PowerNet® SNMP Management Information Base (MIB) v3.0.0

Reference Guide

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PowerNet® SNMP Management Information Base (MIB) v3.0.0: Reference Guide
POWERNET MIB v3.0.0

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Contents

Title Page 1

About This Guide 5
- Guide Purpose 5
- Guide Structure 5
- Associated Documents 6
- This Guide's Conventions 6
- How to Contact APC 6

Chapter 1
PowerNet SNMP MIB Structure 7
- PowerNet MIB Traps 7
- PowerNet MIB OIDs 7
  - SNMP Access Controls 7
  - SNMP Browser Structure 8
  - PowerNet SNMP MIB OIDs Structure 8
  - Tabled OIDs 9

Chapter 2:
How to Manage PowerNet SNMP Adapters and Agents 10
- Overview 10
- How to Monitor a PowerNet Agent 10
  - The [powerNetSoftwareSystem] OIDs 11
  - The [powerNetSoftwareConfig] OIDs 11
- How to Manage A PowerNet Adapter (or MasterSwitch) SNMP Agent 11
  - The [mcontrol] OID 11
  - The [mconfig] OID 12

Chapter 3:
How to Manage a UPS 13
- Overview 13
- How to Monitor a UPS 14
  - UPS Identification ([upsIdent]) OIDs 14
  - UPS Battery ([upsBattery]) OIDs 15
  - UPS Communication ([upsComm]) OID 15
  - UPS Input ([upsInput]) OIDs 16
  - UPS Output ([upsOutput]) OIDs 17
  - UPS Output ([upsOutput]) OIDs 18
- How to Control a UPS 19
- How to Configure a UPS 21
- How to Test a UPS 23

Chapter 4:
How to Manage a Measure-UPS 24
Overview 24
How to Monitor Environment ([mUpsEnviron]) OIDs 24
How to Use Contact ([mUpsContact]) OIDs 25

Chapter 5:
How to Manage a MasterSwitch 26
Overview 26
How to Use the Identification ([sPDUIdent]) OIDs 27
How to Use the Master Control ([sPDUMasterControl]) OIDs 27
How to Use the Master Configuration ([sPDUMasterConfig]) OIDs 28
How to Use the Outlet Control ([sPDUOutletControl]) OIDs 29
How to Use the Outlet Configuration ([sPDUOutletConfig]) OIDs 29

Chapter 6:
How to Download New Code to A PowerNet Adapter 30
Overview 30
The [mcontrol] OID 30
The [mconfig] OIDs 30

Chapter 7:
PowerNet MIB Traps 31
Overview 31
How to Define Trap Receivers 32
PowerNet MIB Trap Definitions 32

About This Guide

This introduction provides information which can help you use this user's guide.

- Guide Purpose
- Guide Structure
- Associated Documents
- Guide Conventions
- How to Contact APC

Guide Purpose

This guide describes how to use the PowerNet Simple Network Management Protocol (SNMP) management information base (MIB) v3.0.0 to manage APC products which allow (or enable) using SNMP-based management:

- MIB v3.0.0 management of a PowerNet SNMP SmartSlot v3.0.0 Adapter, its UPS, and a Measure-UPS
- MIB v2.2-compatible management of a v2.2 Adapter or Agent, its UPS, and a Measure-UPS
- MIB v3.0.0 management of a MasterSwitch

Guide Structure

In addition to this introduction, this guide uses eight chapters to describe how to use the PowerNet MIB:

- **Chapter 1: PowerNet SNMP MIB Structure**
  Provides an overview of the PowerNet MIB, its Object Identifications (OIDs) and traps (messages which alert a network management station [NMS] of specific conditions).
- **Chapter 2 through Chapter 5**
  Describe how to use PowerNet MIB OIDs to manage specific products:

  Chapter 2: How to Manage PowerNet SNMP Adapters and Agents
  Chapter 3: How to Manage a UPS
  Chapter 4: How to Manage a Measure-UPS
  Chapter 5: How to Manage a MasterSwitch

- **Chapter 6: How to Download New Adapter or MasterSwitch Code**
  Describes how to restart a hardware-based (PowerNet Adapter or MasterSwitch) SNMP agent, continue with the current agent, or load new code.
- **Chapter 7: PowerNet SNMP MIB Traps**
  Describes the PowerNet MIB traps and how to define which NMSs can receive those traps.

Associated Documents

This guide describes how to use the PowerNet MIB, only. For information about the APC product you want to manage using the PowerNet MIB, refer to the appropriate APC user's guide or owner's manual, for that product; refer to your network management system (NMS) documentation for information about your NMS, and to APC's *Network Management Station (NMS) Reference Guide* (**nms.pdf**), for general descriptions of how to use the PowerNet MIB with different types of NMSs.

This Guide's Conventions

This guide uses informal references to the following components:

This Guide Uses	To Refer to
PowerNet Adapter or Adapter	Any PowerNet SNMP Adapter
PowerNet Agent or Agent	Any PowerNet SNMP Agent
Measure-UPS	The standalone Measure-UPS or the SmartSlot Measure-UPS II
Network management station (NMS) or just NMS	Any network component capable of using the PowerNet SNMP MIB

Also, this guide uses the following conventions when referring to specific items within the text:

When the Following Appear in Text	This Guide Uses
A document name *(PowerNet SNMP Agent - MIB Reference Guide*)	*Italics*
- File names (**powernet.mib**) - MIB OIDs or traps (**upsAdvControl**)	Boldface **Arial** font, in normal text, or normal **Arial** font, in boldface text
References to other sections of this guide	Small capitalization of non-uppercase letters

How to Contact APC

For more information on this or any other APC product, visit APC's Web site at http://www.apc.com/. APC continuously updates the information you can get through its Web site, including its product documentation.

