

Request for Printer, MFD and other Hardcopy Device Power Management and Monitoring Use Scenarios

What Are We Doing?

The Workgroup for Imaging Management (WIMS) within the Printer Working Group is aware that the increasing importance of energy conservation throughout our society extends to concern about hardcopy device power consumption for all levels of users, from major enterprises with fleets of to smaller concerns making occasional use of copiers and printers. Although manufacturers are working to reduce operating power consumption in new devices, substantial savings can be achieved by having a set of power states that adjust consumption according to use demands and being able to manage these power states.

Extensive standards exist for power management in computers and other devices. Although most printers and MFP's do support some lower-power states (such as standby) and include some algorithms or user settings to control when the device enters and leaves these states, there is no industry power management standard for these devices.. WIMS believes that a standard which defines the imaging power states, and the methods of controlling and reporting on these states would allow much more power efficient use of hardcopy devices.

Because printers and MFPs are not used in the same way as computers or network infrastructure devices, an Imaging Power Management Model must consider the real and desired use scenarios for hardcopy devices. Some scenarios are outline below. It is from these scenarios that the requirements of the model are derived. The design of a model standard rather than a specific implementation (such as a MIB) allows a consistent set if features to be supported, regardless of the management mechanism, be it MIBs, Device Web pages, or operator panels.

What Are We Asking For?

The following scenarios have been considered as illustrating realistic use cases to be addressed by the defined Imaging Power Model and have been the basis for the feature requirements of the model. Although many other use situations could be satisfied by the same features, it would be helpful to consider other scenarios that reflect real in-the-field uses for Imaging Equipment Power Management, and to have some sense of the priorities users would assign to the various features.

Local Printer Use Case

Alice, Bob, and Charlie are graphic artists who share a printer down the hall. They all work on a fairly regular schedule. Alice and Bob have convinced Charlie that he should remember to manually put the printer into the Hibernate power state before going home every Friday afternoon. But they all sometimes stay late on Friday and they often forget to put the printer into Hibernate power state before leaving - they need a PWG Power Management Model implemented in their printer.

Remote Printer Use Case

Joe and his colleagues send large documents to a printer in a building across the street in a 'glasshouse' with some corporate network servers.

Both Joe and the operator Sue in the glasshouse manage lots of print jobs - they need to hold and release jobs when printers are entering and exiting power saving states due to corporate site policies. Joe wants to keep track of printer power states (i.e., relative availability) - he needs to subscribe for power management events.

Sue is expected to manage several printers - she needs to be able to set and query site policies for power management of those printers.

Fleet Management Use Case

Acme Corporation has an office building with 15 floors and different departments on different floors. Acme has their main lobby on the ground floor. Acme has over 50 imaging devices (printers, copiers, MFDs, etc.) from multiple vendors spread throughout their building. Acme engineering staff works 5 days a week, but AP department works 6 days a week, and the main lobby is open 24/7.

The power consumption by these imaging devices is quite significant and Jim (system administrator) has been tasked to look for an approach for possible reduction in this power consumption.

Jim finds this nice tool in his fleet management software that allows him to set power management schedules and monitor power consumption for the imaging devices. So Jim does the following:

- Since the Acme engineering team [floors 10-15] only works 5 days a week 7am-7pm, Jim sets the Monday through Friday schedule for the engineering imaging devices so that the machines enter the Suspend power state after 7pm and wake up to On power state at 7am. On weekends, the machines enter the Hibernate power state.
- Since there are few stand-alone printers, Jim ties computers to network printers in their vicinity such that when the computers go into Suspend or Hibernate state, the printers in their vicinity go into the Suspend or Hibernate power state as well.
- Other departments have different work schedules, so Jim schedules the imaging device sleep/wake cycles accordingly.
- Main lobby imaging devices are left in the On power state much longer.
- Certain specialized imaging devices (e.g., large format plotters) are only used periodically, so Jim changes the default power state on these machines to be Hibernate.
- Jim monitors job processing loads in the various imaging devices and finds that some machines are used very rarely, so he schedules different power state transitions for them.

Acme Corporation also has a print server on each floor that allows for load balancing, so:

- Jim adds power state as one of the load balancing options, such that if imaging devices A and B meet the requirements for the next job and device A is in On state, but device B is in Standby or Suspend state, then the job will be sent to device A, instead of waking up device B.

Acme Corporation is expanding and they need to add new imaging devices to their fleet. Since Jim has done such a good job of saving power, Acme management asks for Jim's recommendations. Based on the power consumption data that Jim has gathered in recent months:

- Jim provides recommendations on which machines consume least power when in different power states.
- Jim has noticed that some devices consume a lot less power when in idle condition since they go into the Standby or Suspend power state based on a factory device policy.

Tech Support Use Case

Big Network Corporation has over 5,000 network printers and multifunction devices installed on their enterprise network. The operating, maintenance, and support costs for these network imaging devices are a significant budget item for Big Network Corporation.

Gracie is a senior engineer in a centralized Tech Support group at Big Network Corporation, specializing in network peripherals (storage devices, imaging devices, file servers, etc). Both end users and Facilities people regularly send in trouble tickets via email or Web forms to Tech Support. Trouble tickets for network peripherals (including imaging devices) are regularly escalated to Gracie.

Gracie uses a custom-built system management tool to periodically gather both system and subunit operating and power states as well as current and monthly power consumption of these network imaging devices. This information is acquired from vendor-specific: (a) private SNMP MIBs; (b) machine-readable Web Services interfaces; and/or (c) diagnostic protocols.

Gracie receives a trouble ticket from Facilities about operating costs for network peripherals at one of the branch offices. She uses her custom-built system management tool to view power consumption trends and anomalies at that branch office. She discovers that one imaging device has had very high power consumption in Standby and Suspend power states when compared with other similar models of imaging devices at that branch office. She tracks the problem down to a bad firmware update that has been leaving heaters and lamps turned on when in Standby and Suspend power states.

Gracie receives a trouble ticket from an end user who has been experiencing very long delays before first-page-out on a particular network printer. She uses her custom-built system management tool to examine the power state transition counters in that network printer. She tracks the problem down to a device configuration error that is sending the network printer into Suspend after 15 seconds of device inactivity.