Power Policy Configuration and Deployment in Windows

October 21, 2010

Abstract

Windows Vista® and later versions of Windows® feature a redesigned power policy store that enables third-party extensibility and configuration by using Windows Group Policy. This paper describes the Windows power policy store, demonstrates common power policy configuration tasks, and provides reference information about native power settings in Windows.

This information applies for the following operating systems:
 Windows Server® 2008 R2
 Windows 7
 Windows Server 2008
 Windows Vista

References and resources discussed here are listed at the end of this paper.

For the latest information, see:
 <http://www.microsoft.com/whdc/system/pnppwr/powermgmt/PMpolicy_Windows.mspx>

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Document History

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| October 21, 2010 | Corrected the description for the processor idle state settings. |
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# Introduction

Windows Vista® and later versions of Windows® feature a new power policy storage mechanism and infrastructure that is called the power policy store and enables several important Windows power management features:

* **Extensibility**: Third-party device and application vendors can install additional power settings by customizing an existing power plan. These power settings can be configured by using the same tools and user interface elements as Windows-installed power settings.
* **Group** **Policy**: All power policy settings in Windows can be enforced to specific values by using Group Policy. This enables enterprises to easily enforce display and sleep idle time-out power settings that can help reduce computer energy consumption and associated expenses.
* **Simplicity**: All users manipulate the same set of power plans. Users do not need administrative credentials to change most power policy preferences.
* **Security**: System administrators can restrict access to power settings on a per-user or per-group basis.

This paper introduces the Windows power policy store and describes how to use Group Policy to deploy power policy. This paper also demonstrates how to perform common power policy configuration tasks by using PowerCfg, the power policy command-line configuration tool that is included with Windows.

# Power Policy User Experience

The new Windows battery meter and the Control Panel Power Options application make it easy for users to control energy savings and adjust power policy configuration on their systems. Before customizing power policy values, manufacturers should become familiar with these user-interface components of Windows power policy.

## Battery Meter

For most portable computer users, the Windows battery meter is the first entry point to power policy management. The battery meter enables a user to easily determine remaining battery power and charge status. The battery meter also lets the user change the active power plan. The battery meter displays the active power plan and one power plan from each power plan personality.

Figure 1 shows basic battery status, which appears when the user moves the mouse pointer over the battery icon in the notification area.



Figure 1. Battery meter status

Figure 2 shows detailed battery status and provides the user the ability to change the active power plan. These options appear when the user clicks the battery icon in the notification area.



Figure 2. Battery meter power plan selection

## Control Panel Power Options Application

The Control Panel Power Options application that is shown in Figure 3 displays the list of installed power plans and enables the user to change individual power setting values in a specified power plan. Power Options lets the user quickly change common power policy settings such as the display idle time-out power setting. Power Options also lets the user create new power plans or restore the default settings for a power plan.



Figure 3. The Control Panel Power Options application

## Advanced Settings in Power Options

The Advanced settings tab in the Control Panel Power Options application (Figure 4) lets the user view and change all power settings that are installed on the system. Advanced settings includes power settings that have been installed by third-party application and device software.



Figure 4. Power Options Advanced settings

# Windows Power Policy Store

The Windows power policy store was redesigned to enable key power management features, including extensibility and deployment of power policy by using Windows Group Policy. The power policy store contains definitions for power settings and power plans that let the user change multiple power policy values with a single profile.

This section describes the power policy store, including power setting definitions, power plans, and power setting attributes.

## Power Setting Definitions

The power setting is the most basic component of Windows power policy. Every Windows power setting has a definition that includes all the information to describe the power setting and its possible values.

Each power setting configures a single power management behavior. Examples of power settings include the display idle time-out and the system power button action.

The power policy store in Windows separates the definition of a power setting from the possible AC and DC (on battery) values for that power setting. This abstraction makes the power policy store extensible because new power settings for third-party devices and applications can be added to the store.

A power setting definition includes:

* Power setting globally unique identifier (GUID). Every power setting is uniquely identified by a GUID, which is used throughout Windows power policy configuration tools and the API set to identify specific power settings. The power setting GUID distinguishes each power setting and is key to enabling third-party extensibility of power policy for Windows.
* Friendly name and description strings. The power setting friendly name and description strings describe the purpose and intent of the power setting. These strings appear in the Control Panel Power Options application and in other power management user interfaces in Windows.
* Allowed values. Allowed values specify the potential values that the power setting can have. Power setting values are expressed as either a range of values or a list of discrete values. For example, a power setting can have a range of values such as 0 to 100 percent or it can have discrete “on” and “off” values.
* Attributes. Each power setting definition contains a set of attributes. Windows defines a single attribute, ATTRIB\_HIDE, that determines whether the power setting is hidden or appears on the Power Options Advanced settings tab.
* Security descriptor. The power setting security descriptor enables administrators to restrict access to the power setting on a per-user basis. Power setting attributes and security descriptors are discussed in more detail later in this paper.

Power Setting Value Ranges. Power settings that control time-outs or percentages are expressed as a range of potential values. A range of potential values is defined by the following properties:

* Minimum value
* Maximum value
* Allowed increment
* Unit label

For example, the display idle time-out and display brightness power settings are defined as a range of values. The minimum, maximum, and allowed increment properties are specified as integers, whereas the unit label is a string.

The following example uses the PowerCfg command-line tool to display the definition of the display idle time-out power setting, which configures the period of inactivity before the display is automatically powered off:

C:\>powercfg /q SCHEME\_CURRENT SUB\_VIDEO

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced)

 Subgroup GUID: 7516b95f-f776-4464-8c53-06167f40cc99 (Display)

 Power Setting GUID: 3c0bc021-c8a8-4e07-a973-6b14cbcb2b7e

 (Turn off display after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x0000012c

 Current DC Power Setting Index: 0x0000012c

For more examples of using PowerCfg, see “Using PowerCfg to Configure Power Policy” later in this paper.

Discrete Values for Power Settings. Discrete values are used to define power settings that have an on/off behavior or power settings that let the user choose one value from a list of several values.

The following example uses PowerCfg to display the allowed values for the Prompt for Password on Resume from Sleep and Power Button Action power settings:

C:\>powercfg /q SCHEME\_CURRENT SUB\_BUTTONS

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced)

 Subgroup GUID: 4f971e89-eebd-4455-a8de-9e59040e7347

 (Power buttons and lid)

 Power Setting GUID: 7648efa3-dd9c-4e3e-b566-50f929386280

 (Power button action)

 Possible Setting Index: 000

 Possible Setting Friendly Name: Do nothing

 Possible Setting Index: 001

 Possible Setting Friendly Name: Sleep

 Possible Setting Index: 002

 Possible Setting Friendly Name: Hibernate

 Possible Setting Index: 003

 Possible Setting Friendly Name: Shut down

 Current AC Power Setting Index: 0x00000001

 Current DC Power Setting Index: 0x00000001

## Power Setting Subgroups

A power setting subgroup is a logical collection of power settings. For example, the power button action and sleep button action settings logically belong together in a group of system button power settings. Power setting subgroups simplify access to and configuration of power policy.

A power setting subgroup has the following properties:

* A GUID that uniquely identifies the subgroup.
* A friendly name and description string.
* A list of power setting definitions that the subgroup contains.

Similar to power setting definitions, each power setting subgroup has a GUID that uniquely identifies the subgroup. Power setting subgroups also have a friendly name and description string that are used on the Power Options Advanced settings tab to identify the subgroup.

Each power setting must belong to a single power setting subgroup. Power settings typically belong to a subgroup that contains similar power settings. For example, the sleep settings subgroup contains power settings that are related to sleep and resume, including hybrid sleep time-out and sleep idle time-out. Power settings that do not belong to any other logical subgroup belong to a special “no subgroup” subgroup, which is identified with its own GUID.

The following example uses PowerCfg to display all the power settings in the sleep settings subgroup:

C:\>powercfg /q SCHEME\_CURRENT SUB\_SLEEP

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced)

 Subgroup GUID: 238c9fa8-0aad-41ed-83f4-97be242c8f20 (Sleep)

 Power Setting GUID: 29f6c1db-86da-48c5-9fdb-f2b67b1f44da

 (Sleep after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x00000e10

 Current DC Power Setting Index: 0x00000384

 Power Setting GUID: 94ac6d29-73ce-41a6-809f-6363ba21b47e

 (Allow hybrid sleep)

 Possible Setting Index: 000

 Possible Setting Friendly Name: Off

 Possible Setting Index: 001

 Possible Setting Friendly Name: On

 Current AC Power Setting Index: 0x00000000

 Current DC Power Setting Index: 0x00000000

 Power Setting GUID: 9d7815a6-7ee4-497e-8888-515a05f02364

 (Hibernate after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x0000fd20

 Current DC Power Setting Index: 0x0000fd20

## Power Plans

A power plan (also known as a power scheme) contains the power setting values that are actually in effect on a system. Only one power plan can be active at a time. Users change the overall system power savings or performance characteristics by changing the power plan for the system.

A power plan contains:

* Power plan GUID. The power plan GUID uniquely identifies the power plan to distinguish it from all other power plans on the system. Software and configuration utilities can refer to the power plan by using this unique identifier instead of a zero-based integer index or name string as was required by versions of Windows earlier than Windows Vista®.
* Power plan friendly name and description strings. The power plan friendly name and description strings are used to identify the power plan in the Control Panel Power Options application and in the PowerCfg command-line tool.
* Power plan personality attribute. The power plan personality attribute indicates the overall power-saving behavior of the plan. The personality attribute helps indicate to software the user’s system-wide intent for power savings or performance. For more information, see ”Power Plan Personality” later in this paper.
* AC and DC value preferences for power settings. A power plan contains an AC and DC value preference for each power setting. The AC value is used when the system is running on AC power (also known as utility power), and the DC value is used when the system is running on battery power. DC values are used only on systems that have a battery or an attached uninterruptible power supply (UPS). AC values for battery settings such as the critical battery threshold are not used on any system.

It is important to remember that the power setting *definition* lists the potential values for a power setting. However, the power *plan* contains the actual value preference that is to be used for that power setting. This enables the user to instantly change preferences for multiple power settings by changing power plans.

More than one power plan can be installed on a given system. Table 1 lists the default power plans that are installed with Windows.