You can also use a telephone to contact Customer or Technical Support, if you have any questions concerning this or other APC products: See the TECHNICAL SUPPORT section in your *PowerNet SNMP SmartSlot v3.0.0 Adapter - User's Guide*. APC does not charge a fee for customer or technical support.

Chapter 1

PowerNet SNMP MIB Structure

This chapter breaks the PowerNet SNMP MIB down into its major OID and trap components.

PowerNet MIB Traps

An Adapter, Agent or MasterSwitch can send traps to an NMS when specific events occur. The NMS does not need to use the PowerNet SNMP MIB to get the trap, but it does need the MIB to interpret the trap's meaning. Also, which NMSs can actually receive traps depends on the trap receiver definitions a particular Adapter, Agent or MasterSwitch uses.

For more information on traps, see CHAPTER 7.

PowerNet MIB OIDs

The PowerNet MIB OIDs allow an NMS to use its SNMP browser to manage:

- An Adapter, its UPS and Measure-UPS
- An Agent, its UPS and Measure-UPS
- A MasterSwitch

However, in the case of an Adapter or MasterSwitch, the NMS can only manage a product if the product's SNMP access controls allow that NMS to have SNMP access. (An Agent, which has limited control over a UPS, does not use SNMP access controls.)

SNMP Access Controls

A PowerNet Adapter and MasterSwitch use console programs which you can use to define specific SNMP access values for up to four SNMP channels.

You Can	To
Disable SNMP access altogether	Prevent SNMP access by any NMS.
Use an NMS IP Address as a SNMP channel value	Limit channel access to only the defined NMS.
Define a non-default password for an SNMP channel	Limit channel access to an NMS which knows the password.
Select the type of access used by an SNMP channel	Allow an NMS to have write access, or just read access.

For more information on SNMP access controls, see your PowerNet Adapter or MasterSwitch user's guide.

SNMP Browser Structure

The PowerNet MIB fits into a top-down structure within the SNMP browser's categories. For example, when using an HP OpenView for Windows SNMP browser, the PowerNet MIB OIDs fit into the browser's structure, as follows:

- **[iso]** (for International Standards Organization) at the top
- **[org]** (for organization) under **[iso]**
- **[dod]** (for Department of Defense) under **[org]**
- **[internet]** under **[dod]**
- **[private]** under **[internet]**
- **[enterprises]** under **[private]**
- **[apc]** (for American Power Conversion) under **[enterprises]**

PowerNet SNMP MIB OIDs Structure

The PowerNet MIB OIDs also break down into a top-down structure, from **[apc]** at the top, down to individual OIDs at the bottom of specific OID categories, or within a specific OID table (see the separate section on TABLED OIDS).

The OID categories provide for grouping specific functions together. For example, under **[apc]**, two categories appear: **[products]**, which provides the OIDs you can use to manage specific products, and **[apcmgmt]**, which provides OIDs you can use to affect the operation of hardware-based (PowerNet Adapter and MasterSwitch) SNMP agents (for more information on how to use the **[apcmgmt]** OIDs, see CHAPTER 2: HOW TO MANAGE HARDWARE-BASED SNMP AGENTS).

Under **[products]**, three categories appear, two of which provide OIDs you can use to manage specific products.

[hardware]	[software]
This category breaks down into categories for each type of hardware product you can manage using PowerNet MIB OIDs. Separate chapters in this guide describe how to use the OIDs which fall under **[hardware]**: **[ups]** (CHAPTER 3) **[measureUps]** (CHAPTER 4) **[miniSNMPadapter]** (CHAPTER 2) **[masterswitch]** (CHAPTER 5) **[measureUps2]** (CHAPTER 4)	This category includes read-only OIDs you can use to monitor a software PowerNet SNMP Agent, only (as described in CHAPTER 2). A single category appears under **[software]**: **[powerNetSubAgent]**

The third listing **[system]** does not provide OIDs you can use for SNMP management. This category contains read-only OIDs which identify UPS, Measure-UPS and MasterSwitch models by unique numbers, numbers other OIDs can reference. For example, the MIB-II system OIDs (listed under **[internet]**, **[mgmt]**, **[mib-2]** and **[system]**) use a PowerNet MIB **[system]** OID number for the MIB-II's **[sysObjectID]** value.

Tabled OIDs

For any PowerNet MIB OID category listed in the SNMP browser, you can access a list of the current values for all OIDs from that category down. For example, you can select **[apc],** to list the current values for all PowerNet MIB OIDs, or **[ups],** to list the current values for all PowerNet MIB UPS OIDs.

With an exception: OIDs grouped together in a table will not appear in such a list. You can only access an OID table's values by selecting that table OID in the SNMP browser (an OID table appears enclosed in curly {} brackets). For example, to access the OIDs which define all four trap receivers for an Adapter (or MasterSwitch), you select **{mconfigTrapReceiverTable}** in the SNMP browser.

For more information on how to define trap receivers, see CHAPTER 2.

Chapter 2:
How to Manage PowerNet SNMP Adapters and Agents

This chapter describes how to use PowerNet MIB OIDs to manage a PowerNet SNMP Adapter, or view software data for a PowerNet SNMP Agent.

Overview

A PowerNet Adapter directly connects a UPS and a Measure-UPS to the network; a PowerNet Agent indirectly connects a UPS and a Measure-UPS by communicating with a PowerChute *plus* application, which, in turn, communicates with the UPS and Measure-UPS. In both cases, the network connection allows an NMS to use an SNMP browser and PowerNet MIB OIDs to manage the UPS and Measure-UPS.

In addition to using SNMP to manage a device connected to the network by an Adapter or Agent, the NMS can also use PowerNet MIB OIDs to manage the PowerNet Adapter, or monitor software values for the PowerNet Agent.

