FEATURE

Using UPS Monitoring to Ensure Power and Data Integrity in High-Density Computing Environments

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Driven by significant increases in computing density, today's data center environments are undergoing significant change. In recent years, data center managers have enhanced their processing power and reducing occupied space by installing high-density blade servers that share key components for space, power and other considerations while maintaining the functionality required to be considered a "computer." Traditional, non-blade computers require components that are bulky, hot, space-inefficient, and duplicated across many computers that may or may not be performing at capacity. By locating these common services in one place and sharing them between the blade computers, overall utilization is more efficient. The specifics of which functions are included and how those functions are implemented vary by blade vendor, but they share common characteristics that impact the design of today's data centers, especially in terms of power and cooling.

Commonly, data centers today feature a mix between the traditional systems and the new blade servers. However, as blade configurations become a bigger part of typical operations, users will experience substantially increased demand on UPS systems and standby generator sets. This increased demand can come as a surprise to IT managers who are unaware of the special power needs typical of blade configurations, which need to be closely monitored to avoid overloading the power infrastructure. Monitoring of the power infrastructure has always been vital to optimizing uptime, but in high-density and heterogeneous environments, it has become even more critical. Not only is it virtually impossible to track operating status without adequate power monitoring, users with minimal monitoring are missing an opportunity for substantial savings that come with optimized efficiency as well as enhanced availability. At the same time, it is necessary to assure security for monitoring and control functions so that power management itself does not present exposure to any security breach.

Developments in UPS Monitoring

When first developed in the late 1980s, rudimentary UPS monitoring software was designed to enable one connected computer to receive basic power status information via RS-232 serial connection from the UPS, typically:

- Input Power Good
- No Input Power
- Low Battery

The computer received the information and was able to perform an orderly system shutdown at a predetermined time in relation to a Low Battery Signal. While this was far superior to allowing a hard shutdown if a blackout lasted longer than the battery capacity, protection of data integrity and other connected devices was very limited.

Subsequent generations of power management software have added several features that provide more comprehensive protection including:

- Graceful shutdown of application software
- Shutdown of multiple network devices
- Sequencing of multiple device shutdown
- Load shedding of non-critical devices to prolong battery life for the most important systems
- Management of redundant power systems or servers with redundant power supplies
- Integration with network management systems (NMS) via SNMP, ModBus and other common protocols
- Remote notification of power disturbances via pagers or e-mail
- Remote control and monitoring via wide area networks and the Internet

Monitoring Considerations

The transition from the one-UPS-to-one-computer model along with common requirements for remote supervision adds significant complexity to the UPS monitoring equation. Remotely managing one UPS doesn't require a lot of oversight or maintenance. When the installations start to include dozens, or even hundreds of servers and other critical devices backed up by multiple UPS systems, sometimes in redundant configurations, careful planning is required to assure maximum uptime. Not only do the administrators need to know the battery status during a power outage, they must have information about maintenance and service requirements so that they can be sure batteries will be available for the next outage. Even more importantly in large rack-based networks, it is essential to know where a given system is located, both logically and physically.

Monitoring Implementation

Although network architecture has changed and become more dense, there are typically only two ways to connect a UPS to any Ethernet (Cat 5 or 6) computer or telecom network:

- Adding a network management card to the UPS which becomes the interface to the network.
- Using a nearby PC or server connected to the network as a proxy.

Network management cards are recommended for central UPS systems that protect a complete network, network zone, multiple networked devices or for UPS systems that provide backup for other types of critical equipment. With an embedded card, the UPS has its own IP (Internet Protocol) address with local intelligence to:

- Serve Web pages with reports, settings and alarms;
- Interface with SNMP-based (Simple Network Management Protocol) network Management consoles such as HP Openview, IBM Tivoli Netview and Computer Associates Unicenter;
- Communicate with shutdown software installed on the servers to be protected.

Network Management Proxy (NMP) is a more economical solution for small networks with a limited number of UPS systems. It allows a UPS to be controlled over the network without adding to the basic cost of the UPS. The proxy software agent is installed on the computer or server to which the UPS is connected via a USB or RS232 port. An NMP "agent" provides both HTTP/XML and SNMP protocols and is used to manage a UPS remotely using a standard browser or a network management console. Only a few number of UPS vendors can provide this cheaper alternative to the network management card.

Optimizing UPS Performance

To ensure system and data integrity, a computer operating system must shut down in the correct sequence. To accomplish this, users must install a software module on each protected server to automate various functions in case of power problems. These automated functions can include:

- Executing a script to close all applications running on the server;
- Initiating a shutdown sequence or hibernation after a pre-set timeout or just before total battery discharge to maintain service continuity;
- Restarting the operating system automatically or in manual mode when the mains power is restored;
- Personalizing alarm messages for events concerning the UPS, etc.

UPS vendors typically offer a selection of software shutdown modules that can be used with Network Management Cards as well as the Network Management Proxy.

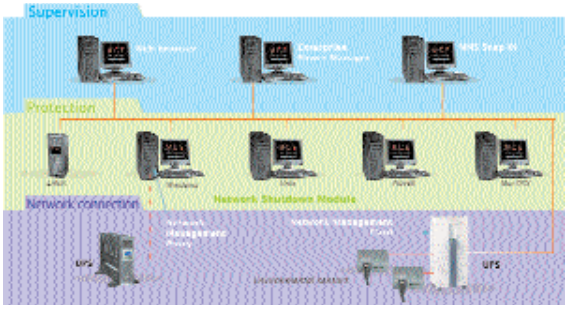
In addition, for smaller satellite offices, very small businesses and home offices, most vendors include individual shutdown packages aimed at users looking for an easy to use, yet fully-featured solution to enhance the power protection provided by their UPS. This simple software gives users a real-time view of their on-site power quality and the ability to set-up automatic actions in case of a

power crisis, like the automatic shutdown of the PC or server at the end of the battery runtime or sending an alert to notify any power problem. Personal UPS software offers a good strategy for individual or small business users looking for a useful upgrade to their power protection at no cost.

