experience).



Figure 4: Sensors for the workflow

Once you deploy the sensors, it could take some time before you see the results. You can steer this by the assignment, i.e., if the sensor runs to establish the baseline or if is it triggered by events like a login. In my case, I run the sensor first to establish the baseline, then run it again at each start-up, since the user may have changed this in BIOS through Dell Power Manager.

My Dashboards > Thermal Check Owner	ADD WORLT ST
V Add Filter	thermal setting → supported (100%)
Thermal Mode BIOS	Thermal setting support Grouped by: oem_model Lattude 7400 2-in-t: 2
⊕ thermal_mode      ∨      ⊡ Donut      ∨	⊕ thermal_setting ~ ② Donut Latitude 5300: 1     Latitude 5420: 1
Guet 5 Total Continued	Lathole 930C 1 Subtota: 6 of 6 Total
Inermal_mode (2)	supported
VIEW (2 tags) ···	VIEW (2 tags) ····

Figure 5: Dashboard for sensors

We can now see the devices which support thermal setting in BIOS, as well as their current settings. Now, let's return to the planned workflow to automate the process to check these two sensors and set all non-Quiet profiles to Quiet.

Start first with a PowerShell script to change the thermal setting. The values which can be set are:

0 {"Optimized"} 1 {"Cool"} 2 {"Quiet"} 3 {"Performance"}

You can use a script to change the thermal setting to value 2 = Quiet. I have generated a script for this task which you can use, or you can build this yourself if you choose.

#### **BIOS setting with PowerShell**

Please note: You will need Dell Command | Monitor on your client to use this script.

```
# WS1 BIOS Thermal Profile as Dell Command Monitor script for PowerShell execution
# Author: Sven Riebe Twitter: @SvenRiebe
# Version: 1.0
# Status: Test
# If you have BIOS PW on this device put in here the pw for authorization
$adminpw = "Password1234!"
#Start logging
Start-Transcript -Path "C:\temp\thermalsetting.txt" -Append
#checking exiting value
Get-CimInstance -Namespace root\dcim\sysman -ClassName dcim_biosenumeration -Filter
"AttributeName='Thermal Management'" | select Currentvalue
```

```
\#Power Profile Manger in BIOS 1 = Optimized, 2 = Cool, 3 = Quiet, 4 = UltraPerformance set to Quite slient Fan for Latitude
```

Get-CimInstance -Namespace root\dcim\sysman -ClassName DCIM\_BIOSService | Invoke-CimMethod -MethodName SetBIOSAttributes -Arguments @{AttributeName=@("Thermal Management");AttributeValue=@("3");AuthorizationToken=\$adminpw}

#checking value again
Get-CimInstance -Namespace root\dcim\sysman -ClassName dcim\_biosenumeration -Filter
"AttributeName='Thermal Management'" | select Currentvalue

#Stop logging Stop-Transcript

https://github.com/SvenRiebe/ws1appscripts/blob/main/ws1 script thermal bios settings V1 0 0.ps1

The script includes a log which Is addressed later in this article.

In the future, Workspace One UEM will support PowerShell to run directly like an app. However in my sandbox, the update is not finished so I will deploy this script as an internal application since this is the option I can use later in my workflow.

#### Preparing the App for deployment by Workspace One UEM

Zip the PowerShell with a dummy.exe file first.

th	thermal_quiet.zip 🗸 🖉 🖉 Search thermal_quiet.zip							
^		Name	Туре	Compressed size	Password	Size	Ratio	Date modified
		📧 dummy.exe	Application	0 KB	No	0 KB	0%	11/06/2021 11:33
		🙀 thermal_quiet.ps1	Windows PowerShell Script	1 KB	No	1 KB	39%	14/06/2021 17:56

The package is now ready for the deployment. Upload the Zip-File to the Workspace One UEM, and deploy it as a Native app to the devices. Click on Applications -> Native and Add.



Upload the file and click continue.

Add Application						×
Organization Group ID <mark>*</mark>				]		
Application File *	thermal_quiet.zip			UPLOAD	]	
ls this a dependency app?	YES	NO	(i)			
					CONTINUE	CANCEL

Input is needed from you for the App deployment.

## Details:

Name: BIOS Thermal Profile Quiet

Supported Processor Architecture: 64-Bit

Add Application - thermal_quiet.zip v 1.0.0.0 Internal   Managed By: UW-Germany   Application ID: (84c96067-c85e-4342-957b-6e3e465cc2e5)						
Details Files Deployment Options	Images Terms of Use					
Name*	BIOS Thermal Profile Quiet	$\odot$				
Managed By	UW-Germany					
Application ID *	{84c96067-c85e-4342-957b-6e3e465cc2e5}					
App Version *	1.0.0.0	$\odot$				
Build Version	{84c96067-c85e-4342-957b-6e3e465cc2e5}					
Current UEM Version	1.0.0.0	0				
Supported Processor Architecture	64-bit • (]					
ls Beta	YES NO ()					
Update Notifications	NOTIEY NONE CO					
		SAVE & ASSIGN CANCEL				

Files:

There are no mst-files or others which require a uninstall. You could make a script for moving back to Optimized, but uninstall is mandatory for non-msi. Type anything you want in the **uninstall command** field.

