

PowerChute™ Network Shutdown with more than 50 Computers connected to one UPS

By Sarah Jane Hannon

Abstract

PowerChute™ Network Shutdown software works in conjunction with the UPS Network Management Card (NMC) to provide graceful, unattended shutdown of multiple computer systems over a network. The number of protected computers is limited only by the capacity of the UPS; however, if you wish to have more than 50 computers protected by one UPS, some consideration must be given to the system configuration. Knowledge of the communications mechanism between PowerChute Network Shutdown and the UPS Network Management Card is also required.

How UPS Information is sent over the Network

The UPS Network Management Card (NMC) provides an interface between the UPS and your network. The NMC¹ sends UPS information to PowerChute Network Shutdown via UDP packets which are limited to a few hundred bytes. The condition under which the packet is sent determines its frequency:

- a) 'Normal UPS Status' packet - sent every 25 seconds.
- b) 'UPS Status Update' packet - sent immediately if the UPS goes on battery.

UPS information is sent over the network in the following manner:

- The NMC in the UPS has a list of IP addresses (up to 50) of computers running PowerChute Network Shutdown. This NMC broadcasts UPS information on the local network segment (the segment on which the UPS Network Management Card resides), as long as it has at least one IP address on its list that is on the local segment. It will also send unicast messages to each IP address on its list that is on a different network segment.
- While Broadcast messages only reach the local network segment, unicast messages are sent to provide connectivity to PowerChute Agents outside the local network segment.
- Each PowerChute Network Shutdown Agent that receives a unicast message from the UPS NMC will rebroadcast that message on its local network segment. Other PowerChute computers on that segment will receive this broadcast message, even if they received a unicast message.
- A PowerChute Agent will not rebroadcast the message if it has already received a broadcast message from another PowerChute Agent. This is done to reduce the amount of broadcast traffic on a network segment. [Note: If there are 3 PowerChute Agents in Segment Two, and they each receive a Unicast packet, they COULD all rebroadcast it in their segment depending on the timing of when they received it. To stop this, it checks if it has already received it as a broadcast, and only rebroadcasts if no one else has yet].

¹ The UPS Network Management Card (NMC) has an IP address and is accessible via FTP, Telnet, SSH, SNMP and the Web.

Recommendation: As all PowerChute Agents on the same local network segment as the NMC will receive broadcast updates and every Agent that receives a Unicast message sends a broadcast message within its local segment; it's recommended to reduce the number of Agents in each segment to limit the amount of broadcast traffic. The minimum requirement is one PowerChute Agent per segment but as the Agent has to be running to rebroadcast to other Agents, registering a few Agents to the NMC per network segment provides a more robust system.