Table 1. Default Windows Power Plans

| **Friendly name** | **Description** | **GUID** |
| --- | --- | --- |
| Balanced | Automatically balances performance with energy consumption on capable hardware. | 381b4222-f694-41f0-9685-ff5bb260df2e |
| High performance | Favors performance but can use more energy. | 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c |
| Power saver | Saves energy by reducing the computer’s performance when possible. | a1841308-3541-4fab-bc81-f71556f20b4a |

The following example uses **powercfg / list** to enumerate the power plans that are installed on a system:

C:\>powercfg /list

Existing Power Schemes (\* Active)

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Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced) \*

Power Scheme GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c (High performance)

Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver)

## Active Power Plan

A power plan must be active for the power setting preferences in the power plan to be applied to the system. Any power plan that is installed on a system can be the active power plan. Only one power plan can be active at a time.

A user can make a power plan active by using the Control Panel Power Options application, the battery meter, or the PowerCfg tool. A system administrator can specify the active power plan by using Windows Group Policy.

When a power plan becomes active, the Windows kernel power manager enumerates AC and DC value preferences for each power setting and applies those values to the system. The kernel power manager uses the AC and DC value preferences according to the current system power source (utility power or battery) and automatically switches between the AC and DC values as needed.

The active power plan remains active until the user or system administrator makes a different power plan active. The active power plan persists across system shutdown, restart, sleep transition, user logon, user logoff, and user session change.

## Power Plan Personality

The power plan personality indicates the overall power-saving intent of the power plan. Table 2 lists the power plan personalities that Windows supports.

Table 2. Power Plan Personalities

| **Name** | **Intent** | **GUID** |
| --- | --- | --- |
| Balanced | The power plan balances performance and energy savings dynamically on capable hardware. | 381b4222-f694-41f0-9685-ff5bb260df2e |
| High performance | The power plan delivers maximum performance at the expense of energy savings. | 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c |
| Power saver | The power plan delivers maximum power savings, possibly at the expense of system performance. | a1841308-3541-4fab-bc81-f71556f20b4a |

The GUID for each power plan personality matches the GUID of the default Windows power plans in Table 1. By default, Windows installs one power plan for each supported power plan personality.

Although Windows supports only three power plan personalities, more than three power plans can be installed on a system. Each power plan has one of the personalities in Table 2.

Tagging each power plan with a personality allows Windows to inform software of the overall system power-saving behavior by broadcasting the personality of the active power plan. Instead of having to check individual power setting values, applications and device drivers can check the personality of the active power plan to determine whether they should change their power-saving or performance behavior.

## Power Setting Attributes

Every power setting definition has a list of bitwise attributes that provide more information about the power setting. Windows supports a single power setting attribute, ATTRIB\_HIDE, which indicates whether the power setting should be hidden or should appear on the Power Options Advanced settings tab.

The ATTRIB\_HIDE attribute lets system administrators and manufacturers control which power settings appear on the Advanced settings tab. This attribute can be set or cleared for any power setting, including third-party settings that are installed with applications or device drivers, by using the PowerCfg tool. For more information, see “Change Power Setting Attributes” later in this paper.

## Power Setting Infrastructure Updates for Windows 7

There are very few changes to the Windows power setting infrastructure store in Windows 7.

The most significant change is in the user experience. The prominence of the default High Performance power plan is reduced to encourage users to save power and extend portable computer battery life. Users can now choose the High Performance power plan in the Control Panel System and Maintenance application by selecting **Show Additional Plans** under **Power Options**. By default, the Windows Battery Meter in Windows 7 lets users choose between the Power Saver and the Balanced power plans.

# Group Policy Control of Power Settings

System administrators can enforce specific power setting preferences by using Group Policy in Windows. This capability can be used to set energy-saving features such as display and system sleep idle time-outs in the enterprise, which helps reduce energy consumption and the associated costs of powering computer systems.

## Deploying a Display Idle Time-out

The display idle time-out automatically powers off display devices that are attached to a system after a period of user inactivity. In the default Windows power plans, this time-out varies according to the power plan personality.

The display idle time-out can have a substantial effect on the power consumption of the display device. Enforcing the display idle time-out through Group Policy enables an administrator to specify a time-out value that users cannot change.

Although the actual savings that result from enforcing a display idle time-out vary by usage patterns and the specific display device, the energy savings can be significant, particularly on systems that are equipped with CRT monitors.

The following example uses PowerCfg to display the power setting definition for the display idle time-out power setting:

C:\>powercfg /q SCHEME\_CURRENT SUB\_VIDEO

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced)

 Subgroup GUID: 7516b95f-f776-4464-8c53-06167f40cc99 (Display)

 Power Setting GUID: 3c0bc021-c8a8-4e07-a973-6b14cbcb2b7e

 (Turn off display after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x0000012c

 Current DC Power Setting Index: 0x0000012c

The display idle time-out power setting is defined as a number of seconds with a minimum of zero (0) for no display idle time-out. In the preceding example, the current value in the Balanced power plan is 300 seconds (hexadecimal 0x12C) or 5 minutes.

Enforcing a Display Idle Time-out by Using Group Policy. To enforce a display idle time-out by using Group Policy, use the Group Policy Object Editor to open a Group Policy Object (GPO). The power management policies are located in Power Management under Computer Configuration > Administrative Templates > System > Power Management. Note that there are no power management policies under User Configuration in Windows.

The display idle time-out policy is located in Video and Display Settings under Power Management. There are separate policy objects for both AC (utility) and DC (battery) power.

To set the display idle time-out power setting for AC power

1. Click Properties for the Turn Off the Display (Plugged In) policy. Windows displays the dialog box that is shown in Figure 5.

 

Figure 5. Turn Off the Display (Plugged In) Properties dialog box

2. Click Enabled and enter a display idle time-out value in the Turn Off the Display (seconds) box.

The display idle time-out value is represented in seconds with a minimum of zero (0) (never turn off the display). In this example, the display idle time-out value is set to 600 seconds (10 minutes).

3. Click OK to save the policy setting value.

4. Use Group Policy Management to deploy the edited GPO to one or more systems.

Validating a Display Idle Time-out That Is Enforced by Group Policy. To confirm that the display idle time-out power setting is enforced on a system by using Group Policy, view the setting in the Control Panel Power Options application or use PowerCfg to try to change the setting value.

Figure 6 shows Power Options with a display idle time-out of 5 minutes enforced with Group Policy. The message in the yellow banner indicates to the user that some power settings are enforced by the system administrator, and the Turn off the display control for changing the display idle time-out is disabled.



Figure 6. Power Options where Group Policy enforces the display idle time-out

The following example uses PowerCfg to try to set the display idle time-out for AC to 5 minutes. However, because the display idle time-out is enforced with Group Policy, the command fails and PowerCfg indicates that a Group Policy value exists for this power setting:

C:\>powercfg ‑setacvalueindex SCHEME\_CURRENT SUB\_VIDEO VIDEOIDLE 300

Group policy override settings exist for this power scheme or power setting.

## Deploying a Sleep Idle Time-out

The sleep idle time-out automatically places a system into a low-power sleep state after a period of user and system inactivity. In the default Windows power plans, the sleep idle time-out value varies by power plan personality. By default, the sleep idle time-out is enabled in all power plans except the High Performance power plan.

Enforcing the sleep idle time-out can help reduce the energy consumption of a system by automatically putting the system into a low-power sleep state when the system is not in use. Sleep saves all the user’s open programs and documents and lets the user quickly resume working with the system instead of waiting for it to start after shutting down the system completely. The power consumption of a desktop system in sleep is comparable to the power consumption of hibernate or shut down.

The power setting definition for the sleep idle time-out resembles the display idle time-out. The following example uses PowerCfg to display the sleep idle time-out:

C:\>powercfg /q SCHEME\_CURRENT SUB\_SLEEP

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced)

 Subgroup GUID: 238c9fa8-0aad-41ed-83f4-97be242c8f20 (Sleep)

 Power Setting GUID: 29f6c1db-86da-48c5-9fdb-f2b67b1f44da (Sleep after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x00000e10

 Current DC Power Setting Index: 0x00000384

The sleep idle time-out is defined as a number of seconds, with a minimum of zero (0) (never idle to sleep).

To enforce a sleep idle time-out value by using Group Policy, use the Group Policy Object Editor to open a GPO. The power management policies are located in Power Management under Computer Configuration > Administrative Templates > System > Power Management.

The sleep idle time-out policy is located in Sleep Settings under Power Management. There are separate policy objects for both AC (utility) and DC (battery) power.

To set the sleep idle time-out setting for AC power

1. Click Properties for the Specify the System Sleep Timeout (Plugged In) policy. Windows displays the dialog box shown in Figure 7.

 

Figure 7. Specify the System Sleep Timeout (Plugged In) properties dialog box

2. Click Enabled and enter the sleep idle time-out value in the System Sleep Timeout (seconds) box. The sleep idle time-out value is represented in seconds with a minimum of zero (0) (never idle to sleep). In this example, the time-out value set is 1200 seconds (20 minutes).

3. Click OK to save the policy setting value.

4. Use Group Policy Management to deploy the edited GPO to one or more systems.

## Enforcing a Default Active Power Plan

In addition to enforcing individual power setting values such as the display and sleep idle time-outs, Group Policy can be used to enforce the use of a single power plan on the system. Enforcing a single power plan lets an administrator require that a system always use one of the Windows default power plans. Alternatively, the administrator can enforce use of a custom power plan that is installed onto the system by using PowerCfg.

When Group Policy is used to enforce a power plan, the enforced power plan is always the active power plan. All power setting preferences in the enforced power plan are applied to the system; the user cannot change any power setting preference or apply a new power plan.

To enforce the use of a Windows default power plan

1. Click Properties for the Select an Active Power Plan policy in the Group Policy Object Editor. Windows displays the Select an Active Power Plan Properties dialog box that is shown in Figure 8.

 

Figure 8. Select an Active Power Plan Properties dialog box

2. Click Enabled.

The Active Power Plan drop-down list is enabled.

3. Select one of the following Windows default power plans:

Automatic. Plan GUID: 381b4222-f694-41f0-9685-ff5bb260df2e

High Performance. Plan GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c

Power Saver. Plan GUID: a1841308-3541-4fab-bc81-f71556f20b4a

Note: If the power setting preferences in a default power plan on a system have been changed from the Windows defaults, the modified values are used when that power plan is enforced. To prevent modification of power setting preferences in a plan, change the power setting access permissions as described in “Configuring Power Setting Access Permissions by Using PowerCfg” later in this paper.

## Enforcing a Custom Power Plan

A custom power plan is a default power plan that has one or more modified power settings. A custom power plan can be created for the enterprise (such as a company-wide power plan), or it can be created for a particular system usage scenario (such as a server power plan).

A custom power plan is created on a single system by using PowerCfg or the Control Panel Power Options application to modify one of the Windows default power plans and then exporting the modified plan to a binary file. The binary file can be imported onto multiple systems by using a script. Group Policy can then be used to enforce the custom power plan. For more information about how to export and import power plans, see ”Export a Power Plan to a File” and “Import a Power Plan from a File” later in this paper.

