

Best Practices: SoMo Battery Discharging Quickly When Not In Use

DESCRIPTION

A few customers have reported that a fully charged SoMo 650 handheld, when powered off and not connected to a charger, will significantly discharge the battery or not turn on at all when the power button is pushed after sitting overnight. The following document describes the likely causes, suggested troubleshooting techniques and best practices to avoid this situation.

MOST LIKELY CAUSES

The lithium-ion battery (1200mAh and 2600mAh) used in the SoMo product line will maintain a powered-down SoMo for many weeks. It is rare that the LiOn batteries used in the SoMo have a quality issue. If a battery has a significant discharge over one or two days when not in use, then one of the following causes is likely.

- 1) **Software:** The operating system or an application is turning the SoMo on and causing current drain on the battery when not in use.
- 2) **Battery Charge:** The battery was not initially completely charged.
- 3) **Battery Usage:** The batteries have exceeded their rated life and do not hold a significant charge to keep a SoMo alive.

A useful diagnostic tool, Socket's "Power Plus Battery Friendly[®]" utility, can help to analyze the problem and find the cause. The Battery Friendly utility was released as part of Windows Mobile 6 (WM6) Service Pack 6 (SP6) in early April. Enable the utility to log all battery and system power supply activity. After a one or two day period is complete, the log can be exported and reviewed for activity to help diagnose the problem. We recommend for this testing that the logging interval be set to 1 minute. Note, this utility is only available in WM6. See Appendix A below for further details on the capabilities of this new utility and how to download it.

The troubleshooting ideas and suggestions below can still be used on WM5 or earlier WM6 platforms without the "Power Plus Battery Friendly" utility, but will require different techniques.

HOW TO TROUBLESHOOT

1) Software Causes

a. Software cause #1 - Windows Mobile "Midnight" turn-on:

Windows Mobile has a feature that can be a contributor to this issue. Windows Mobile systems automatically turn on every day at 12:00AM (midnight). The intent by Microsoft is that the operating system can do "housekeeping tasks", reset alarms, etc. This feature is intended to optimize the Windows Mobile operating system performance. At this time, the screen will not turn on, but the processor will start with normal activity (thus draining battery power). You can observe this by seeing the WLAN and/or Bluetooth lights flash green and/or blue (if you have a DX unit it will be more difficult to detect) even though the display remains off. Note this will only happen if those radios were enabled when the unit was powered down. If there are special applications set to run when a unit powers up, then their execution can cause the screen to turn on or cause the unit to run longer than the backlight setting. This is the most common cause of drained batteries.

Best Practices: While it is not possible to disable this feature, proper configuration of your SoMo "Backlight" and "Power" settings will restore your SoMo to the Power Off state after the "Midnight" turn-on. These settings can be found at:

Best Practices: SoMo Battery Discharging Quickly When Not In Use

Backlight:

Start > Settings > System > Backlight; then select “Battery Power” tab.

At this location you will see a screen like either Figure 1 or 2 below.