You Can Use	To
[powerNetSubAgent] read-only OIDs	View information about a PowerNet SNMP Agent (see How to Monitor a PowerNet Agent).
[apcmgmt] OIDs	Manage a PowerNet Adapter 's internal SNMP agent (see How to Manage a PowerNet Adapter's SNMP Agent). *Note: You can also use these OIDs to manage a MasterSwitch SNMP agent.*
[serialPort2] OIDs	Define a PowerNet 2.2 Adapter's serial port operation (see How to Control a PowerNet 2.2 Adapter's Serial Port).

How to Monitor a PowerNet Agent

You can use **[powerNetSubAgent]** read-only OIDs to view information about a PowerNet Agent:

1) Select **[product]** under **[apc]**.
2) Then select **[software]**.
3) Then select **[powerNetSubAgent]**.

The SNMP browser lists two OID categories: **[powerNetSoftwareSystem]** and **[powerNetSoftwareConfig]**.

The [powerNetSoftwareSystem] OIDs

You Can Use	To See
powerNetSoftwareSystemDescription	Information about an Agent, including its version number.
powerNetSoftwareOid	What technology the Agent uses to implement the PowerNet MIB.
powerNetSoftwareSystemUpTime	How long the Agent has been continuously running on the network.

The [powerNetSoftwareConfig] OIDs

You Can Use These OIDs	To See
powerNetSoftwareTableSize	How many distinct modules an Agent has.
{powerNetSoftwareTable} **moduleNumber** **moduleName** **moduleVersion** **moduleDate**	A tabled set of OIDs which define each module by the modules: - Table row number - Name - Version number - Installation date

How to Manage A PowerNet Adapter (or MasterSwitch) SNMP Agent

When you select **[apcmgmt]** under **[apc]**, the SNMP browser lists two OID categories: **[mcontrol]** and **[mconfig]**. With the exception of the OIDs involved with downloading new agent code, you can use these OIDs to manage either an Adapter or a MasterSwitch. You can only use the download OIDs with an Adapter.

The [mcontrol] OID

You Can Use This OID	To SET this Value
mcontrolRestartAgent	- **restartCurrentAgent (1)** (reboots the Adapter's SNMP agent) - **continueCurrentAgent (2)** (continues the Agent without rebooting) - **LoadandExecuteNewAgent (3)** (starts to download new code) *Note: Only an Adapter can use the **LoadandExecuteNewAgent (3)** value to start a download of new agent code.*

You also use two **[mconfig]** OIDs to download new agent code to an Adapter using TFTP. See CHAPTER 6 to find out how to download new code to an Adapter using TFTP or xmodem.

The [mconfig] OID

You Can Use These OIDs	To
mconfigBOOTPEnabled	Identify the current BOOTP setting. A **GET** to this OID returns: - **yes** (for BOOTP enabled) - **no** (for BOOTP disabled)
mconfigNumTrapReceivers	Identify how many NMSs can receive traps from the Adapter (or MasterSwitch). A **GET** to this OID returns a value from **0** to **4**.
{mconfigTrapReceiverTable}	Use the tabled OIDs to define up to four NMSs as trap receivers.
mconfigTFTPServer	Define a TFTP server, by its IP address, when you want to use TFTP to download new code. *Note: Only the Adapter can use this OID.*
newCodeAuthentViaTFTP	View the results of the last TFTP download of new code. *Note: Only the Adapter can use this OID.*

See CHAPTER 6 to find out how to use TFTP to download new agent to an Adapter; see CHAPTER 7 to find out how to define trap receivers for an Adapter or a MasterSwitch.

Chapter 3:
How to Manage a UPS

This chapter describes how to use PowerNet MIB OIDs to manage (monitor, configure, control and test) a UPS through its PowerNet Adapter or PowerNet Agent.

Overview

The PowerNet MIB OIDs you can use to manage a UPS fall into eight categories under the heading of **[ups]**:

1) Select **[product]** under **[apc]**.
2) Then select **[hardware]**.
3) Then select **[ups]** to list the eight OID categories.

OIDs in These Categories	Allow You To
[upsIdent] **[upsBattery]** **[upsInput]** **[upsOutput]** **[upsComm]**	View information about the UPS and its OVERALL operation (see HOW TO MONITOR A UPS).
[upsConfig]	Modify parameters which affect the overall operation of the UPS (see HOW TO CONFIGURE A UPS).
[upsControl]	Directly affect the current operation of the UPS (see HOW TO CONTROL A UPS).
[upsTest]	Verify that the UPS can operate correctly during a power failure (see HOW TO TEST A UPS).

How many of the OIDs in these eight **[ups]** OID categories you can actually use to manage a UPS depends on how that UPS connects to the network. Also, within these categories two types of OIDs can exist: Simple-signalling (**[upsBasic]**) OIDs and smart-signalling (**[upsAdv]**) OIDs. For a PowerNet Agent, the type of signalling used for the connection between the Agent and the UPS does affect what OIDs you can use.

PowerNet Adapter v3.0.0	PowerNet Adapter v2.2	PowerNet Agent
You can use all OIDs listed under the PowerNet MIB's **[ups]** category.	You can use all **[ups]** OIDs supported by v2.2 of the PowerNet MIB.	You cannot use: - **[ups]** OIDs not originally supported for use by PowerNet Agents in PowerNet MIB v2.2. - **[upsAdv]**-type OIDs, if the Agent-to-UPS communication uses simple-signalling.

How to Monitor a UPS

You use **GETs** (SNMP read commands) to PowerNet MIB OIDs to monitor (view information about) the UPS. However, not every PowerNet MIB OID will respond to a **GET** with useful information. For example, if you use a **GET** with any **[upsControl]** OID, the returned value simply tells you that the related control action was not taken by the UPS: A **GET** to **[upsAdvControlFlashAndBeep]** receives a **noFlashAndBeep** response; A **GET** to **[upsAdvControlRebootUps]** receives a **noRebootUps** response.