Like all default power plans, a custom power plan has a GUID. Typically, the GUID of a custom power plan is the same on every system on which the custom power plan is installed. The GUID of the custom power plan is determined when the custom power plan is imported on the system.

To enforce a custom power plan on a system

1. Click Properties for the Specify a Custom Active Power Plan policy under Power Management in the Group Policy Object Editor. Windows displays the Specify a Custom Active Power Plan Properties dialog box that is shown in Figure 9.

 

Figure 9. Specify a Custom Active Power Plan Properties dialog box

2. Select Enabled for the policy.

3. Specify the GUID of the custom power plan to be enforced.

The GUID shown in Figure 9 (382da305-4706-47a8-8f45-797be2e2cd2) is an example GUID that was created specifically for this paper. It does not represent any of the Windows default power plans.

Note: Group Policy can be used only to enforce a custom power plan that is already installed on a system; it cannot be used to deploy the custom power plan. For more information, see “Export a Power Plan to a File” and “Import a Power Plan from a File” later in this paper.

## Deploying Other Power Settings with Group Policy

The display idle time-out and sleep idle time-out policies offer the greatest opportunity for energy savings. However, Group Policy can be used to enforce most Windows power settings.

For example, Group Policy can be used to enforce the Require a Password When a Computer Wakes power setting. This power setting requires the user to enter a password at the secure desktop whenever the system resumes from sleep.

Other power settings that Group Policy can enforce include:

* Specify the System Hibernate Timeout, which configures the system hibernate idle time-out.
* Turn Off the Hard Disk, which configures the hard disk idle time-out.
* Turn Off Hybrid Sleep, which enables or disables the hybrid sleep feature.

# Power Policy Security

System administrators can assign per-user access permissions to power settings and power policy actions. This capability is useful for kiosk and other managed-desktop scenarios in which an administrator wants to lock down power policy and prevent any user from making changes.

In addition to specifying the access permissions for each power setting, administrators can allow or deny permission to make a power plan active, create new power plans, or delete existing power plans.

## Power Policy Access Permissions

Power policy access permissions are configured by manipulating a security descriptor for each power setting or power policy action. An administrator can change the security descriptor for each power setting that is installed on the system or for the following power policy actions:

* **ActionSetActive**. Set the active power plan.
* **ActionCreate**. Create a new power plan or delete a power plan.

The default power policy security descriptor for Windows power policy enables all users who are members of the local Built-in Users group to change all power settings and to perform all power policy actions. The default power policy security descriptor controls access to all power settings and power policy actions unless the administrator specifies a new security descriptor for a power setting or power policy action. Administrators can change the default power policy security descriptor by using the PowerCfg tool to modify the ActionDefault power policy action. Changing the access permissions that are expressed in the default power policy security descriptor changes the access permissions for all power settings and all power policy actions unless security descriptors have been specified for those individual power settings or power policy actions.

In addition to the default security descriptor, Windows installs one additional power policy security descriptor for the power setting that lets the user return to the secure desktop when the system resumes from sleep. Only users who are members of the Local Administrators group can change this power setting.

The Control Panel Power Options application and the PowerCfg tool check access permissions for the user and the power settings or power policy actions that are being manipulated. If a user does not have permission to change the setting or perform the action, a warning or error message indicates that access is denied. Access permissions are first checked against the security descriptor for the individual power setting or power policy action, if one exists. If a security descriptor has not been specified for the individual power setting or power policy action, the default security descriptor is used to check access permissions.

An administrator specifies a security descriptor for power settings and power policy actions by using Security Descriptor Definition Language (SDDL). Administrators who are configuring power policy security should be familiar with SDDL. For information about SDDL syntax, see “Resources” at the end of this paper.

The following example shows the SDDL representation of the Windows default power policy security descriptor:

C:\>powercfg ‑getsecuritydescriptor actiondefault

O:BAG:SYD:P(A;CI;KRKW;;;BU)(A;CI;KA;;;BA)(A;CI;KA;;;SY)(A;CI;KA;;;CO)

In this example:

* O:BA at the beginning of the security descriptor indicates that it is owned by the Built-in Administrators group.
* A;CI;KRKW;;;BU (shown in bold type) indicates that members of the Built-In Users group (BU) are allowed (A) read (KR) and write (KW) access to power policy by default. **ActionDefault** specifies the default security descriptor.
* The remainder of the security descriptor indicates that the System (A;CI;KA;;;SY), Built-In Administrators (A;CI;KA;;;BA) and Creator Owner (A;CI;KA;;;CO) have all (KA) access to the display idle power setting.

Similarly, the following example shows the SDDL representation of the security descriptor for the setting that controls returning to the secure desktop after resume from sleep:

C:\>PowerCfg ‑GetSecurityDescriptor CONSOLELOCK

O:BAG:SYD:P(A;CI;KR;;;BU)(A;CI;KA;;;BA)(A;CI;KA;;;SY)(A;CI;KA;;;CO)

The primary difference between the security descriptor for this setting and the default security descriptor is that members of the Built-in Users group have only read (KR) access; they do not have write (KW) access. This part of the security descriptor is shown in bold type. Removing write (KW) access for a group denies members of that group the permission to change the power setting or power policy action.

## Configuring Power Setting Access Permissions by Using PowerCfg

Administrators can use the PowerCfg tool to display and set the default security descriptor and, if present, the security descriptor for individual power settings and power policy actions.

Display Security Descriptors for Power Settings and Power Policy Actions. To display the security descriptor for a power setting or power policy action, use the PowerCfg ‑GetSecurityDescriptor command with the GUID of the power setting or power policy action to retrieve.

The following example displays the security descriptor for the sleep idle time-out power setting:

C:\>powercfg ‑getsecuritydescriptor 29f6c1db-86da-48c5-9fdb-f2b67b1f44da

O:BAG:SYD:P(A;CI;KRKW;;;BU)(A;CI;KA;;;BA)(A;CI;KA;;;SY)(A;CI;KA;;;CO)

Note that this example shows the default power policy security descriptor because the sleep idle time-out power setting does not have a security descriptor applied.

To display the security descriptor for a power policy action, specify the action by using ActionSetActive, ActionCreate, or ActionDefault. The following example displays the security descriptor for ActionCreate:

C:\>powercfg ‑getsecuritydescriptor actioncreate

O:BAG:SYD:P(A;CI;KRKW;;;BU)(A;CI;KA;;;BA)(A;CI;KA;;;SY)(A;CI;KA;;;CO)

An administrator can use the ActionDefault power policy action to change the default power policy security descriptor.

Set Security Descriptors for Power Settings and Power Policy Actions. To set the security descriptor for a power setting or power policy action, use the PowerCfg ‑SetSecurityDescriptor command with the GUID for the power setting or power policy action and the new security descriptor in SDDL syntax.

The following example sets a security descriptor that prevents members of the Built‑in Users account from changing the sleep idle time-out power setting:

C:\>powercfg ‑setsecuritydescriptor 29f6c1db-86da-48c5-9fdb-f2b67b1f44da O:BAG:SYD:P(A;CI;KR;;;BU)(A;CI;KA;;;BA)(A;CI;KA;;;SY)(A;CI;KA;;;CO)

In this example, the write (KW) permission is removed from the access control entry for the Built-in Users group (shown in bold type). This group now has only read (KR) permission for the sleep idle time-out power setting.

## Denying Power Setting Access for the Guest Account

By default, Windows lets the Guest account change power plans and power setting preferences. This access is enabled for the Guest account only when it is logged on to the local console session. The Guest account cannot change power setting preferences when it accesses the system remotely through a Terminal Services session.

An administrator can remove power setting and power policy action permission for the Guest account by modifying the default security descriptor. If more granular control is required, then the administrator must modify the security descriptors of individual power settings and power policy actions.

The security descriptor in the following example denies access for the Guest account but lets members of the Built-in Users and Built-in Administrators accounts change power settings and perform power policy actions:

O:BAG:SYD:P(D;CI;KW;;;BG)(A;CI;KRKW;;;BU)(A;CI;KA;;;BA)(A;CI;KA;;;SY)(A;CI;KA;;;CO)

In this example, the deny access entry (D;CI;KW;;;BG, shown in bold type) denies write (KW) access to members of the Built-in Guests (BG) group.

To completely deny the Guest account permission to change power policy, an administrator would apply this security descriptor to the default power policy security descriptor by using the PowerCfg ‑ActionDefault command. This prevents the Guest account from gaining access to all power settings and power policy actions unless additional security descriptors have been specified for individual power settings or power policy actions.

## Access Permission Considerations for Power Policy Actions

System administrators should be aware of the following when they configure access permissions for the AccessSetActive, AccessCreate, and AccessDefault power policy actions:

* The AccessCreate power policy action also controls permissions for deleting, duplicating, and restoring defaults for power plans.
* If a system administrator denies a set of users the ability to change one or more power settings, then the administrator should consider also denying access to the AccessCreate power policy action.
* TheAccessCreate power policy action takes precedence over individual power setting access permissions when the user restores default settings for a power plan. If a user restores defaults for a power plan, all the default power setting preferences overwrite the current power setting preferences in the power plan. The power setting preferences are overwritten with the defaults, even if the user who is restoring the power plan defaults does not have access permissions to change some power settings.

# Using PowerCfg to Configure Power Policy

System administrators can use the PowerCfg command-line tool to perform all power policy configuration tasks, including advanced tasks such as changing power-setting attributes and configuring power setting security. PowerCfg can be used to perform the following tasks:

* List identification GUIDs for all power plans that are installed on the system.
* Set any installed power plan to be the active power plan.
* Create new power plans and duplicate or delete installed power plans.
* Set AC and DC value preferences for any power setting in any power plan.
* List AC and DC value preferences for any power setting in any power plan.
* Configure attributes of individual power settings, including whether the attribute is hidden.
* Set access permissions for individual power settings and power policy actions.
* Export installed power plans to binary files and import power plans from binary files onto other systems.

Running PowerCfg. PowerCfg is installed with Windows; it can be run from any Command Prompt window or script. PowerCfg commands have the following syntax:

powercfg ‑parameters

Command-line parameters can be preceded with either a forward slash (/) or a hyphen (-) and are not case-sensitive; for example, /LIST, **‑**list, and **‑**List are equivalent. To display a list of all PowerCfg commands, type powercfg ‑?.

