

Policy on Computer Power Management



Purpose

The Stephen M. Ross School of Business at the University of Michigan (“Ross”) has established computer power settings to achieve energy cost savings across the enterprise for all managed desktop and laptop computers. Power management is a feature of computers, monitors, printers and copiers that turns off the power or switches the system to a low-power state when inactive in order to save energy. Power management becomes even more important across an enterprise such as Ross due to the significant amount of energy being used the costs associated with that energy use.

More Energy

Always On
Desktop
Faster Processor
Older Processor
Windows PC
Heavy Use (Stats, Gaming)
Online

Less Energy

Sleep/Standby
Laptop
Slower Processor
Newer Processor
Apple Mac
Light Use (Microsoft Office, Email)
Offline

Data gathering and research shows that, on average, Ross can save 200 kilowatt-hours (kWh) per computer per year by simply turning off computers when not in use. A typical computer and monitor use 200 kWh when active and only 2 to 3 watts in sleep mode. Using the UM electricity rate of \$0.07/kWh against the 1,200 computers and laptops at Ross, and considering hours of operation and typical use pattern, Ross would conservatively save \$20,000 per year.

Basic power management for the Ross environment also saves 1,500 trees and effectively removes 80 automobiles from the roads each year through lower CO² emissions.

Finally, basic power management prolongs battery life for laptops, reduces total building cooling requirements, reduces noise, and reduces operating costs for energy and cooling.

Power Management Background

One thing to know about modern computers is that even when powered off, most are never truly 100% off. There is always a small amount of power consumed because of how the power switch works. The only way to consume no power at all is to unplug the computer.

Computers and operating systems have been designed to go into what is commonly known as ‘sleep states’ in order to reduce power consumption when the machine is in a powered-on state but then goes idle. There are four defined sleep states. The higher the number, the less power is used, but the longer it takes for the machine to wake up:

- S1: All processor caches are flushed, and the CPU(s) stop executing instructions. Power to the CPU(s) and RAM is maintained; devices that do not indicate they must remain on may be powered down. Power savings is minimal but the machine wakes up almost instantaneously.
- S2: The CPU is powered off. Power savings is more significant since the CPU is the largest consumer of power in the system. However, S2 mode is not commonly implemented.
- S3: Commonly referred to as Standby, Sleep, or Suspend to RAM. RAM is still powered. S3 offers the most power savings while still allowing the machine to wake up in about fifteen seconds or less, depending on the speed of the machine. Waking requires physical

interaction (e.g. pressing the space bar) or the issuance of a “magic packet” over the network. This is known as Wake On LAN (WOL). Not all machines are capable of WOL and it requires specific configuration of the machine and network infrastructure.

- S4: Hibernation, also known as Suspend to Disk. All content of main memory is saved to non-volatile memory such as a hard drive, and the machine is powered down. This state consumes almost no power and it can take less time to come out of hibernation than to boot from scratch. But this is dependent on the speed of the system and the amount of RAM; the more RAM, the longer it takes to come out of hibernation. Another plus is that if power were to fail while the machine is in hibernation, no data is lost where S1 through S3 will result in data loss, just like if the machine were fully awake. The drawback of S4 is that the system either requires the power button to be pressed (a mouse wiggle or key press will no work) or a directed “magic packet” if supported by the hardware.

The two most common states utilized are S1 and S3.

Policy Assumptions

A one-size-fits-all approach to computer power management will not be successful because faculty and staff have differing work schedules and use their computers in different ways. Faculty also access their office computers from home using ‘remote desktop’ services, so forcing the office computer to stay in a sleep state without an automatic ability to wake up is not acceptable. Classroom and public computers must be available whenever the building is open.

Trying to implement a policy that works for everyone will either be so lenient that it loses a lot of potential energy savings or it will be unduly restrictive for some users, negatively affecting their productivity and leaving them frustrated. Policy guidelines must also allow for some users to completely opt out of any power management settings for unforeseen issues with special software or access requirements used in teaching or research.

This policy allows for the following features:

- **Deploy power profiles for Windows and Mac computers.**
- **Define profiles for different user groups.** Computing Services will create and deploy different power profiles for different audiences (faculty and staff; full-time staff versus temporary staff), computing devices (desktop versus laptop computers) and settings (office, classrooms and labs). For example, some computers can be put into sleep mode after X hours of no use. This may require coming out of sleep mode several times during the day depending on work and meeting patterns. This may be important for faculty and staff who work with sensitive and confidential information on their computer. Other groups of users or computers, for example classroom computers, may require that they be active until the building closes. Laptop computer will need different default settings for when they are attached to the Ross network and when they are not.
- **Save open documents prior to sleep, shut down or restart.** Power management must never interfere with actively running programs.
- **Automatically wake up computers for remote access.** Faculty and staff must be able to access their computer from home and remote location using services like ‘remote desktop’. This is commonly referred to as ‘Wake-on-LAN’ connection.
- **Schedule an automatic wake up of computer for patch management.** Power management policies will support the automatic distribution of computer software and security patches during the evening and other off hours.

Power Management Settings

The following power management settings will be enforced for each type of use and user:

Faculty/Staff/PhD (Windows PC and Mac)*

	Plugged In	On Battery
Display Off	15 minutes	5 minutes
Hard Drive Off	20 minutes	10 minutes
Sleep	60 minutes	15 minutes
Shutdown	8 hours	1 hour

* Faculty, staff and PhD will be able to request individual power settings based on special circumstances. These are the default settings for new computers. Some users, based on accessing sensitive or confidential data, may need tighter settings to avoid leaving a computer unattended with data displayed.

Faculty, primarily, will be able to access a computer in 'sleep' or 'shutdown' with a Wake-on-LAN condition.

Faculty/Staff/PhD personal and non-Ross-domain computers

No default power management settings will be applied to computers and laptops that are not owned by the University and that do not attach to the Ross network.

Executive Center Email Kiosks and Information Kiosks

	Plugged In
Display Off	15 minutes
Hard Drive Off	20 minutes
Sleep	60 minutes
Shutdown	Never

Student Lab, Tozzi, Kresge Public Access computers and Kresge Database Reference computers can also be shut down after building close.

	Plugged In
Display Off	15 minutes
Hard Drive Off	20 minutes
Sleep	60 minutes
Shutdown	Building close