

# PowerChute™ Network Shutdown Operating Modes and supported UPS Configurations

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## ABSTRACT

PowerChute™ Network Shutdown software works in conjunction with the UPS Network Management Card to provide graceful, unattended shutdown of multiple computer systems over a network. This Application Note describes each supported UPS configuration and lists the UPS families that support each configuration. Lastly, a table summarizing which UPS Network Management Card supports which UPS model for each configuration is provided.

## APPLICATIONS

IT Server Rooms, Data Centers, Remote Branch Offices, Distributed Networks.

## CUSTOMER BENEFITS

- Graceful network-based shutdown
- Sequenced server shutdown
- Integration with VMware & Hyper-V
- Support for virtual clusters
- Virtual machine migration/shutdown
- Intuitive PowerChute setup wizard
- Browser accessible
- Command file integration
- Redundant & Parallel UPS support
- Event logging
- HTTPS communications
- IPv6 support



## Introduction

You can configure PowerChute Network Shutdown to operate in several different modes or configurations as follows:

- Single UPS configuration
- Redundant UPS configuration
- Parallel UPS configuration
- Advanced UPS configuration

**Note:** From PowerChute Network Shutdown v4.0, all UPS configurations support virtual clusters and virtual machine migration. This is to facilitate the migration of virtual machines across geographic locations.

### Single-UPS Configuration

In a **Single-UPS configuration**, each server or group of servers is protected by a single UPS. Each server has one PowerChute Network Shutdown Agent communicating with a single NMC inserted in the UPS. This single UPS

provides the full power capacity of the load for all connected servers. When an event that requires shutdown occurs, PowerChute Network Shutdown triggers a safe system shutdown command for all connected server(s).

**Single-UPS Configuration:** All servers are protected by a single UPS. The UPS Network Management Card communicates with each server that has PowerChute installed.

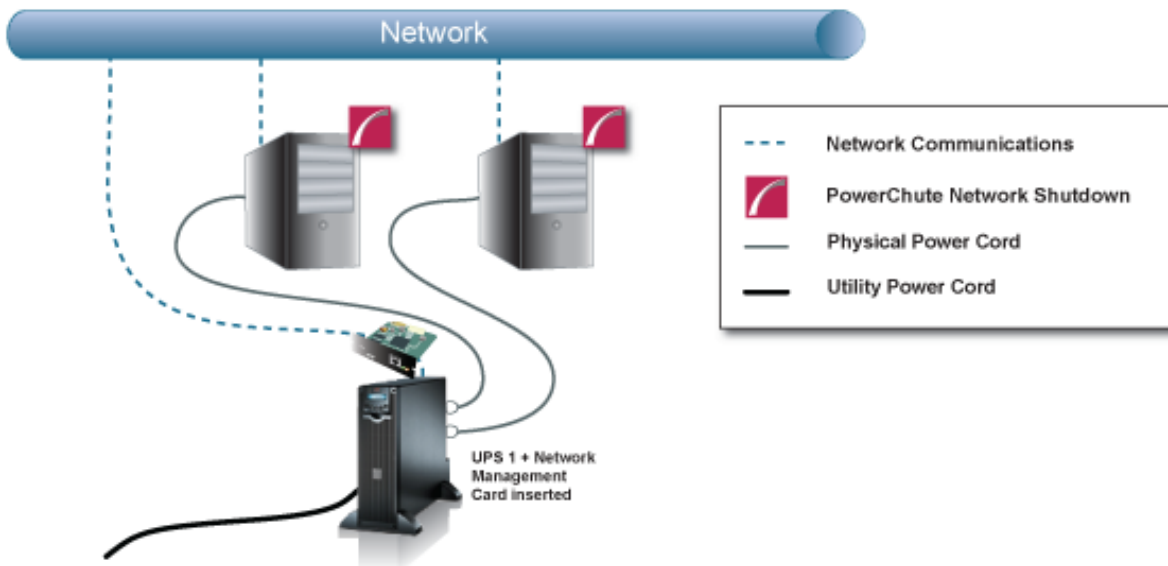


Figure 1 Single UPS Configuration

### Supported UPS's

All Smart-UPS models with a SmartSlot (including Smart-UPS VT), the Galaxy 300 (3:1 & 3:3), Galaxy 3500 (3:1 & 3:3), the Galaxy 5000, Galaxy 7000, Galaxy VM, Galaxy VS, Galaxy VL, Symmetra 1-Phase, Symmetra 3-Phase and Symmetra PX.