Friendly Aliases for GUIDs. Many Windows power policy objects are identified by using GUIDs. Each power setting, power setting subgroup, and installed power plan is identified with a GUID. For more ease of use, PowerCfg supports “friendly” text aliases for many of the common Windows power policy GUIDs. PowerCfg accepts the friendly alias in place of any command-line parameter that requires a GUID.

For example, the following GUID represents the display idle time-out setting:

3c0bc021-c8a8-4e07-a973-6b14cbcb2b7e

The PowerCfg friendly alias for this GUID is VIDEOIDLE.

The following two PowerCfg commands are equivalent. Both commands change the display idle time-out AC value preference to zero (0), which means “never time out,” in the default Balanced power plan.

PowerCfg Command that Uses GUIDs

C:\>powercfg ‑setacvalueindex 381b4222-f694-41f0-9685-ff5bb260df2e 7516b95f-f776-4464-8c53-06167f40cc99 3c0bc021-c8a8-4e07-a973-6b14cbcb2b7e 0

Equivalent PowerCfg Command that Uses Aliases

C:\>powercfg ‑setacvalueindex SCHEME\_BALANCED SUB\_VIDEO VIDEOIDLE 0

To display the complete list of aliases that are supported by the PowerCfg tool, use the powercfg ‑aliases command. See also the individual listings in “Power Setting Reference” later in this paper.

PowerCfg Commands That Require Administrative Credentials. Some PowerCfg commands require administrative credentials. To use these commands, the user who is executing Powercfg.exe must be a member of the Local Administrators group or, if User Account Control (UAC) is enabled, the Command Prompt window must be opened by using Administrator credentials. PowerCfg commands that require administrative credentials are:

PowerCfg ‑Export
PowerCfg ‑Import
PowerCfg ‑Attributes
PowerCfg ‑RestoreDefaultSchemes
PowerCfg ‑ReplaceDefaultSchemes

The examples in the rest of this section show how to use PowerCfg to perform common power policy configuration tasks. Administrators can combine and extend these examples to accomplish a specific power policy configuration scenario.

## List Installed Power Plans

To list the installed power plans and their identification GUIDs, use PowerCfg **‑**List. For example:

C:\>powercfg ‑list

Existing Power Schemes (\* Active)

-----------------------------------

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced)

Power Scheme GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c (High performance)

Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver) \*

This command displays the identification GUID of each power plan and the name of the power plan. The active power plan is denoted with an asterisk (\*).

An administrator might need to view the identification GUIDs of installed power plans when specifying a custom active power plan in Group Policy.

## Set the Active Power Plan

To set the active power plan, use PowerCfg **‑**SetActive and specify the identification GUID of the plan to set as active. Any installed power plan can be the active plan.

The PowerCfg ‑Setactive command has the following syntax:

powercfg ‑setactive power-plan-GUID

The following example sets the default High Performance plan as the active power plan. The alias SCHEME\_MIN refers to the default minimum power savings plan:

C:\>powercfg ‑setactive SCHEME\_MIN

## Duplicate a Power Plan

To create a new power plan, you must start by duplicating an existing power plan. This helps to ensure that each power plan has a power plan personality because the duplicate power plan inherits the personality of the original power plan.

To duplicate an installed power plan, use **PowerCfg ‑**DuplicateScheme and specify the identification GUID of the power plan to duplicate, and optionally, an identification GUID for the duplicate power plan. If you do not provide a GUID for the duplicate power plan, PowerCfg creates one.

The PowerCfg ‑DuplicateScheme command has the following syntax:

powercfg ‑duplicatescheme source-power-plan-GUID [duplicate-power-plan-GUID]

The following example duplicates the default Balanced scheme without providing optional identification GUID for the duplicate plan. PowerCfg creates a new GUID for the duplicate scheme and displays it in the Command Prompt window. The duplicate plan has the same name as the plan that was duplicated:

C:\>powercfg ‑duplicatescheme SCHEME\_BALANCED

Power Scheme GUID: ddb33895-a812-4357-b5e8-8dd5ae50b9a4 (Balanced)

To view the duplicate scheme and its identification GUID, use the PowerCfg ‑List command:

C:\>powercfg ‑list

Existing Power Schemes (\* Active)

-----------------------------------

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced)

Power Scheme GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c (High performance)

Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver) \*

Power Scheme GUID: ddb33895-a812-4357-b5e8-8dd5ae50b9a4 (Balanced)

## Change the Name of a Power Plan

A power plan might have to be renamed to identify a company or usage scenario or to distinguish a duplicate power plan from the original plan. To change the name of a power plan, use PowerCfg **‑**ChangeName and specify the identification GUID of the power plan to modify, a string that indicates the power plan friendly name, and an optional string that provides a description of the plan.

The PowerCfg **‑**ChangeName command has the following syntax:

powercfg ‑changename power-plan-GUID “friendly name” [“description”]

The following example changes the name of the default Balanced power plan to My Balanced Power Plan.

C:\>powercfg ‑changename SCHEME\_BALANCED "My Balanced Power Plan"

To view the modified power plan friendly name, use the PowerCfg **‑**List command:

C:\>powercfg ‑list

Existing Power Schemes (\* Active)

-----------------------------------

Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (My Balanced Power Plan)

Power Scheme GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c (High performance)

Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver) \*

## Delete a Power Plan

To delete a power plan from the system, use PowerCfg **‑**Delete and provide the identification GUID of the power plan to delete.

The PowerCfg **‑**Delete command has the following syntax:

powercfg ‑delete power-plan-GUID

The following example deletes the duplicate power plan that was created in “Duplicate a Power Plan” earlier in this paper. The identification GUID ddb33895‑a812-4357-b5e8-8dd5ae50b9a4 was created specifically for this example.

C:\>powercfg ‑delete ddb33895-a812-4357-b5e8-8dd5ae50b9a4

## Export a Power Plan to a File

A power plan can be exported to a binary file. This functionality is useful for administrators who are deploying customized power plans to other systems. The exported power plan file can be imported on another system by using a script or other utility. Administrators who want to enforce a custom active power plan through Group Policy can configure the custom power plan on one system and then export the power plan so that it can be imported on other systems.

To export a power plan, use PowerCfg **‑**Export and specify the name of the binary file to save the power plan and the identification GUID of the power plan to export.

The PowerCfg ‑Export command has the following syntax:

powercfg ‑export filename power-plan-GUID

The following example exports the default Balanced power plan to a local file that is named Balanced.pow:

C:\>powercfg ‑export balanced.pow SCHEME\_BALANCED

When you export a power plan by using PowerCfg, remember the following:

* The PowerCfg ‑Export command requires administrative credentials.
* The path of the binary file to contain the exported power plan must be on the local system; it cannot be a universal naming convention (UNC) or network path.

## Import a Power Plan from a File

A power plan that was exported to a binary file can be imported by using PowerCfg. The power plan binary file can be imported on the same system from which it was exported or on other systems. A system administrator can import the same power plan on multiple systems as a way to distribute a custom power plan.

To import a power plan in a binary file, use PowerCfg ‑Import and specify the identification GUID for the exported power plan. Use the same GUID for each system on which you are importing the power plan.

The PowerCfg **‑**Import command has the following syntax:

powercfg ‑import path [power-plan-GUID]

The following example imports a power plan from a local file that is named Balanced.pow. The a366abd1-4ff7-4229-11a2-ea326ba2a46b identification GUID was created specifically for this example:

C:\>powercfg ‑import c:\balanced.pow a366abd1-4ff7-4229-11a2-ea326ba2a46b

When importing a power plan by using PowerCfg, remember the following:

* The PowerCfg ‑Import command requires administrative credentials.
* The path of the file that contains the exported power plan must be the full path of a file on the local system. The file cannot be on the network or specified by using a UNC path.
* If an identification GUID for the imported power plan is not specified, PowerCfg generates one—a different GUID every time that the power plan is imported. To ensure that the power plan can be enforced by Group Policy, you must specify the same GUID every time that the power plan is imported.

## Change Power Setting Attributes

To configure power setting attributes, use PowerCfg **‑**Attributes. Windows supports a single power setting attribute, ATTRIB\_HIDE, which controls whether the power setting appears in Advanced Settings in the Control Panel Power Options application.

The PowerCfg ‑Attributes command has the following syntax:

powercfg ‑attributes power-subgroup-GUID power-setting-GUID [+ATTRIB\_HIDE | ‑ATTRIB\_HIDE]

The following example hides the hibernate idle time-out setting:

C:\>powercfg ‑attributes SUB\_SLEEP HIBERNATEIDLE +ATTRIB\_HIDE

The following example exposes the hibernate idle time-out setting again:

C:\>powercfg ‑attributes SUB\_SLEEP HIBERNATEIDLE ‑ATTRIB\_HIDE

When you change power setting attributes, remember the following:

* The PowerCfg ‑Attributes command requires administrative credentials.
* You must provide both the subgroup and power setting identification GUIDs. For a list of these GUIDs, see “Power Setting Reference” later in this paper.

## Change AC or DC Values in a Power Plan

To change the AC or DC preferences in a power plan, use PowerCfg ‑SetACValueIndex or PowerCfg **‑**SetDCValueIndex and specify the identification GUID of the power plan, the power setting subgroup, and the power setting. The changed preference is applied to the system when the modified power plan is set as active.

The PowerCfg**‑**SetACValueIndex and PowerCfg **‑**SetDCValueIndex commands have the same syntax. For example:

powercfg ‑setacvalueindex [power-plan-GUID] [subgroup-GUID] [setting GUID] newvalue

The following example sets the DC display idle time-out value in the High Performance scheme to 10 minutes:

C:\>powercfg ‑setdcvalueindex SCHEME\_MIN SUB\_VIDEO VIDEOIDLE 600

## Enumerate AC or DC Values in a Power Plan

To view the AC and DC values in a power plan, use PowerCfg **‑**Query and specify the identification GUID of the power plan. You can optionally specify the identification GUID of a power setting subgroup to limit the output power setting values within the subgroup.

The PowerCfg **‑**Query command has the following syntax:

powercfg ‑query power-plan-GUID [power-subgroup-GUID]

The following example displays the settings in the sleep settings subgroup for the default Power Saver plan:

C:\>powercfg ‑query SCHEME\_CURRENT SUB\_SLEEP

Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver)

 Subgroup GUID: 238c9fa8-0aad-41ed-83f4-97be242c8f20 (Sleep)

 Power Setting GUID: 29f6c1db-86da-48c5-9fdb-f2b67b1f44da (Sleep after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x00000e10

 Current DC Power Setting Index: 0x00000384

 Power Setting GUID: 94ac6d29-73ce-41a6-809f-6363ba21b47e (Allow hybrid sleep)

 Possible Setting Index: 000

 Possible Setting Friendly Name: Off

 Possible Setting Index: 001

 Possible Setting Friendly Name: On

 Current AC Power Setting Index: 0x00000000

 Current DC Power Setting Index: 0x00000000

 Power Setting GUID: 9d7815a6-7ee4-497e-8888-515a05f02364 (Hibernate after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x0000fd20

 Current DC Power Setting Index: 0x0000fd20

## Enumerate AC or DC Value Preferences for Hidden Power Settings

By default, the **PowerCfg** **‑**Query command displays only settings that do not have the hidden attribute set. To display all power settings, including hidden power settings, use PowerCfg ‑QH (query hidden).