	Add Application - thermal_quiet.zip v 1.0.0.0 Iternal   Managed By: UW-Germany   Application ID: (84c96067-c85e-4342-957b-6e3e465cc2e5)	
Details F	es Deployment Options Images Terms of Use	
> App	fransforms	
> App	Patches	
App U	Install Process	
(i) Uplo	d any scripts to identify the course of actions to be run to uninstall the application.	
Custo	n Script Type* UPLOAD INPUT	
Unins	all Command *	
	SAVE & ASSIGN	ANCEL

#### **Deployment Options**

Install Command: powershell -executionpolicy bypass -file ws1\_script\_thermal\_bios\_settings\_V1\_0\_0.ps1

Install Timeout: 5 (Specify the amount of time, in minutes, that the installation process can run before the installer considers the installation may have failed and no longer monitors the installation operation. The limit on the install timeout is 150 minutes. **Recommendation:** reduce time from 60 min to 5 min to save time in case of troubleshooting)

Add Application -	thermal_quiet.zip v 1.0.0.0 any   Application ID: {84c96067-c85e-4342-957b-6e3e465cc2e5}	
Details Files Deployment Options	Images Terms of Use	
How To Install		
Install Context	DEVICE USER ()	
Install Command *	powershell -executionpolicy bypass -file thermal_quiet.ps1	• ()
Admin Privileges	YES NO	
Device Restart	Do not restart	0
Retry Count *	3	0
Retry Interval *	5	0
Install Timeout *	5	0
Installar Rahoot Evit Coda		$\bigcirc$
		SAVE & ASSIGN CANCEL

Since this is a non-msi, it means Workspace One UEM will need a need a key for success. I will use the logging file – though there are other options, this is the easiest way to check an existing file.

Add Criteria	×
Criteria Type <b>*</b>	File exists • (i)
Path *	c:\temp\thermalsetting.txt
Version *	Any ×
Modified On *	1/21/2021 12:00 AM · (i)
	ADD CANCEL

The app deployment is now ready for assignment. Click Save & Assign.

How To Install			
Install Context	DEVICE USER ()		
Install Command *	powershell-executionpolicy bypass -file thermal_quiet.ps1	• 0	
Admin Privileges	YES NO		
Device Restart	Do not restart	* ()	
Retry Count *	3		
Retry Interval *	5	$\odot$	
Install Timeout *	5	0	
Installer Reboot Exit Code		0	
Installer Success Exit Code			
Vben To Call Install Complete			
Identify Application By *	DEFINING CRITERIA USING CUSTOM SCRIPT		
	1. File exists - c:\temp\thermalsetting.txt		A 🖸 . 🗸

You can now assign all Dell laptops for this app. I made a sensors group which excludes all devices which are not laptops. You will need this if you do not have a new smart group which includes all the relevant devices where the app should be deployed.

I am working with the app as 'IT only' which restricts users from accessing the app via the Software Center. If you want to allow your users to run the BIOS settings themselves, you can activate the **Display in App Catalog**. The deployment is on demand, and in this instance, I chose not to deploy it to all of my devices – only later, to specific devices.

BIOS Thermal Profile Quiet	- Assignment			×
Distribution Restrictions	¢à	Distribution		
		Name *	All Dell Notebooks	_ /
		Description	Assignment Description	]
		Assignment Groups *	To whom do you want to assign this app? (Seman All Servers (all Servers (all Servers))	
		Deployment Begins *	07/79/2021 💼 12:00 AM ~ (GMT-12:00) International Date Line West	
		App Delivery Method *	O Auto	1
		Allow User Install Deferral *		©
		Display in App Catalog		٦
1				CANCEL SAVE

## Click now save.

BIO	3IOS Thermal Profile Quiet - Assignment ×							
Deta App Assid	Details App Version: 1.0.0.0 UEM Version: 1.0.0.0 Platform: Windows Desktop Status: ⊘ Active Assignments Exclusions							
Devic assign	Assignments EXclusions Devices will receive application based on the configurations below. Devices with multiple assignments will receive policies in priority order. Adjusting the priority for a single assignment will automatically reprioritize other assignments. Select the assignment to edit. Adding a new assignment to edit. Adding a new assignment to edit. Adding a new assignment to edit. Adding and the bottom of the list.							
	Priority	Assignment Name	Description	Smart Groups	App Delivery Method	EMM Managed Access		
:	0 ~	All Dell Notebooks		1	On Demand	Senabled		
						CANCEL SAVE		

Make a short check to ensure that everything is working correctly with the assignment and click Publish.