However, most PowerNet MIB categories have OIDs which you can use to view information about the UPS operation. With few exceptions, these OIDs respond to **GETs**, but not to **SETs**: You can view (**GET**) information about UPS operation, but you cannot affect (**SET**) that operation.

OIDs in These Categories	Allow You to View Information about
[upsIdent]	The UPS identification parameters (see UPS IDENTIFICATION (**[upsIdent]**) OIDS).
[upsBattery]	The UPS battery status (see UPS BATTERY (**[upsBattery]**) OIDS).
[upsInput]	The voltage coming to the UPS (see UPS INPUT (**[upsInput]**) OIDS).
[upsOutput]	The voltage output by the UPS (see UPS OUTPUT (**[upsOutput]**) OIDS).
[upsComm]	The UPS-to-SNMP agent communication link (see UPS COMMUNICATION (**[upsComm]**) OID).

UPS Identification ([upsIdent]) OIDs

The **[upsIdent]** category has five OIDs which identify UPS identification parameter values: Four read-only OIDs which report factory-preset values, and one OID which reports the name used for the UPS, a name you can define using a **SET**.

You can access all five OIDs through any PowerNet Adapter or PowerNet Agent which connects to the UPS through a smart-signalling cable. For a PowerNet Agent which connects to the UPS through a simple-signalling cable, you can only use the two **[upsBasicIdent]** OIDs.

This OID	Reports
upsBasicIdent	The UPS model name
upsBasicIdentName	The name used for the UPS (an 8-character value you can change using a **SET**)
upsAdvIdentFirmwareRevision	The UPS firmware version
upsAdvIdentDateOfManufacture	The date the UPS completed the manufacturing process
upsAdvIdentSerialNumber	The UPS serial number

UPS Battery ([upsBattery]) OIDs

The **[upsBattery]** category has nine OIDs which provide UPS battery status information: Eight read-only OIDs, and one OID which reports when the battery was last replaced, a value you can define using a **SET**.

You can access all nine OIDs through any PowerNet Adapter, or through a PowerNet Agent which connects to the UPS through a smart-signalling cable. For a PowerNet Agent which connects to the UPS through a simple-signalling cable, you can only use the three **[upsBasicBattery]** OIDs.

This OID	Reports
upsBasicBatteryStatus	The current UPS battery status: - **unknown** (Adapter or Agent cannot report the status) - **batteryNormal** (within normal operating parameters) - **batteryLow** (lacks enough power to support the UPS load equipment)
upsBasicBatteryLastReplaceDate	When the battery was last replaced, a value you can change using a **SET**.
upsBasicTimeOnBattery	How much time has passed since the UPS switched to battery power.
upsAdvBatteryCapacity	What percentage of full battery capacity the battery currently has.
upsAdvBatteryTemperature	The internal temperature of the UPS, in Celsius.
upsAdvBatteryRunTimeRemaining	How much longer the UPS can use battery power for its output voltage.
upsAdvBatteryReplaceIndicator	Whether or not a UPS battery needs a replacement: - **noBatteryNeedsReplacing** - **batteryNeedsReplacing**
upsAdvBatteryNumOfBattPacks	How many external battery packs a Matrix-UPS or Smart-UPS XL has.
upsAdvBatteryNumOfBadBattPacks	How many defective external battery packs a Matrix-UPS or Smart-UPS XL has.

UPS Communication ([upsComm]) OID

This category has a single read-only OID which you can access through any Adapter. You cannot use this OID with a PowerNet Agent.

This OID	Reports
upsCommStatus	The status of the Adapter's SNMP agent-to-UPS communication link: - **ok** - **noComm**

UPS Input ([upsInput]) OIDs

The **[upsInput]** category has six read-only OIDs which provide information about the UPS input (utility line) voltage.

You can access all six OIDs through any PowerNet Adapter, or through a PowerNet Agent which connects to the UPS through a smart-signalling cable. For a PowerNet Agent which connects to the UPS through a simple-signalling cable, you can only use the **[upsBasicInputPhase]** OID.

This OID	Reports
upsBasicInputPhase	The current input voltage phase
upsAdvInputLineVoltage	The current input voltage level
upsAdvInputMaxLineVoltage	The maximum input voltage sensed by the UPS over the last minute
upsAdvInputMinLineVoltage	The minimum input voltage sensed by the UPS over the last minute
upsAdvInputFrequency	The current input voltage frequency
upsAdvLineFailCause	The reason for the last transfer to battery. The following are standard responses which any Adapter or smart-signalling Agent can report: - **noTransfer (1)** (no transfer has occured) - **highLineVoltage (2)** (voltage exceeded the high-transfer voltage value) - **brownout (3)** (for more than 5 seconds, the voltage level was between 40% of the UPS rated-output and low-transfer voltage values) - **blackout (4)** (for more than 5 seconds, the voltage level was between 40% of the UPS rated-output voltage and ground [0 volts]) - **smallMomentarySag (5)** (a brownout existed for 5 seconds or less) - **deepMomentarySag (6)** (a blackout existed for 5 seconds or less) - **smallMomentarySpike (7)** (less than 10 volts per cycle voltage increase) - **largeMomentarySpike (8)** (more than 10 volts per cycle voltage increase) A PowerNet v3.0 Adapter can also report: - **self-test (9)** (the UPS performed a self-test) - **rateOfVoltageChange (10)** (rate of changes in the line voltage level)

See HOW TO CONFIGURE A UPS for information about the rated-output, high-transfer and low-transfer voltage values cited in the above table's descriptions of the **[upsAdvLineFailCause]** OID values.

UPS Output ([upsOutput]) OIDs

The **[upsOutput]** category has six read-only OIDs which provide information about the UPS input (utility line) voltage.

You can access all six OIDs through any PowerNet Adapter. A PowerNet Agent which connects to the UPS through a smart-signalling cable can use all the OIDs except one: **[upsAdvOutputCurrent]**. For a PowerNet Agent which connects to the UPS through a simple-signalling cable, you can only use the two **[upsBasicOutput]** OIDs.