The PowerCfg **‑**QH command has the following syntax:

powercfg ‑qh power-plan-GUID [power-subgroup-GUID]

The following example displays all settings, including hidden power settings, in the sleep settings subgroup for the default Power Saver plan:

C:\>powercfg ‑query SCHEME\_CURRENT SUB\_SLEEP

Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver)

 Subgroup GUID: 238c9fa8-0aad-41ed-83f4-97be242c8f20 (Sleep)

 Power Setting GUID: 29f6c1db-86da-48c5-9fdb-f2b67b1f44da (Sleep after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x00000e10

 Current DC Power Setting Index: 0x00000384

 Power Setting GUID: 94ac6d29-73ce-41a6-809f-6363ba21b47e (Allow hybrid sleep)

 Possible Setting Index: 000

 Possible Setting Friendly Name: Off

 Possible Setting Index: 001

 Possible Setting Friendly Name: On

 Current AC Power Setting Index: 0x00000000

 Current DC Power Setting Index: 0x00000000

 Power Setting GUID: 9d7815a6-7ee4-497e-8888-515a05f02364 (Hibernate after)

 Minimum Possible Setting: 0x00000000

 Maximum Possible Setting: 0xffffffff

 Possible Settings increment: 0x00000001

 Possible Settings units: Seconds

 Current AC Power Setting Index: 0x0000fd20

 Current DC Power Setting Index: 0x0000fd20

## View PowerCfg GUID Aliases

PowerCfg supports a set of predefined textual aliases that can be used instead of identification GUIDs in PowerCfg commands. To view the list of GUID aliases, use PowerCfg **‑**Aliases. For example:

C:\>powercfg ‑aliases

a1841308-3541-4fab-bc81-f71556f20b4a SCHEME\_MAX

8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c SCHEME\_MIN

381b4222-f694-41f0-9685-ff5bb260df2e SCHEME\_BALANCED

fea3413e-7e05-4911-9a71-700331f1c294 SUB\_NONE

238c9fa8-0aad-41ed-83f4-97be242c8f20 SUB\_SLEEP

29f6c1db-86da-48c5-9fdb-f2b67b1f44da STANDBYIDLE

9d7815a6-7ee4-497e-8888-515a05f02364 HIBERNATEIDLE

94ac6d29-73ce-41a6-809f-6363ba21b47e HYBRIDSLEEP

b7a27025-e569-46c2-a504-2b96cad225a1 CRITICALSLEEP

7516b95f-f776-4464-8c53-06167f40cc99 SUB\_VIDEO

3c0bc021-c8a8-4e07-a973-6b14cbcb2b7e VIDEOIDLE

90959d22-d6a1-49b9-af93-bce885ad335b VIDEOADAPT

0012ee47-9041-4b5d-9b77-535fba8b1442 SUB\_DISK

6738e2c4-e8a5-4a42-b16a-e040e769756e DISKIDLE

4f971e89-eebd-4455-a8de-9e59040e7347 SUB\_BUTTONS

7648efa3-dd9c-4e3e-b566-50f929386280 PBUTTONACTION

96996bc0-ad50-47ec-923b-6f41874dd9eb SBUTTONACTION

5ca83367-6e45-459f-a27b-476b1d01c936 LIDACTION

a7066653-8d6c-40a8-910e-a1f54b84c7e5 UIBUTTON\_ACTION

e73a048d-bf27-4f12-9731-8b2076e8891f SUB\_BATTERY

637ea02f-bbcb-4015-8e2c-a1c7b9c0b546 BATACTIONCRIT

9a66d8d7-4ff7-4ef9-b5a2-5a326ca2a469 BATLEVELCRIT

d8742dcb-3e6a-4b3c-b3fe-374623cdcf06 BATACTIONLOW

8183ba9a-e910-48da-8769-14ae6dc1170a BATLEVELLOW

54533251-82be-4824-96c1-47b60b740d00 SUB\_PROCESSOR

bc5038f7-23e0-4960-96da-33abaf5935ec PROCTHROTTLEMAX

893dee8e-2bef-41e0-89c6-b55d0929964c PROCTHROTTLEMIN

68f262a7-f621-4069-b9a5-4874169be23c PROCIDLE

bbdc3814-18e9-4463-8a55-d197327c45c0 PROCPERF

0e796bdb-100d-47d6-a2d5-f7d2daa51f51 CONSOLELOCK

501a4d13-42af-4429-9fd1-a8218c268e20 SUB\_PCIEXPRESS

ee12f906-d277-404b-b6da-e5fa1a576df5 ASPM

The following aliases are new for Windows 7 and are compatible only with the version of PowerCfg that is included with Windows 7:

17aaa29b-8b43-4b94-aafe-35f64daaf1ee VIDEODIM

aded5e82-b909-4619-9949-f5d71dac0bcb VIDEONORMALLEVEL

f1fbfde2-a960-4165-9f88-50667911ce96 VIDEODIMLEVEL

## Restore Power Plan Defaults

Windows supports restoring power plan defaults. The Control Panel Power Options application lets a user restore power plans on a per-plan basis; PowerCfg can be used to restore all power plan defaults simultaneously. To restore all power plan defaults, use PowerCfg **‑**RestoreDefaultSchemes.

The PowerCfg **‑**RestoreDefaultSchemes command has the following syntax:

powercfg **‑**restoredefaultschemes

When this command is executed, the power manager retrieves the power plan defaults and copies them over existing power schemes. By default, Windows includes power plan defaults for each of the three default power plans. However, administrators can replace the power plan defaults by using PowerCfg ‑ReplaceDefaultSchemes, as described in the next section.

If a power plan exists in the default store but is currently not installed on the system, PowerCfg **‑**RestoreDefaultSchemes reinstalls the power plan on the system.

The PowerCfg **‑**RestoreDefaultSchemes command requires administrative credentials.

## Replace Power Plan Defaults

Administrators can replace the Windows default power plans in the default power plan store with a set of customized power plans. To replace the set of default power plans, use PowerCfg **‑**ReplaceDefaultSchemes.

Replacing the default schemes enables users to use the Restore Defaults option in Power Options to restore customized power plan defaults instead of the Windows power plan defaults.

The PowerCfg **‑**ReplaceDefaultSchemes command has the following syntax:

powercfg ‑replacedefaultschemes

This command places a copy of all currently installed power plans in the default power plan store. If PowerCfg ‑RestoreDefaultSchemes is used later, the Windows kernel power manager restores the copied power plans instead of the Windows power plan defaults.

The PowerCfg **‑**ReplaceDefaultSchemes command requires administrative credentials.

# Customizing Power Policy for a Windows Installation

This section describes how to customize Windows power policy for a Windows installation image that is installed by manufacturers or deployed by administrators in a corporate environment. Windows automatically customizes power policy defaults for desktop and portable computers during Windows Setup. Administrators and manufacturers can disable the automatic customization of power settings when they configure Windows installation images. This prevents Windows Setup from changing some power settings, including the power button action and hybrid sleep, when Windows is installed on a portable computer.

Readers of this section should be familiar with the concepts described in the Windows OEM Preinstallation Kit (OPK).

## Customization of Power Policy for Portable Computers

Windows automatically customizes power policy defaults for portable computers to ensure optimal power management user experiences. On portable computers, the following power settings are customized and their values updated for each default Windows power plan.

|  |  |  |
| --- | --- | --- |
| Power setting | Portable computer default | Desktop computer default |
| Hybrid Sleep | Disabled | Enabled |
| Hibernate Timeout | 18 hours | Never (0 hours) |
| Power Button Action | Sleep | Shut Down |
| Prompt for Password on Resume | Enabled | Home Editions of Windows: DisabledBusiness Editions of Windows: Enabled |
| Wake from Timer\* | Disabled | Enabled |

\*Available in Windows 7 and later versions of Windows.

Windows customizes the power setting defaults for portable computers during the Specialize configuration phase of Windows Setup. Windows automatically determines if the system is a portable computer by first inspecting the ACPI Preferred PM Profile flags in system firmware. If the system firmware does not provide the Preferred PM Profile flags, Windows then checks for the presence of a system battery, which indicates that the system is a portable computer.

## Disabling Customization of Power Policy for Portable Computers

Manufacturers and system administrators might want to disable the automatic customization of power policy for portable computers if they are providing manufacturer-specific or corporation-specific updates to power policy.

The Specialize configuration phase of Windows Setup typically occurs when the system is first started by the customer immediately before the out-of-box experience (OOBE). Therefore, any manufacturer-specific or corporation-specific modifications to power policy that are made before Sysprep has been started or during Audit mode can be overwritten by the automatic customization of power setting defaults for portable computers.

Manufacturers and system administrators can disable the automatic customization of power policy for portable computers by changing the value of the CustomizeDuringSetup registry value. This ensures that Windows Setup does not modify power policy customizations made by manufacturers or system administrators when they install Windows on a portable computer.

|  |  |
| --- | --- |
| Key | HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\Power |
| Registry Value | (DWORD) CustomizeDuringSetup |
| Allowed Values | 0 | Automatic customization of power policy for portable computers is disabled. |
| 1 (default) | Automatic customization of power policy for portable computers is enabled. |
| Value Not Present | Automatic customization of power policy for portable computers is enabled. |

To disable the automatic customization of power policy for portable computers, set the CustomizeDuringSetup registry value to zero (0).

## Best Practices for Customizing Inbox Power Policy

Manufacturers and system administrators should use the PowerCfg utility and the information in this paper to customize power policy for use on specific systems or in the enterprise.

Additionally, manufacturers and system administrators should follow these best practices when customizing default Windows power policy for installation images:

* If changes are required to the default power setting values, update the three default Windows power plans: Balanced**,** High Performance**,** andPower Saver**.**
* If changes are required to power settings that are automatically customized for portable computers, change the value of the CustomizeDuringSetup registry value to zero (0) before you run Sysprep on the image. This ensures that these power setting values will not be modified by Windows during the Specialize configuration phase of Setup.
* For Windows installation images that are to be customized and deployed to desktop computers, first install the image on a desktop computers and then customize the power settings. This ensures that the power policy defaults are appropriate for desktop computers. The same image can be deployed to a portable computer that has the appropriate power setting defaults if the CustomizeDuringSetup registry value is not modified (that is, CustomizeDuringSetup is set to the default of 1).