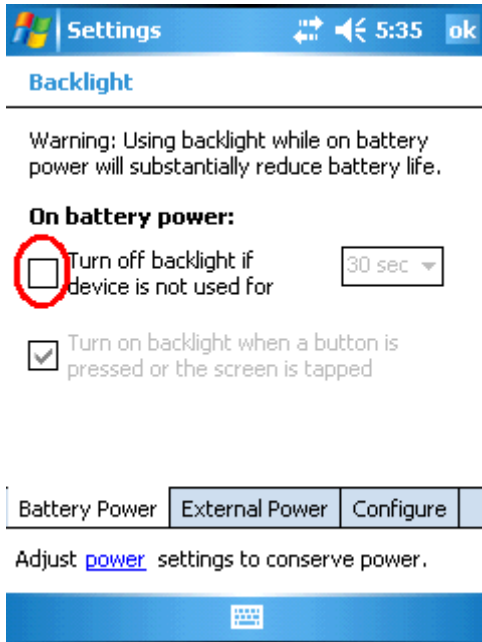


Figure 1

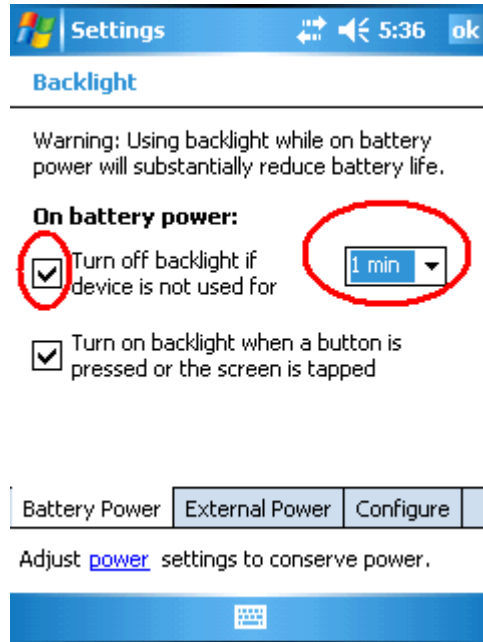


Figure 2

Ensure that your SoMo is configured as in Figure 2. Note: the shorter the interval, the longer the battery life. The “Turn on backlight when a button is pressed or screen is tapped” field is optional and does not affect the “Midnight” turn-on.

Power:

Start > Settings > System > Power (or “power Plus”); then select “Advanced” tab

At this location you will see a screen like either Figure 3 or 4 below.

Best Practices: SoMo Battery Discharging Quickly When Not In Use

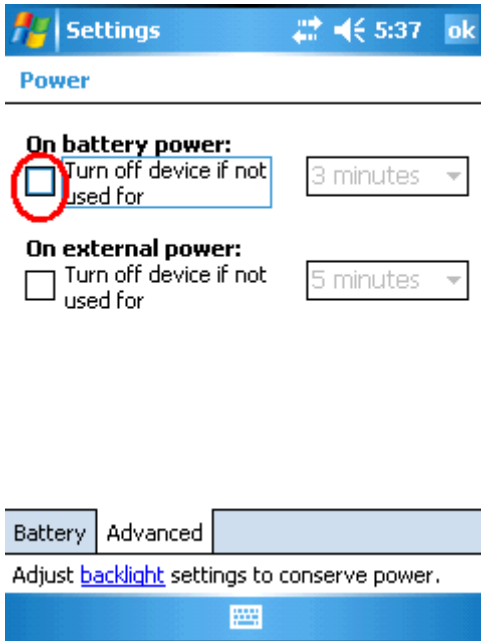


Figure 3

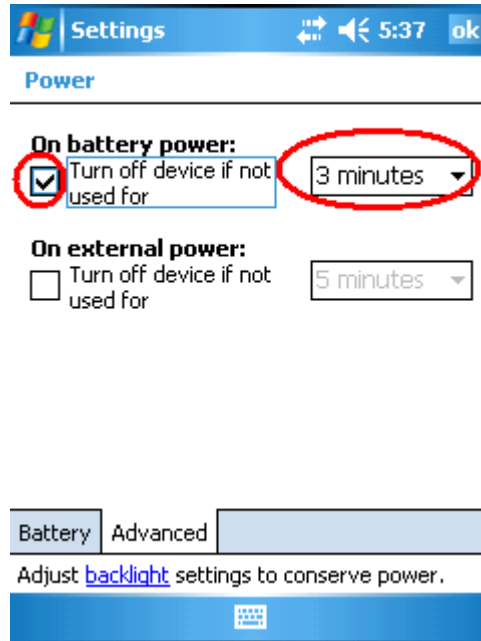


Figure 4

Ensure that your SoMo is configured as in Figure 4. The interval selection (i.e. 3 minutes in this example) is not important, but note you will experience longer battery life if a shorter interval is selected. If the device is not used when on external power, it is recommended that you select the “Turn off device if not used for” box in the On external power section.

In this example the “midnight turn-on” will last for only 1 minute (Backlight setting), and there should be no problem with excessive battery drain. The Backlight setting takes precedence over the Power setting during the Midnight turn-on. If your SoMo is set as in Figure 1 and Figure 3, then at midnight the SoMo will turn on and never turn off. This results in the battery draining overnight.