This OID	Reports
upsBasicOutputStatus	The current UPS operational status: - **unknown (1)** (Adapter or Agent cannot report state) - **onLine (2)** (using acceptable input voltage to provide output voltage) - **onBattery (3)** (using battery power to provide output voltage) - **onSmartBoost (4)** (using SmartBoost with a low input voltage to provide output voltage without going on battery) - **timedSleeping (5)** (waiting for a defined period of time to pass before supplying output power to its load equipment) - **softwareBypass (6)** (the Matrix-UPS or Symmetra was placed into its bypass mode using SNMP, PowerChute *plus* or PowerNet Manager) - **off (7)** (turned off) - **rebooting (8)** (resetting load equipment by turning output power off and then back on) - **switchedBypass (9)** (the Matrix-UPS or Symmetra was placed into its bypass mode using the switch at the UPS) - **hardwareFailureBypass (10)** (the Matrix-UPS or Symmetra placed itself into bypass mode in response to a hardware problem) - **sleepingUntilPowerReturn (11)** (waiting until the input power returns to an acceptable level before it provides output power to its load equipment) - **onSmartTrim (12)** (using SmartTrim with a high input voltage to provide output voltage without going on battery)
upsAdvOutputPhase	The output voltage phase
upsAdvOutputVoltage	The output voltage level
upsAdvOutputFrequency	The output voltage frequency
upsAdvOutputLoad	The percentage of full-load capacity placed on the UPS by its load equipment
upsAdvOutputCurrent	The output voltage current, in Ampheres

See HOW TO CONTROL A UPS for information about how to use SNMP to get a UPS to perform the operations identified in the above table's descriptions of the **[upsAdvOutputStatus]** OID values.

UPS Output ([upsOutput]) OIDs

The **[upsOutput]** category has six read-only OIDs which provide information about the UPS input (utility line) voltage.

You can access all six OIDs through any PowerNet Adapter. A PowerNet Agent which connects to the UPS through a smart-signalling cable can use all the OIDs except one: **[upsAdvOutputCurrent]**. For a PowerNet Agent which connects to the UPS through a simple-signalling cable, you can only use the two **[upsBasicOutput]** OIDs.

This OID	Reports
upsBasicOutputStatus	The current UPS operational status: - **unknown (1)** (Adapter or Agent cannot report state) - **onLine (2)** (using acceptable input voltage to provide output voltage) - **onBattery (3)** (using battery power to provide output voltage) - **onSmartBoost (4)** (using SmartBoost with a low input voltage to provide output voltage without going on battery) - **timedSleeping (5)** (waiting for a defined period of time to pass before supplying output power to its load equipment) - **softwareBypass (6)** (the Matrix-UPS or Symmetra was placed into its bypass mode using SNMP, PowerChute *plus* or PowerNet Manager) - **off (7)** (turned off) - **rebooting (8)** (resetting load equipment by turning output power off and then back on) - **switchedBypass (9)** (the Matrix-UPS or Symmetra was placed into its bypass mode using the switch at the UPS) - **hardwareFailureBypass (10)** (the Matrix-UPS or Symmetra placed itself into bypass mode in response to a hardware problem) - **sleepingUntilPowerReturn (11)** (waiting until the input power returns to an acceptable level before it provides output power to its load equipment) - **onSmartTrim (12)** (using SmartTrim with a high input voltage to provide output voltage without going on battery)
upsAdvOutputPhase	The output voltage phase
upsAdvOutputVoltage	The output voltage level
upsAdvOutputFrequency	The output voltage frequency
upsAdvOutputLoad	The percentage of full-load capacity placed on the UPS by its load equipment
upsAdvOutputCurrent	The output voltage current, in Ampheres

See HOW TO CONTROL A UPS for information about how to use SNMP to get a UPS to perform the operations identified in the above table's descriptions of the **[upsAdvOutputStatus]** OID values.

How to Control a UPS

You can use **SETs** (SNMP write commands) to PowerNet MIB **[upsControl]** OIDs to directly affect the current operation of the UPS. When you use a **GET** with any **[upsControl]** OID, the returned value simply tells you that the control action was not taken. For example, a **GET** to **[upsAdvControlFlashAndBeep]** receives a **noFlashAndBeep** response.

Which **[upsControl]** OIDs you can use depends on how the UPS connects to the network.

All Adapters, and PowerNet Agents which use smart-signalling to connect with the UPS, can use **SETs** to the following OIDs. However, the **[upsAdvControlUpsOff]** OID has a value (**turnUpsOffGracefully**) you can only use with a PowerNet 3.0 Adapter.

You Use These OIDs	To Cause
upsAdvControlUpsOff	The UPS to turn off. How the turn off occurs depends on the **SET** value and how the UPS connects to the network: - All PowerNet Adapters immediately turn off the UPS in response to a **SET** of **turnUpsOff**. - A PowerNet Agent performs a clean shutdown of the UPS server, then turns off the UPS, in response to a **SET** of **turnUpsOff**. - A PowerNet 3.0 Adapter turns off a UPS, after a delay, in response to a **SET** of **turnUpsOffGracefully**. The UPS uses the delay value defined by **upsAdvConfigShutoffDelay**, a UPS configuration OID (see HOW TO CONFIGURE A UPS). *Note: When you use this OID with an Agent or a maxi-Adapter, you can only turn the UPS back on using the UPS on/off switch;for all other adapters, you can turn the UPS back on using a SET of **turnUpsOn** for the **upsAdvControlTurnOnUps** OID (as described in the next table).*
upsAdvControlSimulatePowerFail	The UPS to simulate a power failure by using a **SET** of **simulatePowerFailure**.
upsAdvControlFlashAndBeep	The UPS to test its alarm by using a **SET** of **flashAndBeep**.
upsAdvControlBypassSwitch	A Matrix-UPS or Symmetra to go into software bypass by using a **SET** of **switchToBypass**, or to take the UPS out of software bypass by using a **SET** of **switchOutOfBypass**.