Using Monitoring to Enhance Business Continuity

As networked systems become more diverse, many users find that the common network management system (NMS) platforms are not well suited for their needs, especially when it comes to power and cooling infrastructure. In some cases, the NMS implementations do not address their heterogeneous networks well, are too complex, too expensive or they simply don't provide the comprehensive information needed to assure infrastructure integrity.

As a result, some UPS manufacturers offer comprehensive power monitoring platforms that can operate alongside NMS platforms or independently to cost effectively provide administrators with a higher level of operating data that can offer more system security and assure maximum uptime.

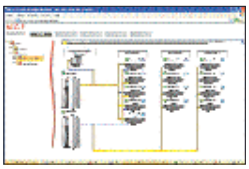


Easy Supervision UPS Groups

New systems such as MGE UPS SYSTEMS' Enterprise Power Manager feature dedicated power management functions that allow supervision of networked UPS systems more easily and at lower cost than the major NMS platforms. This type of software uses industry standard communication protocols to give administrators of UPS networks an overall, consolidated view of the main operating parameters of all the UPS systems. Information is accessible from any workstation using a standard Web browser. Users can easily sort the UPS overviews according to the most critical parameters (location, system status, etc). Alarms are centralized and transmitted, if required, by e-mail or SMS. The log of events and operations helps preventive management of the UPS network.

When installed, this type of software should scan all of the enterprise's UPS systems from any vendor as well as other power management devices such as Power Distribution Units (PDUs), midspans and transfer switches. Users are presented with views of physical and logical layouts that they can easily tailor to their requirements based on the type of UPS, connected equipment, location, operating status and other parameters. Clicking on a UPS in the layout shows detailed information about the operating and configuration parameters (including three phase measurements) in a dedicated window. Complex UPS architectures (e.g. paralleled, redundant configurations and transfer switches) can also be shown and easily managed. It is imperative that this type of software use protocols such as Secure Sockets Layer (SSL) with several levels of password protection (administrator, user, etc.) to assure complete security.

With this type of software, UPS systems can be supervised using a standard Web browser to provide details of all UPS parameters, measurements and settings, from any point in the network, simply using the IP address of each UPS.



Integrating UPS Management with Network Management

With sophisticated UPS management software for enterprises, network administrators have access to the same level of details for UPS systems as for servers and switches using one of the "snap-ins" designed for the best known Network Management Systems, such as HP OpenView, IBM Tivoli and CA Unicenter. Any UPS that meets SNMP standards (RFC 1628 MIB or proprietary UPS MIB) can be easily incorporated into Network Management Systems or server management systems such as HP/Compaq Insight Manager 7 for auto- detection, monitoring, color-coded alarms on each device's icon and other capabilities.

Added Power Management Functionality

Depending on the vendor and UPS hardware installed, enterprise power management software may include a robust set of additional features such as:

- Remote On/Off Control: When a UPS can be turned on and off remotely, it becomes a smart IT equipment switch. For example, this function enables an administrator to re-start a locked-up hardware device from a remote site.
- Programming. This function can be used to program shutdown and re-start sequences for all UPS protected devices; for example, shutting down servers every evening at 08:00 PM and re-starting them the following morning at 06:00 AM, Monday through Friday.
- Individual outlet control. Premium UPS systems often provide load shedding capability that allows users to turn groups of outlets on and off. This feature is useful in particular for:
- Shedding non-critical systems when there is a power failure;
- Defining start-up sequences;
- Individual management of several IT systems connected to a central UPS.

Impact of Monitoring on the UPS Industry

While installing the best UPS hardware is key to maintaining uptime in any critical network, implementing comprehensive software solutions that proactively monitor the health of power and environmental infrastructure add a layer of protection that assures the maximum possible availability and data integrity. UPS vendors can no longer get by with simply providing "batteries and a box," because sophisticated administrators have found that, no matter how robust the hardware, maintaining constant surveillance and extensive control ultimately provide the greatest level of security.

In addition, by having remote access to this type of information, managers have the option of outsourcing UPS monitoring to UPS manufacturers. The best of these have 24 by 7 by 365 service centers that not only proactively keep an eye on critical systems, but can remotely make necessary adjustments or dispatch service personnel to correct anomalies before they become problems.

Mr. Tardy has over 20 years of global experience in the UPS industry including sales, channel and product marketing management positions in Europe, Asia and North America and has spear headed power management developments for the last 15 years. Mr. Tardy's extensive education includes an MBA from the Stanford Executive Program, and his knowledge has contributed to MGE successfully expanded its global reach over the past 10 years, with over 30 subsidiaries worldwide and sales representation in over 170 countries.

MGE UPS Systems is a provider of high quality power solutions that increase power availability and system uptime to PCs and enterprise-wide networks, mission-critical telecommunication systems, medical instrumentation and industrial/manufacturing processes. MGE's global product line includes Uninterruptible Power Supplies (UPSs), inverters, power conditioners, power distribution units, power management software, active harmonic filters, and surge suppressors that provide MGE's customers with end-to-end infrastructure solutions. With its Total Quality Management and MGE PowerServices(TM) programs, supported by a network of 900 service specialists in 170 centers worldwide, MGE's customers are assured of the highest-level of quality and service throughout the complete life cycle of their installations.

For more information visit www.mgeups.com/us or call 800-523-0142