# Power Setting Reference

This section contains reference information for each power setting, including the identification GUID, allowed values, meaning, and common usage scenarios.

Power settings are organized in the following subgroups:

Battery

Desktop Background

Disk

Display

Multimedia

No Subgroup

PCI Express

Power Buttons and Lid

Processor Power Management

Search and Indexing

Sleep

Wireless Adapter

Note: Because the power policy store in Windows is extensible by third-party applications and drivers, a system can have additional power settings that are not described in this paper. For information about third-party power settings, contact the third-party software or device manufacturer.

## Battery Settings Subgroup

Settings in this subgroup control the configuration of battery actions and thresholds.

|  |  |
| --- | --- |
| Subgroup | Battery Settings |
| GUID | e73a048d-bf27-4f12-9731-8b2076e8891f |
|  PowerCfg Alias | SUB\_BATTERY |
| Settings | Critical Battery ActionCritical Battery ThresholdLow Battery ActionLow Battery ThresholdLow Battery WarningReserve Battery Level |

Critical Battery Action Setting

|  |  |
| --- | --- |
| Description | The action to take when the critical battery level is reached. |
| GUID | 637ea02f-bbcb-4015-8e2c-a1c7b9c0b546 |
| PowerCfg Alias | BATACTIONCRIT |
| Possible Values | Index | Name | Description |
| 0 | Do Nothing | No action is taken when the critical battery level is reached. |
| 1 | Sleep | The system enters sleep when the critical battery level is reached. |
| 2 | Hibernate | The system enters hibernate when the critical battery level is reached. |
| 3 | Shut Down | The system shuts down when the critical battery level is reached. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Critical Battery Threshold Setting

|  |  |
| --- | --- |
| Description | A percentage of capacity when the critical battery action is taken. |
| GUID | 9a66d8d7-4ff7-4ef9-b5a2-5a326ca2a469 |
| PowerCfg Alias | BATLEVELCRIT |
| Minimum Value | 0 |
| Maximum Value | 100 |
| Label | Percentage (%) |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Low Battery Action Setting

|  |  |
| --- | --- |
| Description | The action to take when the low battery level is reached. |
| GUID | d8742dcb-3e6a-4b3c-b3fe-374623cdcf06 |
| PowerCfg Alias | BATACTIONLOW |
| Possible Values | Index | Name | Description |
| 0 | Do Nothing | No action is taken when the low battery level is reached. |
| 1 | Sleep | The system enters sleep when the low battery level is reached. |
| 2 | Hibernate | The system enters hibernate when the low battery level is reached. |
| 3 | Shut Down | The system shuts down when the low battery level is reached. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Low Battery Threshold Setting

|  |  |
| --- | --- |
| Description | A percentage of capacity when the low battery action is taken and the low battery warning (if enabled) appears. |
| GUID | 8183ba9a-e910-48da-8769-14ae6dc1170a |
| PowerCfg Alias | BATLEVELLOW |
| Minimum Value | 0 |
| Maximum Value | 100 |
| Label | Percentage (%) |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Low Battery Warning Setting

|  |  |
| --- | --- |
| Description | Whether Windows displays a user interface (UI) warning at the battery meter when the battery capacity crosses the low battery threshold. |
| GUID | bcded951-187b-4d05-bccc-f7e51960c258 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Disabled | Windows does not display a UI warning when the battery capacity crosses the low battery threshold. |
| 1 | Enabled | Windows displays a UI warning when the battery capacity crosses the low battery threshold. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Reserve Battery Level Setting

|  |  |
| --- | --- |
| Description | A percentage of capacity when the reserve battery warning is shown to the user. |
| GUID | f3c5027d-cd16-4930-aa6b-90db844a8f00 |
| PowerCfg Alias | Not applicable |
| Minimum Value | 0 |
| Maximum Value | 100 |
| Label | Percentage (%) |
| Hidden | No |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

## Desktop Background Settings Subgroup

Settings in this subgroup control the behavior of the Windows desktop background and related functionality.

|  |  |
| --- | --- |
| Subgroup | Desktop Background Settings |
| GUID | 0d7dbae2-4294-402a-ba8e-26777e8488cd |
| PowerCfg Alias | Not applicable |
| Settings | Slideshow Power |

#### Slideshow Power Setting

|  |  |
| --- | --- |
| Description | Configures the behavior of the desktop background slideshow. |
| GUID | 309dce9b-bef4-4119-9921-a851fb12f0f4 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Enable Slideshow | The desktop background slideshow is enabled. |
| 1 | Disable Slideshow | The desktop background slideshow is disabled. |
| Hidden | No |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

## Disk Settings Subgroup

Settings in this subgroup control the power management of disk devices.

|  |  |
| --- | --- |
| Subgroup | Disk Settings |
| GUID | 0012ee47-9041-4b5d-9b77-535fba8b1442 |
| PowerCfg Alias | SUB\_DISK |
| Settings | AHCI Link Power Management – HIPM/DIPMAHCI Link Power Management – AdaptiveDisk Burst Ignore TimeDisk Idle Timeout |

AHCI Link Power Management – HIPM/DIPM Setting

|  |  |
| --- | --- |
| Description | Configures the link power management mode for disk and storage devices that are attached to the system through an AHCI interface. |
| GUID | 0b2d69d7-a2a1-449c-9680-f91c70521c60 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Active | Link power management is not used. |
| 1 | HIPM | Host-Initiated Power Management (HIPM) is used. |
| 2 | HIPM and DIPM | HIPM and Device-Initiated Power Management (DIPM) are used. |
| Hidden | Yes |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

AHCI Link Power Management – Adapative Setting

|  |  |
| --- | --- |
| Description | The period of AHCI link idle time before the link is put into a slumber state when HIPM or DIPM is enabled. |
| GUID | dab60367-53fe-4fbc-825e-521d069d2456 |
| PowerCfg Alias | Not applicable |
| Minimum Value | 0 (only use Partial state) |
| Maximum Value | 300,000 (5 minutes) |
| Label | Milliseconds |
| Hidden | Yes |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Disk Burst Ignore Time Setting

|  |  |
| --- | --- |
| Description | The period of disk activity to ignore when attempting to aggressively power down the disk. |
| GUID | 80e3c60e-bb94-4ad8-bbe0-0d3195efc663 |
| PowerCfg Alias | Not applicable |
| Minimum Value | 0 (do not ignore disk activity) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | No |
| Operating System Versions | Available in Windows Vista with Service Pack 1 (SP1), Windows Server® 2008, and later versions of Windows. |

Disk Idle Time-out Setting

|  |  |
| --- | --- |
| Description | The period of inactivity before the disk is automatically powered down. |
| GUID | 6738e2c4-e8a5-4a42-b16a-e040e769756e |
| PowerCfg Alias | DISKIDLE |
| Minimum Value | 0 (never idle off the disk) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

## Display Settings Subgroup

Settings in this subgroup control the power management of the display.

|  |  |
| --- | --- |
| Subgroup | Display Settings |
| GUID | 7516b95f-f776-4464-8c53-06167f40cc99 |
| PowerCfg Alias | SUB\_VIDEO |
| Settings | Adaptive Display Idle TimeoutAllow Display Required Policy Dim Adaptive Increase PercentageDim Annoyance TimeoutDim Display BrightnessDim Idle Timeout Display Level BrightnessDisplay Idle Timeout |

Adaptive Display Idle Time-out Setting

|  |  |
| --- | --- |
| Description | Whether Windows automatically scales the display idle time-out based on user activity. If the user provides input to the system shortly after the display idle time-out is reached, Windows automatically extends the display idle time-out to deliver a better user experience. |
| GUID | 90959d22-d6a1-49b9-af93-bce885ad335b |
| PowerCfg Alias | VIDEOADAPT |
| Possible Values | Index | Name | Description |
| 0 | Disabled | Windows does not adaptively extend the display idle time-out. |
| 1 | Enabled | Windows adaptively extends the display idle time-out based on user activity. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Allow Display Required Policy Setting

|  |  |
| --- | --- |
| Description | Whether Windows allows applications to temporarily prevent the display from automatically reducing brightness or turning off to save power. |
| GUID | a9ceb8da-cd46-44fb-a98b-02af69de4623 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | No | Applications are not allowed to temporarily prevent display power management. |
| 1 | Yes | Applications are allowed to temporarily prevent display power management. |
| Hidden | Yes |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Dim Adaptive Increase Percentage Setting

|  |  |
| --- | --- |
| Description | The percentage of the dim idle time-out value by which to automatically increase the dim idle time-out value if user annoyance is detected. This setting applies only to portable computers that support Windows control of the brightness level of an integrated display device. In most situations, this setting should not be changed from the default value. |
| GUID | eed904df-b142-4183-b10b-5a1197a37864 |
| PowerCfg Alias | Not applicable |
| Minimum Value | 0 (do not automatically extend the dim idle time-out when user annoyance is detected) |
| Maximum Value | 100 |
| Label | % (Percentage) |
| Hidden | Yes |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Dim Annoyance Time-out Setting

|  |  |
| --- | --- |
| Description | The user annoyance detection threshold. This setting specifies the duration between automatic display brightness level reduction and user input to consider the automatic display brightness level reduction as an annoyance to the user. This setting applies only to portable computers that support Windows control of the brightness level of an integrated display device. In most situations, this setting should not be changed from the default value. |
| GUID | 82dbcf2d-cd67-40c5-bfdc-9f1a5ccd4663 |
| PowerCfg Alias | Not applicable |
| Minimum Value | 0 (do not detect user annoyance) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | Yes |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Dim Display Brightness Setting

|  |  |
| --- | --- |
| Description | Reduced display brightness level after the dim idle time-out has been reached. This setting applies only to portable computers that support Windows control of the brightness level of an integrated display device. |
| GUID | f1fbfde2-a960-4165-9f88-50667911ce96 |
| PowerCfg Alias | VIDEODIMLEVEL |
| Minimum Value | 0  |
| Maximum Value | 100 |
| Label | % (Percentage) |
| Hidden | No |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Dim Idle Time-out Setting

|  |  |
| --- | --- |
| Description | The period of inactivity before the display brightness is automatically reduced. This setting applies only to portable computers that support Windows control of the brightness level of an integrated display device. |
| GUID | 17aaa29b-8b43-4b94-aafe-35f64daaf1ee |
| PowerCfg Alias | VIDEODIM |
| Minimum Value | 0 (never automatically reduce display brightness) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | No |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Display Brightness Level Setting

|  |  |
| --- | --- |
| Description | Default display brightness level. This setting applies only to portable computers that support Windows control of the brightness level of an integrated display device. |
| GUID | aded5e82-b909-4619-9949-f5d71dac0bcb |
| PowerCfg Alias | VIDEONORMALLEVEL (Windows 7 and later versions of Windows) |
| Minimum Value | 0 |
| Maximum Value | 100 |
| Label | Percentage (%) |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Display Idle Time-out Setting

|  |  |
| --- | --- |
| Description | The period of inactivity before the display is automatically turned off. |
| GUID | 3c0bc021-c8a8-4e07-a973-6b14cbcb2b7e |
| PowerCfg Alias | VIDEOIDLE |
| Minimum Value | 0 (never power off the display) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