Any PowerNet Adapter can use **SETs** to the following OIDs, with one exception: Maxi-Adapters cannot use the **[upsAdvControlTurnOnUps]** OID to turn a UPS back on. You can only turn the maxi-Adapter's UPS back on using the UPS on/off switch. Also, two OIDs, as noted in the table, have values you can only use with a PowerNet 3.0 Adapter.

You Use These OIDs	To Cause
upsBasicControlConserveBattery	A UPS running on battery to go turn off until acceptable input power returns by using a **SET** of **upsOffToConserveBattery**.
upsAdvControlRebootUPS	The UPS to reset its load equipment by turning power off and then back on: - All PowerNet Adapters immediately reboot the UPS in response to a **SET** of **rebootUps**. - A PowerNet 3.0 Adapter reboots a UPS using a delay before it turns off the UPS, in response to a **SET** of **rebootUpsGracefully**. The UPS uses the delay value defined by **upsAdvConfigShutoffDelay**, a UPS configuration OID (see HOW TO CONFIGURE A UPS).
upsAdvControlUpsSleep	The UPS to turn off until a specified period of time passes.The UPS uses the time defined by **upsAdvConfigUpsSleepTime**, a UPS configuration OID (see HOW TO CONFIGURE A UPS). - All PowerNet Adapters immediately turn UPS power off in response to a **SET** of **putUpsToSleep**. - A PowerNet 3.0 Adapterturns UPS power off, after delay, in response to a **SET** of **putUpsToSleepGracefully**. The UPS uses the delay value defined by **upsAdvConfigShutoffDelay**, a UPS configuration OID (see HOW TO CONFIGURE A UPS).
upsAdvControlTurnOnUps	A mini-Adapter's UPS to turn back on in response to a **SET** of **turnOnUpsLoad**, when that UPS was turned off using the **upsAdvControlTurnOnUps** OID (as described in the previous table).

How to Configure a UPS

You can use **GETs** and **SETs** (SNMP read and write commands) to the PowerNet MIB **[upsConfig]** OIDs to define how the UPS will respond to specific operating conditions. A **GET** will tell you the current setting for an OID; A **SET** allows you to change that setting.

All Adapters can use **SETs**, with two exceptions: You only use **GETs** with the **[upsBasicConfigNumDevices]**, **{upsAdvConfigDipSwitchSetting}** and **{upsAdvConfigAllowedSetTable}** OIDs. A basic-signalling PowerNet Agent can only use the OIDs involved with defining the load equipment; a smart-signalling Agent can use all but five of the OIDs, as noted in the table.

You Use These OIDs	To
upsBasicConfigNumDevices	Identify the number of devices specified in **{upsBasicConfigDeviceTable)**.
{upsBasicConfigDeviceTable} **deviceIndex** **deviceName** **vaRating** **acceptThisDevice**	View or define information about each UPS outlet's load equipment: - A read-only value which identifies the specific outlet. - A 16-character long name for the equipment at this outlet. - The VA rating of the outlet's load equipment. - Allows you to add (**yes**) or delete (**no**) a row from the table.
upsAdvConfigRatedOutputVoltage [1]	Define the UPS nominal VAC output voltage, for a UPS model which has multiple possible values (this value is fixed for most domestic UPS units; it is settable on all 230 VAC units).
upsAdvConfigHighTransferVolt [1]	Define the voltage the UPS will use as its trigger to go on SmartBoost, or to go on battery, if the UPS does not use SmartBoost.
upsAdvConfigLowTransferVolt [2]	Define the voltage a Smart-UPS will use as its trigger to go on SmartTrim, or to go on battery, if the UPS does not use SmartTrim (Matrix-UPS, for one).
upsAdvConfigAlarm	Define when the UPS will generate an audible alarm for a line-fail condition: - **timed** (after going on battery, and the time defined by the **upsAdvConfigAlarmTimer** value passes) - **atLowBattery** (whenever a low-battery condition occurs) - **never** (no alarm)
upsAdvConfigAlarmTimer [3]	Define how long the UPS must wait, after going on battery, before it can generate an alarm when **timed** is the value for the **upsAdvConfigAlarm** OID above.
upsAdvConfigMinReturnCapacity [2]	Define how much battery capacity, expressed as a percentage of full capacity, required before the UPS can return from a low-battery shutdown.
upsAdvConfigSensitivity	Define the UPS sensitivity to input line abnormalities or noise: - **auto** (not all UPS models can use this setting) - **low** - **medium** - **high**

You Use These OIDs	To
upsAdvConfigLowBatteryRunTime [2]	Define when a low-battery condition will occur, based on how much battery runtime remains, in seconds.
upsAdvConfigReturnDelay [2]	Define the amount of time, in seconds, a UPS placed in an until-power-returns sleep mode will wait, after the utility line power returns to an acceptable level, before the UPS can go back on line.
upsAdvConfigUpsSleepTime	Define how long the UPS will remain in a timed sleep, with the time specified as multiples of 360 seconds (6-minute intervals). *Note: Only PowerNet Adapters can use this OID. If a **SET** provides a value that is not a multiple of 360 seconds, the UPS rounds the value to the nearest multiple of 360, with one exception: a value between 1 and 540, inclusive, is rounded to 360.*
upsAdvConfigShutoffDelay [2]	Define the delay time, in seconds,used for graceful turn off, reboot and sleep control options (see HOW TO CONTROL A UPS). *Note: Only PowerNet Adapters can use this OID.*
upsAdvConfigSetEEPROMDefaults	Reset the UPS configuration values back to their factory preset values using **setEEPROMDefaults**. *Note: Only PowerNet Adapters can use this OID.*
{upsAdvConfigDipSwitchSetting} **dipSwitchIndex** **dipSwitchStatus**	Identify the dip switch settings on some older Smart-UPS models: **Open=On=1** or **Closed=Off=0**. *Note: A PowerNet 3.0 Adapter does not support using these OIDs.*
upsAdvConfigPassword	Define the 4-byte password used for front-panel access to a Matrix-UPS or Symmetra.
upsAdvConfigAllowedSetTable	Identify the settable OIDs for all **upsConfig** values.
upsAdvConfigBattExhaustThresh [2]	Define how many seconds of runtime will remain before a battery exhaustion condition exists. When this value is reached, the UPS turns off. *Note: Only PowerNet Adapters can use this OID.*

For all of the following notes, the **{upsConfigAllowedSetTable}** specifies the allowed values.

