



Software Solutions for Effective Network Power Management

by Brad Wyckoff

With network computing becoming more complex and power issues becoming more critical to productivity, network managers need powerful solutions to handle the complexities associated with local area, wide area and mixed networks. Small businesses and users with a single PC or workstation also need to protect themselves from the problems associated with uncertain power conditions.

Central to this protection is the Uninterruptible Power System (UPS). A basic UPS is a battery backup system with associated electronics which provides power to a computer or other device should the normal electrical power from the incoming utility line fail. More advanced, on-line UPSs bring the incoming power through sophisticated internal circuitry to provide protection from power abnormalities such as spikes and to provide better coverage over a wide range of incoming power conditions. In the past a UPS, alone, provided adequate protection for many electrical devices.

Today, the power problems facing a network manager are too numerous and too complex for a simple UPS-only solution. The most common power problems facing the network manager and user are:

1. Loss of Data/Information,
2. Notification of Utility Outages and Power Related Events,
3. Increasing Network Complexity,
4. Limited Resources to Manage the Network,
5. The Need to Understand and Diagnose Power Problems.

Today's sophisticated network power management software products, when used in conjunction with a UPS, can solve these problems. Alternatives and tradeoffs between higher end software solutions and entry level products will be examined.

Loss of Data/Information

The first and most important problem facing the network manager is the loss of data or information. In fact, according to Contingency Planning Research, "45% of computer data loss in the U.S. is due to power outages and surges." Protection by a UPS is adequate unless the power outage lasts longer than the battery in the UPS will provide power to the

computer. Should a computer suddenly be without power it, of course, stops functioning. With some sophisticated operating systems, such as UNIX, the impact goes beyond simply the system turning off. Mission critical datafiles and even the operating system itself can be corrupted leaving the network manager or user with the task of trying to figure out what has been affected and then taking the necessary corrective action. It may even require that the operating system be reinstalled. With the potential for many users to be unable to perform their respective tasks while waiting for the problems to be resolved, the company faces significant loss of productivity and the resulting revenue and profits.

Today's network power management software products, whether it be high end or entry level, all provide for a graceful shutdown of the operating system and closing of all open applications and files in the event of an extended electrical failure, thus protecting the critical information from loss or corruption. They also provide configurable shutdown parameters which allow the user to select how much time to spend on-battery prior to beginning the shutdown process and usually turn off the UPS to prevent complete discharge of the battery, which shortens battery life. By choosing a more sophisticated package, a shutdown sequence may also be customized to execute a particular command prior to bringing down the system. This feature allows for stopping applications in order of a priority scheme determined by the user.

Notification of Utility Outages and Power Related Events

Aside from shutting down the computer properly, one of the next most important problems to address is rapid notification of people affected by a changing power condition. The first and most important feature is notification of users so that they have an opportunity to save their work before the system shuts down. This feature is standard in most power protection software packages. With more advanced packages, notification via Email or paging is included. This allows a network manager to be notified remotely of a power related problem and provides an opportunity to perform any specific system management activities prior to shutdown either on-site or using a remote connection.

A high-end package may also provide notification via Simple Network Management Protocol (SNMP) traps. SNMP is an evolving standard for network management, which has seen increasing acceptance recently. A trap is a message which is sent to an SNMP supported network management software package, such as IBM's NetView for AIX, Hewlett Packard's OpenView, Sun Microsystems' SunNet Manager, etc., which gives a brief statement/alert describing power condition. In this manner, a network manager receives the information in a form consistent with other network related messages.

Communication with network adapter products is also a consideration. Network adapter products connect a UPS directly to a network which allows for protection of non-computer devices. By using a network power management software package, a network manager can monitor and reboot a remote UPS, cycling power to a device which initiates a

reset (sometimes required to get a device to function properly). This feature provides control of a UPS (and protected equipment) which may be literally half-the-world away. Some more advanced software packages also permit communication with adapters to allow multiple computers to be powered by one UPS and still shutdown properly upon utility failure. Potential cost and space savings may be realized through this configuration.

Network managers should look at the needs for notification carefully, paying particular attention to potential future requirements, such as SNMP communication, when selecting a network power management software package.

Increasing Network Complexity

As networks become more complex, network managers have the increasingly difficult task of maintaining consistent software solutions across hardware platforms. Whether an entry level, basic package is selected or a higher end package is used, a software vendor needs to support the wide variety of operating systems that may be found across an enterprise. For true wide area network protection, users should select packages which can communicate across network devices such as bridges and routers. Also, with mixed networks, such those having computers running both Netware and UNIX, becoming more prevalent, packages which provide this internetworking capability are certainly worth careful consideration. Integration with network management software packages, such as NetView for AIX or HP's OpenView, can be desirable because it means easier operation. A graphical user interface (GUI) also helps speed installation, configuration and use of the software.

Limited Resources to Manage the Network

With today's downsizing and streamlining of organizations coupled with the trend toward distributed computing, network managers are faced with the fact that they will be expected to effectively manage an increasingly complex network with no proportional increase in resources or, perhaps, even fewer resources. In a situation with a large number of protected computers or network devices spread geographically, one of the most important features to look for is remote monitoring capability. Using remote monitoring and advanced features such as notification via SNMP traps, network managers can monitor the power enterprise-wide from a single workstation. In some higher end packages remote retrieval of battery information is also possible, making planning for maintenance of UPSs much easier. Advanced packages also should contain a scheduled shutdown/restart feature which will safely shutdown and restart the system on a daily, weekly or on an exception (for holidays) basis for energy conservation or security purposes. For example, a user could select to shutdown a server (and power-off the UPS) Fridays at 6 PM and restart on Mondays at 7AM. Depending on the rate of power consumption and power cost, significant power cost savings could be realized. System security is increased because the

computer and UPS are automatically brought down and powered-off during times when no users are present.

Need to Understand and Diagnose Power Problems

Of all the topics related to power protection, detecting and solving power problems before they happen is perhaps the most desirable and the most difficult to achieve. Advanced network power management software packages do take a first step at tackling this issue by providing a log of power events that have occurred over a period of time. Using this data, an analysis can be performed to spot trends and resolve chronic power problems. Some advanced packages also contain a battery test which can be performed automatically every month, for example, to get an early warning of a potential battery problem. To visually see power parameters and detect and diagnose power quality problems, some advanced packages also contain real-time meters and power waveform graphs. The meter graphs show values for typical power parameters, such as voltage and frequency over time. A power waveform graph gives a visual indication of power quality by a comparison of the incoming sine wave vs. the outgoing sine wave. A calculation of the total harmonic distortion (a measure of power quality) can also be performed. These features are useful to the more advanced, power oriented user to analyze power issues.

Although these features are useful to analyze repeated power problems, there is no way to foresee a totally random event. The best method to protect a system is to select a UPS which has the level of protection desired, considering the benefits of on-line vs. other technologies and choose an appropriate network management software package.

Conclusion

Solving today's power protection problems, in an increasingly complex environment, requires a total system approach combining UPS hardware and power management software. Network managers should carefully consider the problems they face and select the software solution which not only meets today's needs but also allows for possible expansion, including such features as the use of a standard communication protocol and diagnostic tools. Developing a checklist of the "must have" and "nice to have" features is one simple way of ensuring that the needs for power protection are met.

Take this opportunity to find out more about our products. And feel free to contact us at info@psd.invensys.com if you have any questions.