## Multimedia Settings Subgroup

Settings in this subgroup control power management behaviors of multimedia software.

|  |  |
| --- | --- |
| Subgroup | Multimedia Settings |
| GUID | 9596fb26-9850-41fd-ac3e-f7c3c00afd4b |
| PowerCfg Alias | Not applicable |
| Settings | Media Sharing ActionWhen Playing Video |

Media Sharing Action Setting

|  |  |
| --- | --- |
| Description | Whether Windows Media Connect and Windows Media Center can change the sleep idle time-out and away mode when sharing media. |
| GUID | 03680956-93bc-4294-bba6-4e0f09bb717f |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Do Nothing | Take no action regarding the sleep idle time-out or away mode. |
| 1 | Prevent Idle | Prevent the system sleep idle time-out. |
| 2 | Use away mode | Enable away mode. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

When Playing Video Setting

|  |  |
| --- | --- |
| Description | Whether Windows Media Player favors power savings or performance in playing video content. |
| GUID | 34c7b99f-9a6d-4b3c-8dc7-b6693b78cef4 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Optimize Video Quality | Favor video quality at the expense of power savings. |
| 1 | Balanced | Balance video quality and power savings. |
| 2 | Optimize Power Savings | Favor power savings at the expense of video quality. |
| Hidden | No |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

## No Subgroup Settings Subgroup

Settings in this subgroup do not belong to any other subgroup.

|  |  |
| --- | --- |
| Subgroup | No Subgroup Settings |
| GUID | fea3413e-7e05-4911-9a71-700331f1c294 |
| PowerCfg Alias | SUB\_NONE |
| Settings | Device Idle PolicyPower Plan PersonalityPrompt for Password on Resume |

Device Idle Policy Setting

|  |  |
| --- | --- |
| Description | Determines whether conservation idle time-outs or performance idle time-outs are used for devices that are integrated with Windows kernel power manager device idle detection.  |
| GUID | 4faab71a-92e5-4726-b531-224559672d19 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Performance | Performance idle time-outs are used. |
| 1 | Power Savings | Conservation idle time-outs are used. |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista with Service Pack 1 (SP1), Windows Server 2008, and later versions of Windows. |

Power Plan Personality Setting

|  |  |
| --- | --- |
| **Description** | The personality of the power plan.Warning: The power plan personality setting should not be changed by administrators. |
| **GUID** | 245d8541-3943-4422-b025-13a784f679b7 |
| **PowerCfg Alias** | Not applicable |
| **Possible Values** | Index | Name | Description |
| 0 | Power Saver | The power plan is a Power Saver plan. |
| 1 | High Performance | The power plan is a High Performance plan. |
| 2 | Balanced | The power plan is Balanced plan. |
| **Hidden** | Yes |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Prompt for Password on Resume Setting

|  |  |
| --- | --- |
| Description | Whether the user must enter a password at the secure desktop when the system resumes from sleep. |
| GUID | 0e796bdb-100d-47d6-a2d5-f7d2daa51f51 |
| PowerCfg Alias | CONSOLELOCK |
| Possible Values | Index | Name | Description |
| 0 | Disabled | The system returns to the desktop when resuming from sleep. |
| 1 | Enabled | The system returns to the secure desktop, and the user must enter a password when the system resumes from sleep. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

## PCI Express Settings Subgroup

Settings in this subgroup control the power management of PCI Express links.

|  |  |
| --- | --- |
| Subgroup | PCI Express Settings |
| GUID | 501a4d13-42af-4429-9fd1-a8218c268e20 |
| PowerCfg Alias | SUB\_PCIEXPRESS |
| Settings | Link State Power Management  |

Link State Power Management Setting

|  |  |
| --- | --- |
| Description | The personality of the power plan.Warning: The power plan personality setting should not be changed by administrators. |
| GUID | ee12f906-d277-404b-b6da-e5fa1a576df5 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | None | The power plan is a Power Saver plan. |
| 1 | Moderate Power Savings | The system attempts to use the L0s state when the link is idle. |
| 2 | Maximum Power Savings | The system attempts to use the L1 state when the link is idle. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

## Power Button and Lid Settings Subgroup

Settings in this subgroup control the configuration of system button actions.

|  |  |
| --- | --- |
| Subgroup | Power Buttons and Lid Settings |
| GUID | 4f971e89-eebd-4455-a8de-9e59040e7347 |
| PowerCfg Alias | SUB\_BUTTONS |
| Settings | Lid Switch ActionPower Button ActionPower Button Forced ShutdownSleep Button ActionStart Menu Power Button Action |

Lid Switch Close Action Setting

|  |  |
| --- | --- |
| Description | The action to take when the system lid is closed. |
| GUID | 5ca83367-6e45-459f-a27b-476b1d01c936 |
| PowerCfg Alias | LIDACTION |
| Possible Values | Index | Name | Description |
| 0 | Do Nothing | No action is taken when the system lid is closed. |
| 1 | Sleep | The system enters sleep when the system lid is closed. |
| 2 | Hibernate | The system enters hibernate when the system lid is closed. |
| 3 | Shut Down | The system shuts down when the system lid is closed. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Power Button Action Setting

|  |  |
| --- | --- |
| Description | The action to take when the system power button is pressed. |
| GUID | 7648efa3-dd9c-4e3e-b566-50f929386280 |
| PowerCfg Alias | PBUTTONACTION |
| Possible Values | Index | Name | Description |
| 0 | Do Nothing | No action is taken when the power button is pressed. |
| 1 | Sleep | The system enters sleep when the power button is pressed. |
| 2 | Hibernate | The system enters hibernate when the power button is pressed. |
| 3 | Shut Down | The system shuts down when the power button is pressed. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Power Button Forced Shutdown Setting

|  |  |
| --- | --- |
| Description | The type of system shutdown that occurs when the system power button is pressed if the power button action is set to **Shut Down**.**Warning:** If this setting is enabled and a user presses the power button to shut down the system, any open documents might not be saved and data loss could occur.  |
| GUID | 833a6b62-dfa4-46d1-82f8-e09e34d029d6 |
| PowerCfg Alias | n/a |
| Possible Values | Index | Name | Description |
| 0 | Off | A normal system shutdown will occur. |
| 1 | On | A forced system shutdown will occur. |
| Hidden | Yes |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Sleep Button Action Setting

|  |  |
| --- | --- |
| Description | The action to take when the system sleep button is pressed. |
| GUID | 96996bc0-ad50-47ec-923b-6f41874dd9eb |
| PowerCfg Alias | SBUTTONACTION |
| Possible Values | Index | Name | Description |
| 0 | Do Nothing | No action is taken when the sleep button is pressed. |
| 1 | Sleep | The system enters sleep when the sleep button is pressed. |
| 2 | Hibernate | The system enters hibernate when the sleep button is pressed. |
| 3 | Shut Down | The system shuts down when the sleep button is pressed. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Start Menu Power Button Action Setting

|  |  |
| --- | --- |
| Description | The action to take when the power button in the Start menu is pressed. |
| GUID | a7066653-8d6c-40a8-910e-a1f54b84c7e5 |
| PowerCfg Alias | UIBUTTON\_ACTION |
| Possible Values | Index | Name | Description |
| 0 | Sleep | The system enters sleep when the Start menu power button is pressed. |
| 1 | Hibernate | The system enters hibernate when the Start menu power button is pressed. |
| 2 | Shut Down | The system shuts down when the Start menu power button is pressed. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and Windows Server 2008. Not available in Windows 7 or Windows Server 2008 R2. |

## Processor Power Management Settings Subgroup

Settings in the processor power management subgroup control processor performance and idle behaviors. In most scenarios, administrators and end users are not required to change these settings.

Additional processor power management subgroup settings are documented in “Processor Power Management in Windows 7 and Windows Server 2008 R2” and “Processor Power Management in Windows Vista and Windows Server 2008“ on the WHDC Web site.

|  |  |
| --- | --- |
| Subgroup | Processor Power Management Settings |
| GUID | 54533251-82be-4824-96c1-47b60b740d00 |
| PowerCfg Alias | SUB\_PROCESSOR |
| Settings | Allow Throttle StatesMaximum Processor StateMinimum Processor StateProcessor Idle State SettingsProcessor Performance State SettingsSystem Cooling Policy |

Allow Throttle States Setting

|  |  |
| --- | --- |
| Description | Specifies that the performance state algorithm can use any ACPI throttle states (T-states) that the system supports.  |
| GUID | 3b04d4fd-1cc7-4f23-ab1c-d1337819c4bb |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Disabled | Throttle states are not used. |
| 1 | Enabled | Throttle states can be used. However, the processor throttle state will not change adaptively. When enabled, the Minimum Processor State and Maximum Processor State settings can be used to lock the system processors into a specific processor throttle state. |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista with Service Pack 1 (SP1), Windows Server 2008, and later versions of Windows. |

Maximum Processor State Setting

|  |  |
| --- | --- |
| Description | Specifies the maximum processor performance state. The performance state is specified as a percentage of maximum processor frequency. |
| GUID | bc5038f7-23e0-4960-96da-33abaf5935ec |
| PowerCfg Alias | PROCTHROTTLEMAX |
| Minimum Value | 0 |
| Maximum Value | 100 |
| Label | Percentage (%) |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Minimum Processor State Setting

|  |  |
| --- | --- |
| Description | Specifies the minimum processor performance state. The performance state is specified as a percentage of maximum processor frequency. |
| GUID | 893dee8e-2bef-41e0-89c6-b55d0929964c |
| PowerCfg Alias | PROCTHROTTLEMIN |
| Minimum Value | 0 |
| Maximum Value | 100 |
| Label | Percentage (%) |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Processor Idle State Settings

|  |  |
| --- | --- |
| Description | Detailed settings for processor idle state usage and maintenance. These settings are not designed to be modified by system administrators. |
| GUID | 68f262a7-f621-4069-b9a5-4874169be23c |
| Operating System Versions | Available in Windows Vista and Windows Server 2008. Not available in Windows 7 or Windows Server 2008 R2. |