Figure 1: Broadcasts and Unicasts

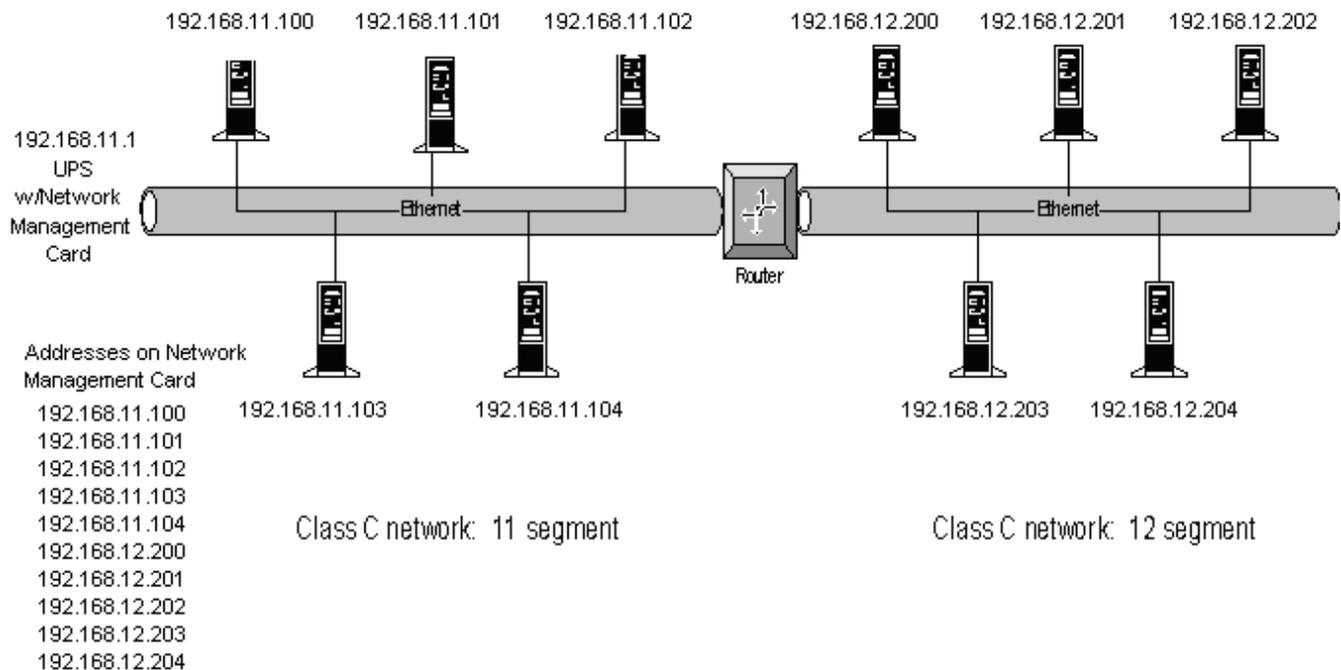
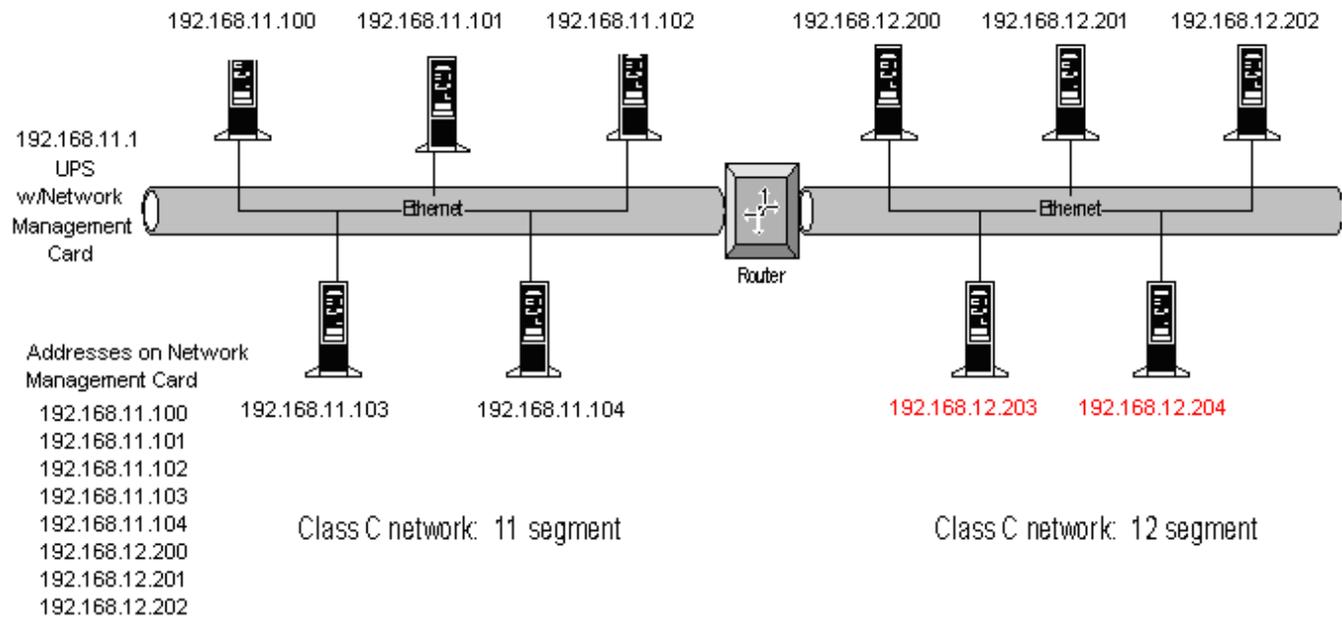


Figure 1 – All 11 segment computers (192.168.11.xxx) will receive broadcasted UPS data while PowerChute computers on the 12 segment (192.168.12.xxx) will receive unicast UPS data every 25 seconds.

