Best practice power settings for Surface devices

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Surface devices are designed to take advantage of the latest advances in mobile device energy consumption to deliver a streamlined experience optimized across workloads. Depending on what you're doing, Surface dynamically fine tunes how power flows to individual hardware components, momentarily waking up system components to handle background tasks -- such as an incoming email or network traffic -- before returning to a low power idle state (S0ix).

Summary of recommendations for IT administrators

To ensure Surface devices across your organization fully benefit from Surface power optimization features:

- Install the latest drivers and firmware from Windows Update or the Surface Driver and Firmware MSI. This creates the balanced power plan (aka power profile) by default and configures optimal power settings. For more information, refer to Manage and deploy Surface driver and firmware updates.
- Avoid creating custom power profiles or adjusting advanced power settings not visible in the default UI (**System** > **Power & sleep**).
- If you must manage the power profile of devices across your network (such as in highly managed organizations), use the powercfg command tool to export the power plan from the factory image of the Surface device and then import it into the provisioning package for your Surface devices.

> **Tip**
>
> You can only export a power plan across the same type of Surface device. For example, you cannot export a power plan from Surface Laptop and import it on Surface Pro. For more information, refer to **Configure power settings**.

- Exclude Surface devices from any existing power management policy settings.

Background

The way Surface implements power management differs significantly from the earlier OS standard that gradually reduces and turns off power via a series of sleep states; for example, cycling through S1, S2, S3, and so on.

Instead, Surface is imaged with a custom power profile that replaces legacy sleep and energy consumption functionality with modern standby features and dynamic fine tuning. This custom power profile is implemented via the Surface Serial Hub Driver and the system aggregator module (SAM). The SAM chip functions as the Surface device power-policy owner, using algorithms to calculate optimal power requirements. It works in conjunction with Windows power manager to allocate or throttle only the exact amount of power required for hardware components to function. This article applies to all currently supported Surface devices.

Utilizing the custom power profile in Surface

If you go into the power options on a surface device, you'll see that there's a single power plan available. This is the custom power profile. And if you go to the advanced power settings, you'll see a much smaller subset of power options compared to a generic PC running Windows 10 or Windows 11. Unlike generic devices, Surface has firmware and custom components to manage these power options.

Modern Standby

The algorithmically embedded custom power profile enables modern standby connectivity for Surface by maintaining a low power state for instant on/instant off functionality typical of smartphones. S0ix, also known as Deepest Runtime Idle Platform State (DRIPS), is the default power mode for Surface devices. Modern standby has two modes:

- **Connected standby.** The default mode for up-to-the minute delivery of emails, messaging, and cloud-synced data, connected standby keeps Wi-Fi on and maintains network connectivity.

- **Disconnected standby.** An optional mode for extended battery life, disconnected standby delivers the same instant-on experience and saves power by turning off Wi-

Fi, Bluetooth, and related network connectivity.

To learn more about modern standby, refer to the Microsoft Hardware Dev Center.

How Surface streamlines the power management experience

Surface integrates the following features designed to help users optimize the power management experience:

- Singular power plan
- Simplified power settings user interface
- Windows performance power slider

Singular power plan

Surface is designed for a streamlined power management experience that eliminates the need to create custom power plans or manually configure power settings. Microsoft streamlines the user experience by delivering a single power plan (balanced) that replaces the multiple power plans from standard Windows builds.

Simplified power settings user interface

Surface provides a simplified UI in accord with best practice power setting recommendations. In general, it's recommended to only adjust settings visible in the default user interface and avoid configuring advanced power settings or Group Policy settings. Using the default screen and sleep timeouts while avoiding maximum brightness levels are the most effective ways for users to maintain extended battery life.