Processor Performance State Settings

|  |  |
| --- | --- |
| Description | Detailed settings for processor performance state usage and maintenance. These settings are not designed to be modified by system administrators. |
| GUID | bbdc3814-18e9-4463-8a55-d197327c45c0 |
| Operating System Versions | Available in Windows Vista and Windows Server 2008. Not available in Windows 7 or Windows Server 2008 R2. |

System Cooling Policy Setting

|  |  |
| --- | --- |
| Description | Configures Windows thermal behavior on systems that support active cooling features. |
| GUID | 94d3a615-a899-4ac5-ae2b-e4d8f634367f |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Passive | The system reduces processor performance before it enables active cooling features such as fans. |
| 1 | Active | The system enables active cooling features such as fans before it reduces processor performance. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista with Service Pack 1 (SP1), Windows Server 2008, and later versions of Windows. |

## Search and Indexing Settings Subgroup

Settings in this subgroup control the power management of the search and indexing services in Windows.

|  |  |
| --- | --- |
| Subgroup | Search and Indexing Settings |
| GUID | 581a5406-53a3-4acd-af43-f685fa098e06 |
| PowerCfg Alias | Not applicable |
| Settings | Indexing Power Savings Mode |

Indexing Power Savings Mode Setting

|  |  |
| --- | --- |
| Description | The personality setting for the power plan.Warning: The power plan personality setting should not be changed by administrators. |
| GUID | c1dd9fd6-ff5b-4270-8ab6-d48f1c40506a |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Power Saver | Indexing activity is minimal. |
| 1 | Balanced | Indexing activity is balanced with workload and power savings. |
| 2 | High Performance | Indexing activity takes precedence over power savings. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and Windows Server 2008. Not available in Windows 7 or Windows Server 2008 R2. |

## Sleep Settings Subgroup

Settings in this subgroup control sleep, resume, and related functionality.

|  |  |
| --- | --- |
| Subgroup | Sleep Settings |
| GUID | 238c9fa8-0aad-41ed-83f4-97be242c8f20 |
| PowerCfg Alias | SUB\_SLEEP |
| Settings | Allow Away ModeAllow Programs to Prevent SleepAllow Sleep with Open Remote FilesAllow Sleep StatesAllow System Required RequestsAutomatically Wake for TasksHibernate Idle TimeoutHybrid SleepIdle ThresholdSleep Idle TimeoutSleep Unattended Idle Timeout |

Allow Away Mode Setting

|  |  |
| --- | --- |
| Description | Whether the system uses away mode. If this setting is disabled, away mode is not used even if programs request it. |
| GUID | 25dfa149-5dd1-4736-b5ab-e8a37b5b8187 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Disabled | Away mode is not available. |
| 1 | Enabled | Away mode is available. |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Allow Programs to Prevent Sleep Setting

|  |  |
| --- | --- |
| Description | Whether programs can prevent sleep transitions. By default, this functionality is disabled.Warning: System behavior regarding sleep transitions is nondeterministic when this setting is enabled. |
| GUID | b7a27025-e569-46c2-a504-2b96cad225a1 |
| PowerCfg Alias | CRITICALSLEEP |
| Possible Values | Index | Name | Description |
| 0 | Disabled | Programs cannot block sleep transitions. |
| 1 | Enabled | Programs can prevent sleep transitions. |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista and Windows Server 2008. Not available in Windows 7 or Windows Server 2008 R2. |

Allow Sleep with Open Remote Files Setting

|  |  |
| --- | --- |
| Description | Configures the network file system to prevent the computer from automatically entering sleep when remote network files are open. |
| GUID | d4c1d4c8-d5cc-43d3-b83e-fc51215cb04d |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Off | Prevents automatic sleep when remote network files are open. However, if the open files are stored in Offline Files and are backed by the Offline File cache, automatic sleep is allowed. |
| 1 | On | Prevents automatic sleep when remote network files are open. However, if the open files are stored in Offline Files or the open files have not been updated since they were originally opened, automatic sleep is allowed. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Allow Sleep States Setting

|  |  |
| --- | --- |
| Description | Whether the system uses low-power sleep states. |
| GUID | abfc2519-3608-4c2a-94ea-171b0ed546ab |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Disabled | Sleep states (ACPI S1, S2, and S3) are not available. |
| 1 | Enabled | Sleep states (ACPI S1, S2, and S3) are available. |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Allow System Required Requests Setting

|  |  |
| --- | --- |
| Description | Configures the power manager to accept or ignore application system required requests. These requests prevent the system from automatically entering sleep after a period of user inactivity. |
| GUID | a4b195f5-8225-47d8-8012-9d41369786e2 |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | No | Application system required requests will be ignored. |
| 1 | Yes | Application system required requests will be accepted. |
| Hidden | Yes |
| Operating System Versions | Available in Windows 7 and later versions of Windows. |

Automatically Wake for Tasks Setting

|  |  |
| --- | --- |
| Description | Whether the system uses the system-wide wake-on-timer capability. The system can automatically use wake-on-timer on capable hardware to perform scheduled tasks. For example, the system might wake automatically to install updates. |
| GUID | bd3b718a-0680-4d9d-8ab2-e1d2b4ac806d |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | No | Wake-on-timer is disabled. |
| 1 | Yes | Wake-on-timer is enabled. |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Hibernate Idle Time-out Setting

|  |  |
| --- | --- |
| Description | Duration of time after sleep that the system automatically wakes and enters hibernate. |
| GUID | 9d7815a6-7ee4-497e-8888-515a05f02364 |
| PowerCfg Alias | HIBERNATEIDLE |
| Minimum Value | 0 (never idle to sleep) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Hybrid Sleep Setting

|  |  |
| --- | --- |
| Description | Whether the system can enter hybrid sleep. |
| GUID | 94ac6d29-73ce-41a6-809f-6363ba21b47e |
| PowerCfg Alias | HYBRIDSLEEP |
| Possible Values | Index | Name | Description |
| 0 | Disabled | Hybrid sleep is disabled. |
| 1 | Enabled | Hybrid sleep is enabled. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Idle Threshold Setting

|  |  |
| --- | --- |
| Description | Amount of idleness, as measured by processor use, that is required for the system to accrue idle time for the sleep idle time-out. |
| GUID | 81cd32e0-7833-44f3-8737-7081f38d1f70 |
| PowerCfg Alias | Not applicable |
| Minimum Value | 0 |
| Maximum Value | 100 |
| Label | Percentage (%) |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista and Windows Server 2008. Not available in Windows 7 or Windows Server 2008 R2. |

Sleep Idle Time-out Setting

|  |  |
| --- | --- |
| Description | Duration of inactivity before the system automatically enters sleep. |
| GUID | 29f6c1db-86da-48c5-9fdb-f2b67b1f44da |
| PowerCfg Alias | STANDBYIDLE |
| Minimum Value | 0 (never idle to sleep) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

Sleep Unattended Idle Time-out Setting

|  |  |
| --- | --- |
| Description | Duration of inactivity before the system automatically enters sleep after waking from sleep in an unattended state. For example, if the system wakes from sleep because of a timed event or a Wake on LAN (WoL) event, the sleep unattended idle time-out will be used instead of the sleep idle time-out. |
| GUID | 7bc4a2f9-d8fc-4469-b07b-33eb785aaca0 |
| PowerCfg Alias | Not applicable |
| Minimum Value | 0 (never idle to sleep) |
| Maximum Value | Maximum Integer  |
| Label | Seconds |
| Hidden | Yes |
| Operating System Versions | Available in Windows Vista with Service Pack 1 (SP1), Windows Server 2008, and later versions of Windows. |

## Wireless Adapter Settings Subgroup

Settings in this subgroup control the power management of wireless networking devices.

|  |  |
| --- | --- |
| Subgroup | Wireless Adapter Settings |
| GUID | 19cbb8fa-5279-450e-9fac-8a3d5fedd0c1 |
| PowerCfg Alias | Not applicable |
| Settings | Wireless Adapter Power Save Mode |

#### Wireless Adapter Power Save Mode Setting

|  |  |
| --- | --- |
| Description | The power saving mode of the wireless networking device, if one is present on the system. |
| GUID | 12bbebe6-58d6-4636-95bb-3217ef867c1a |
| PowerCfg Alias | Not applicable |
| Possible Values | Index | Name | Description |
| 0 | Maximum Performance | Performance of the wireless adapter is favored over power savings. |
| 1 | Low Power Saving | Low Power Savings mode is used. |
| 2 | Medium Power Saving | Medium Power Savings mode is used. |
| 3 | Maximum Power Saving | Power savings of the wireless adapter is favored over performance. |
| Hidden | No |
| Operating System Versions | Available in Windows Vista and later versions of Windows. |

# Summary

Starting with Windows Vista, the Microsoft Windows operating system features a new power policy storage mechanism and infrastructure that support Windows Group Policy, granular power policy security, and a robust PowerCfg tool.

Manufacturers can take advantage of these features to customize power policy for their systems. IT professionals and system administrators can take advantage of Windows Group Policy to enforce display and system sleep idle time-outs to reduce computer power consumption in the enterprise.

# Call to Action

Manufacturers, IT professionals, and system administrators should use the information in this paper to:

* Understand the details of the Windows power policy store, including power settings, power setting subgroups, and power plans.
* Customize power plans for manufacturer-specific systems and designs.
* Deploy energy-saving features such as the display idle time-out and sleep idle time-out by using Windows Group Policy to reduce computer power consumption.
* Use the PowerCfg tool to customize power policy from the command line or in a script.
* Configure power policy security to remove power policy access permissions from specific accounts, including the Guest account.
* Refer to the power subgroup and power setting information in this paper.

# Resources

ACPI / Power Management – Architecture and Driver Support on WHDC

<http://www.microsoft.com/whdc/system/pnppwr/powermgmt/default.mspx>

Processor Power Management in Windows 7 and Windows Server 2008 R2

<http://www.microsoft.com/whdc/system/pnppwr/powermgmt/ProcPowerMgmtWin7.mspx>

Processor Power Management in Windows Vista and Windows Server 2008

<http://www.microsoft.com/whdc/system/pnppwr/powermgmt/ProcPowerMgmt.mspx>

Security Descriptor Definition Language

[http://msdn.microsoft.com/en-us/library/aa379567.aspx](http://msdn.microsoft.com/library/default.asp?url=/library/en-us/secauthz/security/security_descriptor_definition_language.asp)