An Individual Client Notification packet (MACONFIG packet) is sent by each NMC every ~100 seconds. The propagation of this packet to PowerChute Agents through various network segments is managed the same way as the UPS Status Update Packets; only the purpose of the packet is different. This packet contains a list of all IP addresses on the NMC thereby identifying which PowerChute Agents are registered.

Note: While all PowerChute Agents can be configured to protect their systems in the event of an extended power outage, only those Agents that receive this MACONFIG packet can issue a UPS Turn Off Command.

Figure 2: PowerChute Packet Propagation



In **Figure 2**, computers 192.168.11.100, 192.168.11.101, 192.168.11.102, 192.168.11.103, and 192.168.11.104 receive broadcast information from the UPS Network Management Card.

Computers 192.168.12.200, 192.168.12.201, and 192.168.12.202 will receive unicast information containing the UPS data from the UPS Network Management Card.

Computers 192.168.12.203 and 192.168.12.204 will receive re-broadcasted data from PowerChute computers on the 12 segment only. These computers do not receive unicast information from the UPS Network Management Card (as they are not registered to the NMC).

IP Addresses Stored on the UPS Network Management Card

The UPS Network Management Card can store 50 IP addresses. One of these should be the IP address of a PowerChute Agent on the local segment (same network segment as the NMC), which will cause the NMC to broadcast to that PowerChute Agent. The NMC will send unicast messages to PowerChute Agents on any other network segments. If you have more than 50 computers connected to the UPS, you must determine which computers will receive broadcast messages, and which will receive unicast messages. To make this decision, take the following conventions into consideration:

- Computers that are on the same network segment as the NMC will receive broadcast messages. Only one of these computers needs to have its IP address stored in the UPS Network Management Card.
- Computers that are not on the same network segment as the UPS Network Management Card can receive unicast messages from the UPS Network Management Card, or broadcast messages from another PowerChute computer on their network segment. You must decide which computers will have their IP addresses stored on the UPS Network Management Card. For reliability, it is recommended that at least two computers on each segment have their IP addresses stored on the UPS Network Management Card.

UPS Turnoff

Only computers with IP addresses stored on the UPS Network Management Card are allowed to order the UPS to turn off.

For instance, in Figure 2 above;

- Computers 192.168.11.100, 192.168.11.101, 192.168.11.102, 192.168.11.103, 192.168.12.200, 192.168.12.201, 192.168.12.202, and 192.168.11.104 will be able to turn off the UPS.
- Computers 192.168.12.203 and 192.168.12.204 will not be allowed to turn off the UPS after safely shutting down their system as they are not registered on the NMC and instead received a re-broadcasted message from another PowerChute computer on their network segment.

Putting the IP Addresses on the UPS Network Management Card

When you execute the PowerChute Network Shutdown installation program, it will add the IP address of the computer to the list stored on the UPS Network Management Card. If the list is already full (contains 50 addresses), then the new address will not be added.

When you execute the silent installation (command line installation) for PowerChute Network Shutdown, you can choose whether or not to add the computer IP address to the NMC list. Refer to the PowerChute Network Shutdown installation guide for more details. You can add or delete IP addresses from the NMC at any time through its user interface. Please refer to the UPS Network Management Card installation guide or the PowerChute Network Shutdown installation guide for more details.

About the Author:

Sarah Jane Hannon is Product Line Manager for the PowerChute UPS Management software range. Prior to joining APC in November 2007, she worked for over five years in Product Management and Strategic Planning in the Telecommunications industry. Sarah Jane holds a Bachelor's degree in Business and French from the University of Limerick and a Masters in Marketing Management from University College Dublin.