### Redundant UPS Configuration

In a **Redundant-UPS Configuration**, PowerChute Network Shutdown recognizes a group of up to four UPS's as a single UPS system. In this configuration, one PowerChute Network Shutdown Agent on a server communicates with up to four NMCs (depending on the number of UPS's in the configuration). Typically, the servers have multiple (dual or triple) power cords. Each UPS has its own NMC, which has a unique IP address. In addition, all the NMCs use the same HTTP port and the same administrator user name and authentication phrase.

Each UPS has the capacity to supply power to the load on its own. The first UPS provides all the power for the load, the additional UPS(s) act as reserve. The UPS's have to be the same model type and each UPS must have enough battery power to support the system during a power outage. This configuration may have either two or three UPS's.

All UPS's in a Redundant-UPS configuration must be from the same UPS Family as opposed to the same UPS model. For example; SMX, SMT or SUA Smart-UPS can be mixed together but an SMX Smart-UPS cannot be mixed with an SURT or SRT model which belongs to the Smart-UPS On-Line Family.

**Redundant-UPS Configuration:** Two or more UPS's protect each server. Each UPS can support the server load on its own. All UPS Network Management Cards communicate with each server that has PowerChute installed.

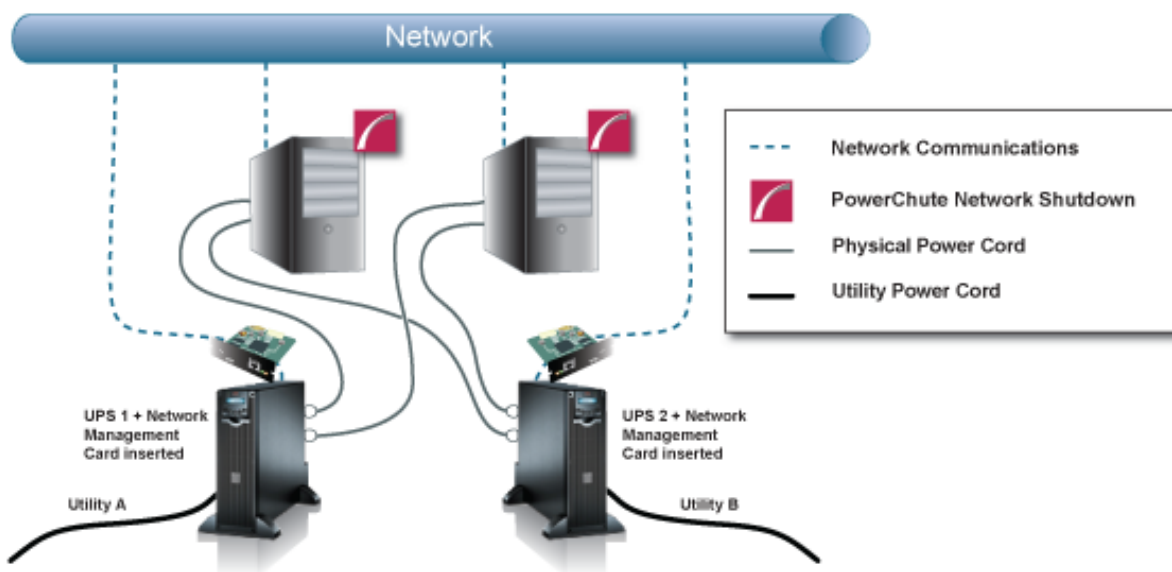


Figure 2 Redundant UPS configuration

**Recommendation:** Please read Application Note #98 (AN-98) 'Using PowerChute Network Shutdown in a Redundant-UPS Configuration' for further information including event handling in different shutdown scenarios.