The app is now visible.

•	Deell	BIOS Thermal Profile Quiet		1 version(s)	
	0	Deel	BIOS Thermal Profile Quiet	1.0.0.0	

### Automation by Dell Command | Monitor and Workspace One Intelligence.

The sensors are now in place to identify the right devices and the approach to change the BIOS settings has been determined. Let's look at the workflow.

Open Workspace One Intelligence and click on Automations.



Add a Custom Workflow now.

() ()	/orkspace ONE	nce Q	DASHBOARDS Y	
Home	Getting Started	Solutions	Dashboards	Automations
		~		
😚 Intelli	gence Automations			
Work	flows			
			From	Template om Workflow

The Category is Workspace One UEM -> Device Sensors. This will enable us to use the sensors we have in place.

Select a cate	egory to get started.		
CATEGORY ~	Workspace ONE UEM	>	Anns
	BETTER Mobile	>	Devices
	Carbon Black	>	Devices
	Check Point	>	Device Custom Attributes
	Employee Experience	>	Device Risk Score
	Lookout	>	Device Sensors
			macOS Updates

Give this workflow a name like 'BIOS Thermal Quiet Profile' and chose an option on how this workflow will run. You can schedule it to run once a week and choose this as Automatic or Manual.

Edit Workflow								
Category:	Category: Workspace ONE UEM: Device Sensors							
BIOS	Thermal Quiet Profile							
Trigger	(When) ①							
	Workspace ONE UEM: Device Sensors Data							
●	Manual	í						
	Trigger Option							
Automatic           Filter (         Automatically execute the workflow when incoming events match the filter								
the 2 AI	Schedule Define when the filtered results should execute							
	Manual Execute the workflow On-Demand (good for one-time actions)							
		Includos						

Now let's use the sensors to filter for devices with non-Quiet profile and which support BIOS thermal settings.

Filte	Filter (If) 🗊							CLOSE
<b>T</b> 2	thermal_settin AND therma	ng includes (supported) I_mode does not include	e (Quiet)					© @
		thermal_setting	<u>×</u>	Includes	~	supported X	<u> </u>	+ <del>[]</del>
		thermal_mode	<u>×</u>	Does Not Include	~	Quiet X	<u> </u>	÷ 🗓

Next, plan the actions you will take – in this case, we are using Workspace One UEM to take the action 'Install Internal Application'.

Action (Then) (1)					
New Action (Empty)       Q     Search for trigger or connectors	Ü				
Available Connectors (4)					
<b>Install Internal Application</b> Install a managed, internal application on a device					

Select the new app which was previously generated for the needed BIOS settings.

P	Workspace ONE UEM $\rightarrow$ Install Internal Application (1)						
	Body						
	Device ID	\${airwatch.device_id}					
	Path Variables						
		• Search for existing values					
	Application Name	BIOS Thermal Profile Quiet (26795719-b3fe-4ae2-b475-580ebab3b14b) · Optional					

In this case, one device is matched. Enable the workflow and click 'Save'.

Summary
Filter Results ① Last updated a few seconds ago 3
VIEW
Basic Info Created By td.sven.riebe   Thu, Jul 22, 2021 3:57 PM Modified By System   Mon, Nov 15, 2021 5:17 PM
Enable workflow

We have now generated a full managed workflow.



Please note that you can easily automate another device setting in the same way, such as setting Thunderbolt security.

Some may say that it's not secure to use a BIOS password in clear text in PowerShell. This is indeed true, but the purpose of this article is to provide an understanding of how orchestration could work. There are options if you want to protect the BIOS password:

- 1. Build one script for Settings and one for File Clearing and deploy both as zip files to the device (this is a workaround). This prevents someone from capturing the BIOS password.
- Dell offers Dell Command | Configure (DCC), where DCC has the option to build a .exe which includes password and settings. That way, the password would not be discoverable in clear text. You can take this .exe and make a deployment like what was done with the zip file in the previous option.
- 3. If you are using the BIOS Profile from Workspace One, it handles the BIOS password through a secure communication. This adds steps to the workflow, where the first step deletes the BIOS profile (removing the old password), the second step deploys the script without password and the last step redeploys the BIOS profile again. This allows the thermal setting to be changed without the password appearing in clear text.

Trigger (When) 🗊								
Workspace ONE UEM: De	Workspace ONE UEM: Device Sensors Data Manual (j)							
Filter (If) ③								
<ul> <li>thermal_setting includes (</li> <li>AND thermal_mode does</li> </ul>	supported) s not include (Quiet)	Ø []						
Action (Then) 🗊								
✓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	ightarrow Install Internal Application							
Device ID:	\${airwatch.device.device_id}							
Application	13161							
ID:								

Let me know if you have other ideas to share. Thank you for reading this blog.  $\overline{oldsymbol{arepsilon}}$