Occasionally there are cases where an application takes control of the SoMo when it turns on at midnight. In this case the SoMo might not turn off as defined by the Backlight and Power settings. There are several ways to diagnose this problem.

A quick test is to set the SoMo clock to 11:59 PM, shut the unit off and then observe what happens when the clock passes “midnight”.

Another approach is to use the “Power Plus Battery Friendly” utility to log activity overnight. This is a more comprehensive approach as it will uncover other possible causes described in #2 below. To test this, enable the logging interval to be 1 minute in the utility, run the system overnight and then observe the logs. When a SoMo is off (suspended) there will be no logging, so it will be obvious if the unit does turn on during the evening. It should turn on only as long as the backlight setting described above.

b. Software cause #2 - Application Alarm Startup:

Best Practices: SoMo Battery Discharging Quickly When Not In Use

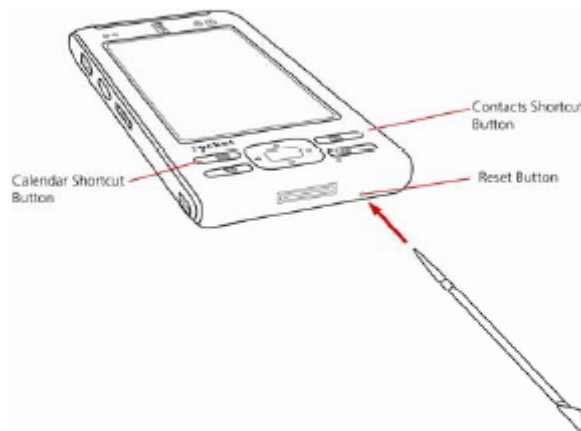
Software applications have the ability to turn the SoMo on at arbitrary times. They can set up what is known as an “alarm”.

Unless one knows the applications being used and all of the operations they can perform, it is difficult to determine if this is the issue. The simplest approach is to use the “Power Plus Battery Friendly” utility to log activity during this failing period. The utility will log all processor activity. When a SoMo is off (suspended) there will be no logging, so it will be obvious if the unit does turn on during the evening. Except for the “midnight turn-on” noted previously, you would expect to see no other activity during the evening unless an application turned the SoMo on.

Another approach to diagnosing the cause is to factory reset (“hard reset”) the SoMo back to factory conditions.

To perform a hard reset:

1. Press and hold the Calendar and Contacts shortcut buttons on your SoMo 650.
2. While holding the two buttons, using the tip of your stylus, lightly press the Reset button inside the hole on the bottom of your SoMo 650.



Press the two shortcut buttons with the index and middle finger of one hand. Hold the stylus in your other hand to press the reset button and then release.

3. Keep pressing the two buttons until a splash screen appears with the Socket logo and then disappears.
4. After the Socket Splash Screen disappears, release the two buttons and follow the onscreen instructions.

After performing the reset, allow the unit to operate through the time period of failure. If the SoMo runs successfully through the “problem period” without the application, then one should suspect an application program causing the issue.

c. Software cause #3 - Low Power Mode vs. Off Mode:

The Windows Mobile OS has a special “Quick Low Power” mode available. Sometimes users will mistakenly go into this mode when they think they have turned off the device. Users will think that

Best Practices: SoMo Battery Discharging Quickly When Not In Use

the device is off, when in actuality it is still running in this low power state. If a unit was running in this state over night it would drain the battery down significantly more than if the SoMo was off.

This mode was intended to be used by users if they want to use their PDA as a MP3 player in a lower power mode. The mode darkens the backlight display, so users also used this when operating the SoMo in outside well-lit situations, using natural light to illuminate the display versus the backlight.

To power down the SoMo you would momentarily touch the power On/Off switch. If the power On/Off switch is pressed for a few seconds then the SoMo enters the low power mode. At this point you would see the backlight dim. To get out of this mode, tap the LCD display and the unit will turn back on to a normal operating state.

2) Improper Battery Charge Cause:

There are instances where the SoMo battery may not have been properly charged or charged to their full charge level.

The simplest way to determine if a battery is fully charged is to go to the system power utility found on all SoMo devices. The path to that utility is:

Start > Settings > System > Power

The “battery power remaining” should be 100% when fully charged and the battery should be listed as Li-Ion.