[1] If a **SET** provides an unsupported value, the UPS interprets the value as the next lowest allowed value. If the value is less than the lowest allowable value, the lowest allowed value is used.

[2] If a **SET** provides an unsupported value, the UPS interprets the value as the next highest allowed value. If the value is higher than the highest allowable value, the highest allowed value is used.

[3] If a **SET** provides an unsupported value, the UPS ignores the **SET**.

How to Test a UPS

You can use **SETs** (SNMP write commands) to PowerNet MIB **[upsConfig]** OIDs to cause a UPS to perform self-tests and runtime calibrations. You can use **GETs** (SNMP write commands) to some OIDs to view current values.

Adapters can use the following OIDs, with two exceptions: Only a smart-signalling PowerNet Agent can use the self-test and runtime calibration date OIDs. A basic-signalling PowerNet Agent cannot use any of the OIDs; a smart-signalling Agent can use all but two of the OIDs, as noted in the table.

You Use These OIDs	To
upsAdvTestDiagnosticSchedule	Define the self-test schedule for the UPS: - **unknown** (Adapter or Agent cannot determine the setting) - **biweekly** - **weekly** - **atTurnOn** (whenever the UPS turns on) - **never**
upsAdvTestDiagnostics	Cause the UPS to perform a self-test in response to a **SET** of **testDiagnostics** (a **GET** always returns a value of **noTestDiagnostics**).
upsAdvTestDiagnosticsResults	View the result of the last self-test: - **ok** - **failed** - **invalidTest** - **testInProgress**
upsAdvTestLastDiagnosticDate	View the date (in **dd/mm/yy** format) of the last UPS self-test. *Note: Only smart-signalling PowerNet Agents use this OID.*
upsAdvTestRuntimeCalibration	Control a runtime calibration: - **performCalibration** (Starts a runtime calibration, if the UPS battery is at 100% capacity. If not at 100%, a **SET** of this value results in an **invalidCalibration** setting for the **upsAdvTestCalibrationResults** OID.) - **cancelRuntimeCalibration** (Cancels a runtime calibration.) *Note: Only an Adapter can use this OID. A **GET** always returns a value of **noPerformCalibration**.*
upsAdvTestCalibrationResults	View the result of the last runtime calibration: - **ok** - **invalidCalibration** - **calibrationInProgress**
upsAdvTestCalibrationDate	View the date (in **dd/mm/yy** format) of the last runtime calibration. *Note: Only smart-signalling PowerNet Agents use this OID.*

Chapter 4:

How to Manage a Measure-UPS

This chapter describes how to use PowerNet MIB OIDs to manage (monitor, configure, control and test) a Measure-UPS I, or SmartSlot Measure-UPS II, through its PowerNet Adapter or PowerNet Agent.

Overview

The Measure-UPS I and SmartSlot Measure-UPS II are environmental-measuring accessories used with Smart-UPS, Matrix-UPS, and Symmetra *PowerArray* models. Both have built in temperature and humidity sensors, and support four contact-closure inputs that can monitor a wide variety of devices (such as smoke and fire sensors, or the open/closed condition of doors).

The PowerNet MIB OIDs you can use to manage a Measure-UPS fall into two categories under the heading of **[measureUps]**:

1) Select **[product]** under **[apc]**.
2) Then select **[hardware]**.
3) Then select **[measureUps]** to list the two OID categories.

OIDs in These Categories	Allow You To
[mUpsEnviron]	View information about the Measure-UPS environment's ambient temperature and relative humidity (see HOW TO MONITOR ENVIRONMENT (**[mUpsEnviron]**) OIDS).
[mUpsContact]	View and define Measure-UPS contact values (see HOW TO USE CONTACT (**[mUpsContact]**) OIDS).

How to Monitor Environment ([mUpsEnviron]) OIDs

A Measure-UPS can monitor an environment's ambient temperature and relative humidity. You can use two read-only **[mUpsEnviron]** OIDs to view those temperature and humidity values.

This OID	Reports
mUpsRelativeHumidity	The relative humidity sensed by the Measure-UPS.
mUpsAmbientTemperature	The ambient temperature, in Celcius, sensed by the Measure-UPS.

How to Use Contact ([mUpsContact]) OIDs

A Measure-UPS can have up to four contact sensors. Each sensor provides an open contact condition and a closed contact condition.

You can use the following **[mUpsContact]** OIDs to view the current contact sensor values, and to change some of those values.

You Use These OIDs	To
mUpsContactNumContacts	Find out how may contact sensors the Measure-UPS has.
{mUpsContactTable} **contactNumber** **normalState** **description** **monitoringStatus** **currentStatus**	Access the set of OIDs for each contact sensor and perform the following: - Identify the contact sensor to which the other OIDs apply. - Define the contact sensor's normal condition (**open** or **closed**). - Define a brief description of the contact sensor's purpose. - Define whether or not the Measure-UPS will monitor the contact sensor. - Identifiy the contact sensor's current condition (**open** or **closed**).