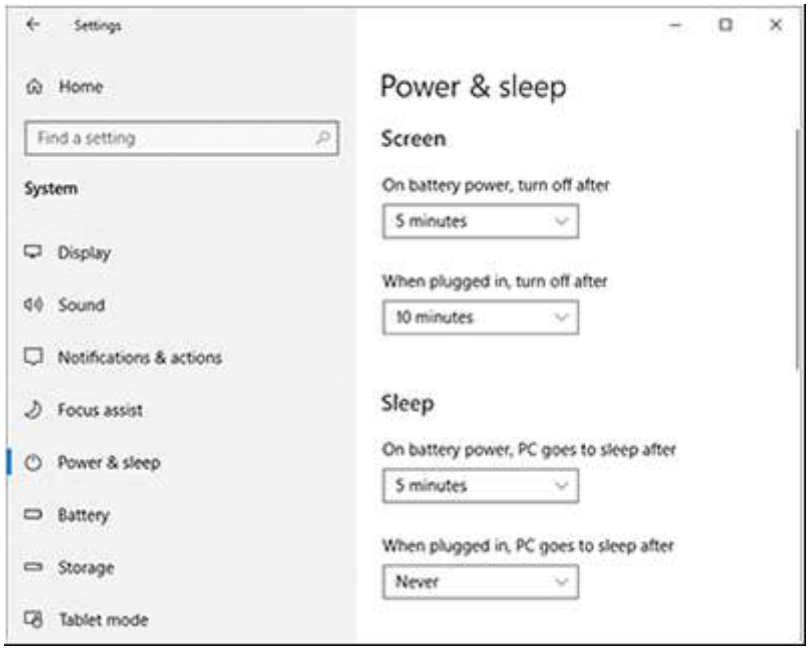

Figure 1. Simplified power and sleep settings

Windows performance power slider

Surface devices running Windows 10 build 1709 and later include a power slider allowing you to prioritize battery life when needed or favor performance if desired. You can access the power slider from the taskbar by clicking on the battery icon. Slide left for longer battery life (battery saver mode) or slide right for faster performance.

Figure 2. Power slider

Power slider enables four states as described in the following table:

Slider mode	Description
Battery saver	Helps conserve power and prolong battery life when the system is disconnected from a power source. When battery saver is on, some Windows features are disabled, throttled, or behave differently. Screen brightness is also reduced. Battery saver is only available when using battery power (DC). To learn more, see Battery Saver.
Recommended	Delivers longer battery life than the default settings in earlier versions of Windows.
Better Performance	Slightly favors performance over battery life, functioning as the default slider mode.
Best Performance	Favors performance over power for workloads requiring maximum performance and responsiveness, regardless of battery power consumption.

Power slider modes directly control specific hardware components shown in the following table.

Component	Slider functionality
Intel Speed Shift (CPU energy registers) and Energy Performance Preference hint.	Selects the best operating frequency and voltage for optimal performance and power. The Energy Performance Preference (PERFEPP) is a global power efficiency hint to the CPU.
Fan speed (RPM)	Where applicable, adjusts for changing conditions such as keeping fan silent in battery saver slider mode.
Processor package power limits (PL1/PL2).	Requires the CPU to manage its frequency choices to accommodate a running average power limit for both steady state (PL1) and turbo (PL2) workloads.
Processor turbo frequency limits (IA turbo limitations).	Adjusts processor and graphics performance allowing processor cores to run faster or slower than the rated operating frequency.

> **Note**
>
> The power slider is entirely independent of operating system power settings whether configured from Control Panel/ Power Options, Group Policy, or related methods.

To learn more, see:

- Customize the Windows performance power slider
- Battery saver.

Best practices for extended battery life

Best practice	Go to	Next steps
Ensure your Surface device is up to date	Windows Update	In the taskbar search box, type **Windows Update** and select **Check for updates**.
Choose the best power setting for what you're doing	Power slider	In the taskbar, select the battery icon, then choose **Best performance**, **Best battery life**, or somewhere in between.
Conserve battery when it's low	Battery saver	In the taskbar, select the battery icon and click **Battery settings**. Select **Turn battery saver on automatically if my battery falls below** and then move the slider further to the right for longer battery life.
Configure optimal screen brightness	Battery saver	In the taskbar, select the battery icon and click **Battery settings**, select **Lower screen brightness while in battery saver**.
Conserve power whenever you're not plugged in	Battery saver	Select **Turn on battery saver status until next charge**.
Investigate problems with your power settings.	Power troubleshooter	In the Taskbar search for troubleshoot, select **Troubleshoot**, and then select **Power** and follow the instructions.
Check app usage	Your apps	Close apps.
Check your power cord for any damage.	Your power cord	Replace power cord if worn or damaged.

Learn more

- Modern standby
- Customize the Windows performance power slider

- Battery saver
- Manage and deploy Surface driver and firmware updates