The “Power Plus Battery Friendly” utility will give a very clear picture of battery charge status in its log of the charge level and charge usage of a battery. It will also confirm as to whether a battery was fully charged.

A battery not reaching proper charge levels or not listed as “Li-Ion” is usually due to a battery connector issue or to charging a battery under extreme temperature conditions. Socket Customer Support Notice CSN-1004 discusses these cases in Sections 3 & 4. Also, be sure to read the last two sections at the end of the document: “Battery Charge shutdown due to High Temperature” and “Extending Battery Life”. Charging a SoMo above 35° C/95° F will result in a much longer charge time because of the high temperature self protection feature of the SoMo. This can result in a doubling or tripling of the charge time. The result would be that a battery can't fully charge over one evening.

3) Battery has reached it's rated End Of Life:

The Lithium Ion battery in your SoMo 650 is rated for 500 charge/discharge cycles. It is highly recommended to replace the batteries after that point.

The “Power Plus Battery Friendly” utility has a colored bar indicator that displays the number of charging cycles remaining (under the usage tab). As the battery is used, the bar indicator will move from green to yellow to red.

As mentioned in the prior section, Socket Customer Support Notice CSN-1004 discusses how the environment can impact the battery charge capacity. See the last section in the document called “Extending Battery Life”. This Notice can be found at:

<http://support.socketmobile.com> ; select KnowledgeBase ; search for CSN-1004

Best Practices: SoMo Battery Discharging Quickly When Not In Use

Batteries used in a hot environment for long periods of time or not properly stored will reduce battery life. A SoMo battery should last for over 2 years if not exceeding 500 charge cycles.

Appendix A - Power Plus Battery Friendly utility

Socket's SoMo 650 Power Plus Battery Friendly[®] utility is an advanced power management and monitoring application. Available to all Windows Mobile 6 (WM6) customers with Service Pack 6 (SP6) or above installed, the Power Plus Battery Friendly[®] utility with MCU firmware version 2.7 or greater provides detailed information on SoMo performance for optimization, analysis and troubleshooting. Utility features include:

- Battery ID*
- Battery size*
- Real-time power remaining indicator* and charging status
- Real-time charging/discharging battery current usage indicator
- Configurable power settings for battery and AC power operation
- Indicator for Date, Time and % charged of last battery charging*
- Battery specification charging cycles remaining*
- Exportable Power Log providing:
 - o **Battery ID** – The unique ID of the battery* (Note 1)
 - o **Date/Time** – The date and time the log entry was recorded
 - o **Charge %** - Shows remaining battery capacity from 0% to 100%*
 - o **Battery or AC power** – Indicates device is powered by AC or battery
 - o **Battery Voltage (mV)** – Reports the battery voltage
 - o **Current Usage (mA)** – Reports usage and charging/discharging status
 - o **Battery Temperature (C)** – Reports battery temperature
 - o **WiFi** - Shows if WiFi is ON or Off
 - o **Bluetooth** - Shows if Bluetooth is ON or Off
 - o **CPU Speed** - Reports the speed of the CPU in MHz
 - o **CPU Load** – Reports the processing load of the CPU, 0% to 100%
 - o **Cradled** - Reports if SoMo is connected with ActiveSync, YES/NO
 - o **Display** - Indicates if the screen is ON or OFF
 - o **Display** - Indicates the screen brightness on a scale of 0 to 10
 - o **System State** - Reports either Running, Reset or Suspend/resume
 - o **Remaining** - Estimated usage time remaining in hours and minutes

* Features not available with SoMo MCU firmware version below 2.7

- Note 1: Battery ID is a unique # associated with each battery, but not the same as the Battery Serial Number.

To get full functionality of the utility requires sending the SoMo back to the factory for an upgrade of the Power management unit to revision 2.7 or greater. Your SoMo MCU revision can be found in Start > Settings> System > System Info > OS Version – it should read “MCU Version: 2.7” or greater.

Further information on usage of the utility can be found at:

http://ww1.socketmobile.com/Libraries/Documents/SoMo_650_Battery_Friendly_UTILITY.sflb.ashx