SENTINEL

NETWORKS SIMPLIFIED

Understanding Power Management:

The options available for Effective Power Management at the Rack Level

Power Management in the Rack

Introduction

As the reliance on computer networks has evolved, the demand for bandwidth has increased, driven by more and more web based applications. As a result, there has been a surge in the installation of IT equipment. People and businesses need their network services to be available continuously for their critical applications.

Faced with strict Service Level Agreements with your customers and the costs associated with any unexpected downtime, you need your core switches, servers, routers and other networking equipment to be always available. If a device goes wrong, impacting on the service level, it is essential that you can respond quickly. If you have to wait for a field support engineer to reach the problematic device then you will have a lot of angry customers to listen to while you wait.

This increasing demand for high availability networking is in turn increasing the demand for more and more computing power. Subsequent constraints on actual physical space in the rack and datacentre have led to even more densely packed rack enclosures. As the number of rack-mounted servers, network switches, routers, etc. increases, so the demand for power in the rack grows. The ability to deliver this power in the most efficient way while conserving rack space is accomplished by a Power Distribution Unit (PDU). There are a wide range of different types of PDU available so it is important to understand what each type offers to ensure that you select the right one for your particular application. PDUs are available from low cost basic power distribution models to higher cost units with enhanced power switching and management options.

What is a PDU

Simply, a PDU is a device with multiple outlets which has been specifically designed to distribute electrical power to computers or other networking equipment in a computer rack within a datacentre. Instead of having to install multiple power supplies to support every piece of equipment individually, a PDU will resolve this issue by distributing the power supplied to the rack via multiple outlets to all the devices in the rack, such as routers, servers and other networking equipment.

As there are various different types of PDU from which to choose, it can be difficult to decide which PDU is best for your rack application. You need to understand what each type offers and which features will be most suitable for your requirement. Let's look at an overview each type.

Overview of PDU Types

Basic PDUs

A basic PDU is a low cost, entry level device, designed to deliver power to equipment in a rack from a UPS system, generator or utility wall outlet. It is the easiest way to distribute power and with a variety of inputs and outputs available, there is a PDU for any power requirement. Being a dumb device, a basic PDU does not provide any power control and usually lacks the power monitoring features of the higher cost PDU devices. Basic PDUs are available from Sentinel on request.

Switched PDUs

A Switched PDU will not only distribute power to multiple devices as a Basic PDU does, but will also provide remote on/off switching control of individual outlets for power cycling and other switching applications.

Metered and Switched PDUs

Metered and Switched PDUs offer the functionality of a Switched PDU by providing remote on/off switching control of individual outlets, but also offer real-time remote power monitoring of each individual outlet so you can have total power management of all your equipment whenever you require it.

High Amp Dual or Quad Input PDUs

Some types of IT equipment are designed to accept more than one source of input power for the sake of redundancy and high availability. Your managed PDU will itself need to have dual power inputs (or quad power inputs for equipment with multi power supplies) so that the power redundancy of the device is maintained. If the PDU does not have multiple inputs then you will have to install a multiple PDUs in your already cramped cabinet to protect the power redundancy.

Automatic Transfer Switch PDU

An Automatic Transfer Switch PDU is a reliable and cost effective way to provide single-corded (single power supply) network devices with dual power redundancy.

PDU Combos

A PDU Combo combines the functionality of a switched PDU with further functionality such as automatic power switching and/or serial console management.

Considerations when selecting a PDU

Where do you plan to install the PDU?

PDUs can be mounted horizontally or vertically inside or outside the rack enclosure.

Horizontal PDUs are installed in the rack and take up one or two rack spaces (1U-2U).

Vertical PDUs can be mounted on the back or side of the rack enclosure. Deep racks will sometimes leave space for vertical PDUs to be mounted inside the enclosure. Often however, with the latest high end switches and routers taking up the full depth of the rack, it is not possible to fit a vertical PDU so the only solution is to fit a horizontal version.

How many Inputs do you require?

Single, Dual or Quad Power?

Dual or Quad Power Inputs on a PDU provide two or four completely separate power circuits for servers with redundant power supplies. Some types of IT equipment are designed to accept more than one source of input power for the sake of redundancy and high availability. Given their size, it is not easy to find a PDU that will provide power management and fit in an already cramped rack cabinet. The depth of the chassis means that there is little or no space to mount a vertical PDU. As there is minimal space at the rear of the rack, a horizontal managed PDU works best for your power management needs.

Additionally, it is essential that the dual power supply architecture incorporated within the IT device is not jeopardised by a single power input PDU. Your managed PDU will itself need to have dual power inputs so that the dual power redundancy of the switch is maintained. If the PDU does not have dual inputs then you will have to install a second PDU in your already cramped cabinet to protect the power redundancy. This will add to your project costs, and cause more cabling headaches at the rear of the cabinet.

What features do I need?

Remote reboot: Simply connect the power cable of your switches, routers, firewalls or any other network device directly to the power outlets of the PDU and you have the ability to remotely power reboot your IT devices from anywhere. Just point your browser to the IP address of Switched PDU, enter the secure user name and password and you can immediately reboot a locked up device. Your network is returned to operational status immediately without a costly and time consuming engineering call-out, maximising network uptime.

Individual Outlet Switching: Turn on and off attached equipment as required with a user-defined scheduled switching option. When devices are not required at certain times, perhaps when staff have gone home or at weekends, the PDU will automatically switch them off, reducing your power consumption and energy costs.

Considerations when selecting a PDU Cont'd

Power Sequencing: Define the order in which to power up or down attached equipment to avoid circuit overload.

Load Shedding: When temperature readings exceed user-defined critical values, the PDU can decrease the amount of heat being generated within the rack by temporarily shutting down user-defined non-essential devices. When readings return to acceptable levels, the PDU will restore power to these devices. Load Shedding of non-essential loads during blackouts will extend battery backup runtime for critical equipment.

Alarm Notification: Comprehensive activity logs on the PDU create a record of all power switching and monitoring activity and will identify issues before they become critical. Alarms are also generated and sent by email, SNMP, SYSLOG or audibly to provide you with advanced warning of problems with attached equipment such as lost voltage or high rack temperatures. Current metering provides real-time remote monitoring of connected loads with user-defined alarms to warn of potential circuit overloads.

Power Monitoring: Measure power metrics on all attached devices. These measurements are logged to the PDU's own non-volatile memory, alleviating the need for external storage for this data. Measure and report amps, wattage, voltage, kilowatt-hours and rack temperature. From this data, the PDU's Linux powered integral software will produce user-defined live, weekly, monthly and annual trending graphs and reports so that know exactly how much power your individual device, rack or data centre is producing, without having to deploy and maintain expensive additional software. The data can also be easily exported into your own independent network management package if required with per Outlet Power Data via Web, XML, CSV or ASCII.

Automatic Power Transfer Switching: Instead of purchasing new IT equipment with redundant power supplies, automatic transfer switching on a PDU, will provide redundant power sources to devices with only a single power supply. Every device can now be connected to a redundant power supply. The PDU includes dual AC inputs that connect to a primary power source and a secondary redundant power source. If the primary source fails for any reason, the units will automatically and seamlessly transfer to the secondary source, so that your devices are always up and running.

Power and Console Management: Secure console management became the obvious complement to a PDU as often when devices fail and require rebooting, the boot-up process needs to be monitored via a serial console port at the BIOS level to ensure that the failed device is returned to full operational status. Instead of having to purchase a separate PDU and serial console server, a unit combining console access, remote reboot, power metering, temperature monitoring and automatic power transfer switching into one single unit will preserve limited rack-space and making valuable cost savings too.