### Supported UPS's

All Smart-UPS models with a SmartSlot (including Smart-UPS VT), Galaxy 3500 (3:1 & 3:3), Symmetra 1-Phase and Symmetra 3-Phase Galaxy VS and Galaxy VL.

### Parallel-UPS Configuration

In a **Parallel-UPS Configuration**, two or more UPS's (up to nine depending on the model) support the load. Each UPS does not need to be capable of supporting the load on its own as the combined output of all UPS's in the configuration can share the load. However, depending on the size of the load there may be reserve UPS(s) available. Redundancy is provided if there is at least one more UPS than is required to support the load.

- An example of a **Parallel Redundant Configuration** is if three 5kVA UPS's are supporting an 8kVA server load; one of the three UPS's can fail and the load can still be supported by the remaining two UPS's.
- A **Parallel Capacity Configuration** exists if three 5kVA UPS's are supporting a 13kVA bank of servers. All three UPS's are required to continue supporting this load.

In this configuration, you have one PowerChute Network Shutdown Agent on a server communicating with several Network Management Cards (NMC) installed on UPS's *which have already been configured to operate in parallel mode*. Each UPS has its own NMC, which has a unique IP address. In addition, all the NMCs use the same HTTP port and the same administrator user name and authentication phrase.

PowerChute Network Shutdown recognizes that the UPS's are set-up in a Parallel configuration and will monitor the changing load on the UPS's (as a single device) so the software can modify how the events are aggregated depending on the level of redundancy in the system at any given time. All UPS's in a Parallel-UPS configuration must be of the same UPS family (model and firmware version).

**Parallel-UPS Configuration:** Two or more UPS's protect the load and provide redundancy or increased capacity depending on the load. The UPS outputs are tied together so a single output goes to the load. All UPS Network Management Cards communicate with each server that has PowerChute installed.

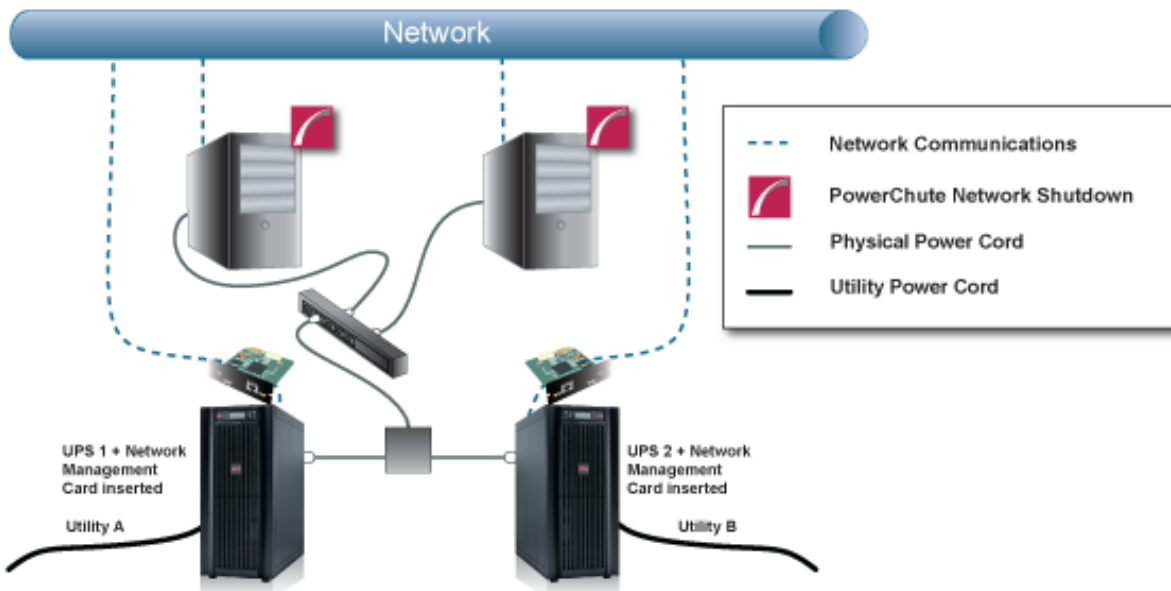


Figure 3 Parallel UPS Configuration Set-Up

**Recommendation:** Please read Application Note #169 (AN-169) 'Using PowerChute Network Shutdown in Parallel Redundant or Parallel Capacity UPS Configurations' for further information including event handling in different shutdown scenarios.

