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## COMPUTERS, ON 24/7, AWAITING UPDATES BUT WASTING ENERGY?

### *How University of Wisconsin Put Computers to Sleep and Saved \$20 /PC*

Like many organizations, University of Wisconsin-Oshkosh (UW Oshkosh) computer labs kept their PCs powered 24 hours a day to accommodate students and nightly software updates. While the updates were critical for maintaining a healthy and secure network, the UW Oshkosh Academic Computing department realized that a great deal of energy was being wasted. Convinced that there must be a better way, UW Oshkosh ultimately found the answer at [www.energystar.gov/powermanagement](http://www.energystar.gov/powermanagement). Using built-in Windows Wake on LAN (WOL) functions, a free network tool provided by EPA called *EZ GPO*, and about 3 hours of staff time, UW Oshkosh was able to:

- place 485 computers into a low-power "sleep,"
- continue to update lab computers every night, and
- save over \$9,000 annually (at 5 cents/kWh).<sup>1</sup>

"The tool worked wonderfully and installed in 5 minutes. We sent out a blast email letting the users know. Given that we were new to the system standby we were a little apprehensive. But there was really minimal increased Help Desk traffic after that regarding minor issues like the need to use the keyboard instead of the mouse for waking up certain machines."  
 Daniel M. Hoyt - System Administrator

Here's how they did it...

### A MEANS TO ACTIVATE SLEEP SETTINGS -- EZ GPO TOOL

Encouraged by a State of Wisconsin directive to save energy, Academic Computing took a hard look at their computer lab and realized that they were not taking full advantage of computer power management features – standard in most Windows operating systems.

Often overlooked, power management features allow both computers (CPU, hard drive, etc.) and/or monitors to enter a low-power sleep mode during periods of inactivity and wake up in seconds when the mouse or keyboard is touched. Since they had already set computer *monitors* to go to sleep after 20 minutes – saving roughly \$20 per monitor annually – UW Oshkosh decided to look into activating *computer* sleep settings. That's when they discovered *EZ GPO*, a free software tool, on the ENERGY STAR Web site ([www.energystar.gov/powermanagement](http://www.energystar.gov/powermanagement)). *EZ GPO* works with Active Directory and Group Policy Objects to activate "system standby" on computer networks quickly and easily. Using *EZ GPO*, UW Oshkosh set the system standby idle timer to 20 minutes on each

#### EZ GPO Allows Logged Off Computers to Sleep

Normally, system standby does not work in the logged-off state because settings are "user" based and not "machine" based. Since users log in, do their work, and log off, shared computers are usually inactive (and able to enter sleep mode) only in the logged off state. Anticipating this issue, *EZ GPO* was designed to activate system standby even in the logged off state. This is a very important feature for shared computers.

computer. As a result, their computers -- which normally use around 60 to 70 watts of

<sup>1</sup> With electricity rates only five cents/kWh, UW Oshkosh savings of \$20 per computer were on the low side. In the northeast and California, where rates can run around 11 cents/kWh, savings can easily reach be over \$40 per computer.

power -- now enter a low-power mode, using around 2 to 3 watts, after 20 minutes of inactivity.

### **THE NEED FOR NIGHTLY SOFTWARE UPDATES**

After activating computer sleep settings, an issue arose regarding night-time updates. Once sleep settings were activated, IT staff could not perform nightly maintenance and software updates because there was no means for accessing sleeping computers. UW Oshkosh uses Symantec Ghost 8.0 to deploy and manage images, Centurion Guard DriveShield -- which restores a computer back to the administrator's pre-defined configuration -- and Centurion Guard Compuguard Control Center -- for centralized management to lock and unlock workstations. "DriveShield is an essential night-time update tool for our computer lab. We needed a way to continue to use DriveShield AND save the energy," said Andy Knoke, System Administrator for Academic Computing. "We needed a solution."

### **A TECHNICAL SOLUTION – WAKE ON LAN**

UW Oshkosh Academic Computing staff contacted EPA. Over a conference call, EPA technical staff and UW Oshkosh System Administrators discussed the possibility of using Wake on LAN (WOL). With WOL activated, network administrators can wake up machines out of sleep to allow for critical night-time patches and updates. To use WOL, UW Oshkosh Administrators had to follow the three steps outlined below:

