

## Do I really need all those external batteries?

### *The case for load segments on Eaton single-phase UPS products*

#### Importance of graceful shutdown

A typical rackmount UPS will run on battery for 5-10 minutes at normal load (50-75%). This provides enough time to ride out 95% of power outages, but the other 5% of outages present a worrisome scenario: loss of data, data corruption and the associated data recovery costs.

To avoid these costs, customers can use **UPS protection software**, with or without a Web/SNMP card for graceful server shutdown. UPS protection software is a client application that runs in the background on a server or workstation awaiting a signal from the UPS to initiate a safe shutdown of the local operating system. However, graceful shutdown doesn't always happen quickly. Additional shutdown time often requires the use of external battery modules (EBMs) for the UPS, adding cost and filling up valuable rack space.

#### UPS load segments

**Load segments** are managed groups of receptacles that can be independently turned on or off either through manual or pre-programmed means. Peripherals such as monitors, backup devices, and other non-critical machines can consume valuable battery runtime even though they are not essential. Outlet level control through load segmentation enables certain loads to be turned off so battery runtime can be extended for the remaining critical devices, thus limiting the need for EBMs.

For optimal performance in the event of a power outage, non-essential loads are plugged into different load segments than those that are essential. Shortly after the UPS goes to battery, peripherals are shed by their load segment turning off, while both critical and non-critical servers continue to operate. Then after a user-defined time, UPS protection software begins to gracefully shutdown non-critical servers, further extending runtime to critical devices. Finally, as the UPS nears the end of its available battery backup time, critical servers are safely shutdown.

Figure 1. Eaton 9130 UPS with two load segments



#### Application

Eaton provides load segment management and graceful shutdown solutions for both peer-to-peer connections as well as UPSs equipped with a Web/SNMP card. Both applications utilize Eaton's UPS protection software, Intelligent Power<sup>®</sup> Protector. This powerful software acts as a graceful shutdown client over local area networks and doubles as UPS management software and a shutdown client in a peer to peer application.

#### Using load segments for graceful shutdown with a Web/SNMP card

Web/SNMP-enabled Eaton<sup>®</sup> UPS solutions provide direct shutdown of connected devices through Intelligent Power Protector. This software registers with the Web/SNMP card during installation, and the user specifies whether the server is on load segment 1, 2 or the master, which controls all receptacles together. The user can then manage all the shutdown schedules for connected clients on respective load segments through the Web/SNMP card.

Figure 2. Shutdown parameters menu on the Web/SNMP card

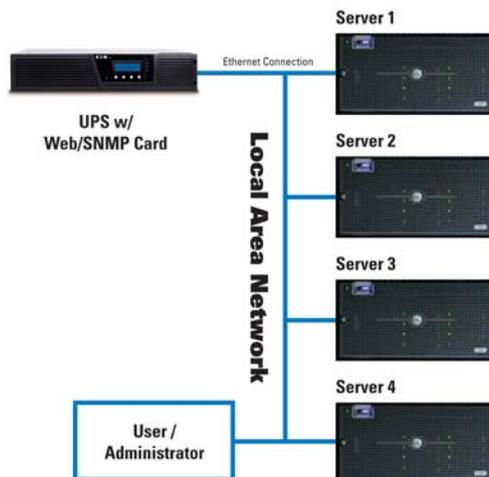
Shutdown Parameters		Help	
Evolution S 3000		Computer Room	
Output	On battery	System Shutdown	Restart
 Master	<b>Shutdown</b> if Remaining time under: 2000 sec if Capacity under: 20 % <input checked="" type="checkbox"/> after: 3 min	Shutdown duration : 180 sec  See also additional Shutdown configuration on <a href="#">Environment Settings</a>	If Capacity exceeds: 5 %
 Segment 1	<b>Switch Off</b> after: 1920 sec if Capacity under: 10 %	Shutdown duration : 180 sec	<b>Switch On</b> after: 3 sec
 Segment 2	<b>Switch Off</b> after: 180 sec if Capacity under: 10 %	Shutdown duration : 120 sec	<b>Switch On</b> after: 6 sec

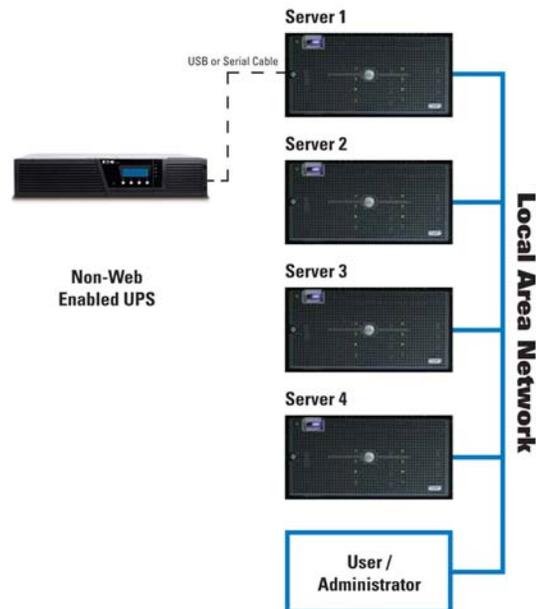
### Using load segments for graceful shutdown through serial or USB

For Eaton UPS solutions without Web/SNMP cards, Intelligent Power Protector is installed on a primary workstation or server (Server 1) connected to the UPS through serial or USB interface. The shutdown schedule of the server is managed locally at the server within the Intelligent Power Protector application.

Scheduled shutdown for other network connected clients is available by installing the client version of Intelligent Power Protector. The client looks to the controller (Server 1) for any outgoing messages about system shutdown; this function enables shutdown of multiple items without the need for a Web/SNMP card.

Figures 3 and 4. Network connection diagrams



**Note**

The network backbone must be treated as one of the most critical loads and kept powered as long as the most critical server. A network that is shutdown early or not protected will prevent the transmission of shutdown messages, shutdown initiation, proper shut-down of servers and remote notification.

**Additional applications for load segments**

Load segments can also be manually controlled. This can be extremely beneficial for remote applications involving servers that are unresponsive on the network. Rather than walking into the IT closet, an IT manager can simply log into the UPS through the Web/SNMP card, from any location as long as he is connected to the network, and cycle the power on the load segment corresponding to the problematic server.

Delayed restart is another service offered by load segments to prevent overloads after a graceful shutdown. A UPS near its full load capacity during normal operation can be painstakingly close to overloading when servers are turned on due to power inrush. Instead of turning on all devices at once, load segmentation allows groups to come back on slowly, at a preprogrammed delay, after power returns. This reduces the possibility of overloading the UPS when nominal loads are close to UPS capacity increasing system reliability.

**For more information**

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