### Supported UPS's

Smart-UPS VT (Parallel-Capable), Galaxy 300 (3:1 & 3:3), Galaxy 3500 (3:1 & 3:3), Galaxy 5000, Galaxy 7000, Galaxy VM, Galaxy VS, Galaxy VL, Symmetra PX 250 and Symmetra PX 500.

### Advanced UPS Configuration

PowerChute Network Shutdown v4.0 has introduced a new Advanced UPS configuration which enables a single PowerChute Agent to monitor multiple UPS setups and initiate graceful shutdown based on different redundancy levels. Each UPS setup can be a single UPS or a UPS group of 2 or more UPS's. For example, one UPS setup may be a group of UPS's with N+2 redundancy while another setup may be a single UPS.

For details on configuring Advanced Redundant Setups, please see the "Using PowerChute Network Shutdown in Advanced Redundant Setups" Application Note.

### Supported UPS Models

All Smart-UPS models with a SmartSlot (including Smart-UPS VT), the Galaxy 300 (3:1 & 3:3), Galaxy 3500 (3:1 & 3:3), the Galaxy 5000, Galaxy 7000, Symmetra 1-Phase, Symmetra 3-Phase and Symmetra PX.

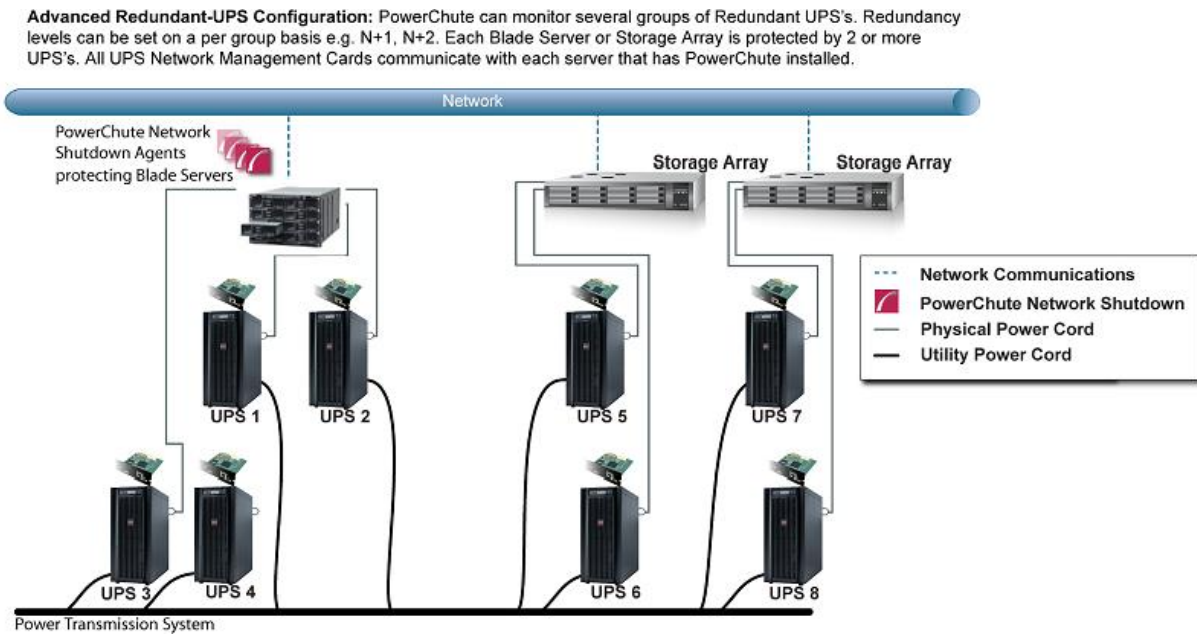


Figure 4 Advanced UPS Configuration Set-Up

**Recommendation:** Please see the Application Note 'Using PowerChute Network Shutdown in an Advanced Redundant Setup' for further information and details on different advanced redundant setups.