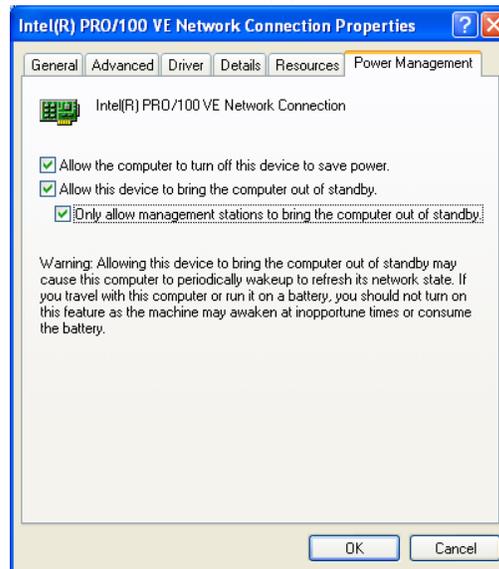
- **Step 1: Activate WOL in the Basic Input/Output system (BIOS) Configuration Utility:** Computers that are shut down (as opposed to in sleep/hibernation) can be awakened if the WOL setting in the BIOS (sometimes called "Remote Wake Up") is activated. In many instances – particularly with older computers – these WOL settings will not be activated by default on computers. The WOL setting in the BIOS can be centrally managed using tools from computer/BIOS vendors such as Dell (Dell OpenManage), Hewlett-Packard, and IBM. *At UW Oshkosh, WOL was already activated in the BIOS.*
- **Step 2: Activate WOL in the Operating System (OS):** Computers in system standby or hibernate can be awakened if the OS WOL setting, which is tied to the network interface card (NIC) driver, is activated by checking the appropriate boxes<sup>2</sup> on the network adapter power management properties. (See the screen shot in Exhibit 1 below.) In many instances this setting will not be activated by default. Solutions for centrally managing OS WOL settings include:
  - Windows Management Instrumentation (WMI) scripting of the setting
  - Modifying the default base image and re-imaging

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<sup>2</sup> Found in XP at Control Panel >System >Hardware>Device Manager>Network Adapter. Double click "Card", open power management tab and check off "Allow this device to bring the computer out of standby" and "Only allow management stations to bring this computer out of standby."

*At UW Oshkosh, Academic Computing staff use Symantec Ghost to re-image their computer lab machines and activate the WOL settings on the NICs. Activating this setting can be complicated because naming conventions for WOL registry keys may be different on each type of NIC. Fortunately, UW Oshkosh ran only three different types of HP computers. Consequently, they had only three NIC types and associated WOL registry names to manage. Since they had three hardware-specific images, updating each image and redeploying was all they had to do to activate WOL.*

**Exhibit 1**

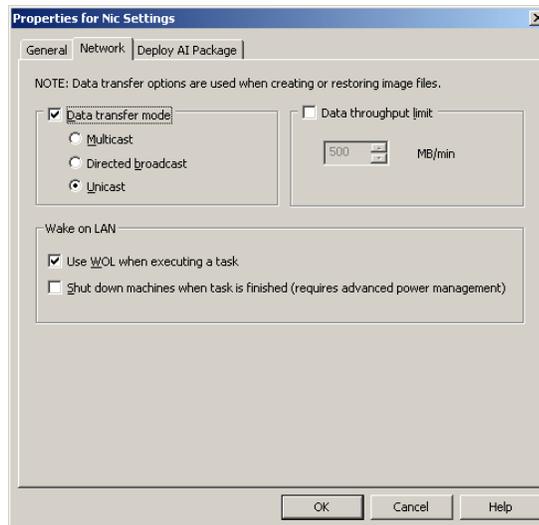


- **Step 3: Use “Wake-Up” Packets to Awaken Sleeping Computers:** With WOL activated in the BIOS and OS, computers can be awakened by sending wake-up packets. “Magic Packets” were one of the first types of such packets. Today, remote wakeup can be initiated by a variety of packets. Wake-up packets, which work based on the Media Access Control (MAC) address and not the Internet Protocol (IP) address, can be sent by any number of network management or stand-alone programs. A number of simple tools for sending wake up packages are available for free on the Internet.

*UW Oshkosh used two types of WOL wakeups. Ghost was used to create a task and specify that the task, such as DriveShield activation, use WOL before pushing the task. (See screen shot in Exhibit 2.) In addition, a free third party Linux utility was found that scripts waking up groups of machines at a time:*

<http://qsd.di.uminho.pt/jpo/software/wakeonlan/mini-howto/wol-mini-howto-3.html>

## Exhibit 2



### LESSONS LEARNED

UW Oshkosh's experience with activating system standby in their computer lab demonstrated the following:

- **Activating Sleep Settings Cuts Computer Energy Use by 75%.** For organizations that leave computers on 24/7, these savings are typical. Cost savings can be as much as \$50/computer, depending on electricity rates.
- **WOL Can Facilitate Night-Time Updates of Sleeping Computers.** Easy to implement and manage, WOL allows for regular night-time updates of computers.
- **Up Front User Education Pays Off.** Help Desk calls were minimized by adequately informing users ahead of time about the activation of system standby features.

### FOR MORE INFORMATION

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#### Technical Information on the *EZ GPO* Tool

- Provides network administrators with centralized control of user power management settings.
- Sets appropriate power management settings for both the computer monitor and the PC.
- Leverages existing infrastructure on Windows and Novell based networks.
- Requires no special hardware or network processes.
- Allows management of power management settings for machines in either the logged-on or the logged-off state.

#### How it Works

- Installs a client application via an MSI installer.
- Reads the desired power management settings that are set using GPOs in integer and string value format.
- Changes power management settings, stored client side as a binary string, using Microsoft's core Application Programming Interface.
- Intelligently selects only capable computers when activating "system standby." (Computers generally capable of using system standby run Windows 2000 or higher with Pentium 4 or newer chip sets capable of S3 standby mode.)

EZ GPO is available for free at  
[www.energystar.gov/powermanagement](http://www.energystar.gov/powermanagement)