## [APPLICATION NOTE #170] Operating Modes and Supported UPS Configurations

### UPS Network Management Cards & UPS Configurations

UPS Configuration	UPS Model	UPS Network Management Card
<b>Single and Advanced</b>	<ul style="list-style-type: none"> <li>➤ All Smart-UPS models with a SmartSlot</li> <li>➤ Smart-UPS VT Models</li> <li>➤ Galaxy 3500 (3:1 &amp; 3:3)</li> <li>➤ Symmetra 1-Phase</li> <li>➤ Symmetra 3-Phase</li> <li>➤ Symmetra PX (excluding PX 250 &amp; 500)</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9640/ AP9630 / AP9630CH</li> <li>➤ AP9641/ AP9631 / AP9631CH</li> <li>➤ AP9635</li> <li>➤ AP9617*, AP9618*, AP9619*</li> </ul> <p><i>*Does not support Next Generation UPS models (e.g. SMX, SMT, SURTD, SRT Smart-UPS)</i></p>
	<ul style="list-style-type: none"> <li>➤ Galaxy 300 (3:1 &amp; 3:3)</li> <li>➤ Galaxy 7000</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9630CH</li> <li>➤ AP9635</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Galaxy 5000</li> <li>➤ Symmetra PX 250</li> <li>➤ Symmetra PX 500</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9635</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Galaxy VM</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9635</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Galaxy VS &amp; Galaxy VL</li> </ul>	<ul style="list-style-type: none"> <li>➤ Built-in network management card</li> <li>➤ AP9644 (optional)</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Silcon DP3500E &amp; Silcon BC3 (Single UPS Configuration only).</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9617, AP9618, AP9619</li> </ul>
<b>Redundant</b>	<ul style="list-style-type: none"> <li>➤ All Smart-UPS models with a SmartSlot</li> <li>➤ Smart-UPS VT Models</li> <li>➤ Galaxy 3500 (3:1 &amp; 3:3)</li> <li>➤ Symmetra 1-Phase</li> <li>➤ Symmetra 3-Phase</li> <li>➤ Galaxy VS and Galaxy VL</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9640/ AP9630 / AP9630CH</li> <li>➤ AP9641/ AP9631 / AP9631CH</li> <li>➤ AP9635</li> <li>➤ AP9617*, AP9618*, AP9619*</li> <li>➤</li> <li>➤ Built-in network management card</li> <li>➤ AP9644 (optional)</li> </ul> <p><i>*Does not support Next Generation UPS models (e.g. SMX, SMT, SURTD, SRT Smart-UPS)</i></p>

UPS Configuration	UPS Model	UPS Network Management Card
<b>Parallel</b>	<ul style="list-style-type: none"> <li>➤ Smart-UPS VT (Parallel Capable Models)</li> <li>➤ Galaxy 3500 (3:1 &amp; 3:3)</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9640/ AP9630 / AP9630CH</li> <li>➤ AP9641/ AP9631 / AP9631CH</li> <li>➤ AP9635</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Galaxy 300 (3:1 &amp; 3:3)</li> <li>➤ Galaxy 7000</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9630CH</li> <li>➤ AP9635</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Galaxy 5000</li> <li>➤ Symmetra PX 250</li> <li>➤ Symmetra PX 500</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9635</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Galaxy VM</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9635</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Galaxy VS &amp; Galaxy VL</li> </ul>	<ul style="list-style-type: none"> <li>➤ Built-in network management card</li> <li>➤ AP9644 (optional)</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Silcon DP3500E &amp; Silcon BC3</li> </ul>	<ul style="list-style-type: none"> <li>➤ AP9617, AP9618, AP9619</li> </ul>