Chapter 5:

How to Manage a MasterSwitch

This chapter describes how to use PowerNet MIB OIDs to manage (monitor, configure, control and test) a MasterSwitch.

Overview

A MasterSwitch can connect directly to the network without using a PowerNet Adapter or Agent. The MasterSwitch has its own SNMP agent which allows you to use SNMP to manage the MasterSwitch or any of its eight relay-controlled outlets.

The PowerNet MIB OIDs you can use to manage a MasterSwitch fall into five categories under the heading of **[masterswitch]**:

1) Select **[product]** under **[apc]**.
2) Then select **[hardware]**.
3) Then select **[masterswitch]** to list the five OID categories.

OIDs in These Categories	Allow You To
[sPDUIdent]	Identify the MasterSwitch by its identification parameter values (see HOW TO USE THE IDENTIFICATION (**[sPDUIdent]**) OIDS).
[sPDUMasterControl]	Directly affect the current, overall operation of the MasterSwitch (see HOW TO USE THE MASTER CONTROL (**[sPDUMasterControl]**) OIDS).
[sPDUMasterConfig]	Modify parameters which affect the overall operation of the MasterSwitch (see HOW TO USE THE MASTER CONFIGURATION (**[sPDUMasterConfig]**) OIDS).
[sPDUOutletControl]	Directly affect the current operation of a MasterSwitch outlet (see HOW TO USE THE OUTLIET CONTROL (**[sPDUOutletControl]**) OIDS).
[sPDUOutletConfig]	Modify parameters which affect the operation of a MasterSwitch outlet (see HOW TO USE THE OUTLET CONFIGURATION (**[sPDUOutletConfig]**) OIDS).

How to Use the Identification ([sPDUIdent]) OIDs

The **[sPDUIdent]** category has five read-only OIDs which identify MasterSwitch identification parameter values.

This OID	Reports
sPDUIdentHardwareRev	The MasterSwitch hardware version
sPDUIdentFirmwareRev	The MasterSwitch firmware version
sPDUIdentDateOfManufacture	The date the MasterSwitch completed the manufacturing process
sPDUIdentModelNumber	The MasterSwitch model number
sPDUIdentSerialNumber	The MasterSwitch serial number

How to Use the Master Control ([sPDUMasterControl]) OIDs

The **[sPDUMasterControl]** category has three OIDs: Two OIDs respond to **GETs** with information about all eight outlets; the third OID uses **SETs** to directly affect the operation of all outlets at the same time.

You Use These OIDs	To
sPDUMasterControlSwitch	Affect the current operation of all outlets: - **turnAllOnNow** (turns on all outlets based on the master power's **sPDUMasterConfigPowerOn** configuration OID value) - **turnAllOnSequence** (turns on all outlets based on the master power's **sPDUMasterConfigPowerOn** configuration OID value, and on each outlet's **sPDUOutletPowerOnTime** configuration OID value) - **turnAllOffNow** (immediately turns off all outlets) - **rebootAllNow** (immediately reboots all outlets by turning power off and then turning power back on based on the master power's **sPDUMasterConfigReboot** configuration OID value) - **rebootAllSequence** (reboots all outlets by turning power off and then back on, using both the master power's **sPDUMasterConfigReboot** configuration OID value and the outlet's **sPDUOutletPowerOnTime** configuration OID value to determine when to turn on each outlet's power) - **noCommand** (the value returned for a **GET**)
sPDUMasterState	Identify the **on** or **off** status of the eight outlets.
sPDUMasterPending	Identify whether or not any outlet has a command pending (**yes** or **no**).

For information on the **[sPDUMasterConfigReboot]** and **[sPDUMasterConfigPowerOn]** OIDs, see HOW TO USE THE MASTER CONFIGURATION (**[sPDUMasterConfig]**) OIDS; for information on the **[sPDUMasterConfigReboot]** and **[sPDUOutletPowerOnTime]** OID, see HOW TO USE THE OUTLET CONFIGURATION (**[sPDUOutletConfig]**) OIDS.

How to Use the Master Configuration ([sPDUMasterConfig]) OIDs

The **[sPDUMasterConfig]** category has three OIDs which allow you to use **SETs** to define two overall operational values, and a name for the MasterSwitch.

You Use These OIDs	To Define
sPDUMasterConfigPowerOn	How long of a delay will occur between power being applied to the MasterSwitch and the MasterSwitch supplying power to the outlets: - **-1** (requires turning each outlet on individually) - **0** (no delay) - **15** (15-second delay) - **30** (30-second delay) - **45** (45-second delay) - **60** (1-minute delay) - **120** (2-minute delay) - **300** (5-minute delay) *Note: Each outlet's **sPDUOutletConfigPowerTimeOn** configuration OID can also affect the time it takes for power output from an outlet. See How to Use the Outlet Configuration (**[sPDUOutletConfig]**) OIDs.*
sPDUMasterConfigReboot	How long of a delay will occur between master power being turned off during a reboot sequence, and master power being turned back on: - **5** (5-second delay) - **10** (10-second delay) - **15** (15-second delay) - **20** (20-second delay) - **30** (30-second delay) - **45** (45-second delay) - **60** (1-minute delay) *Note: Each outlet's **sPDUOutletConfigPowerTimeOn** configuration OID can also affect the time it takes for power output from an outlet. See How to Use the Outlet Configuration (**[sPDUOutletConfig]**) OIDs.*
sPDUMasterConfigPDUName	Define an up to 20-character name for the MasterSwitch.

For information on the **[sPDUOutletPowerOnTime]** OID, see How to Use the Outlet Configuration (**[sPDUOutletConfig]**) OIDs.

How to Use the Outlet Control ([sPDUOutletControl]) OIDs

The **[sPDUOutletControl]** category has a read-only OID and a tabled set of OIDs.

You Use These OIDs	To
sPDUOutletConfigTableSize	Identify the number of MasterSwitch outlets (always **8**).
{sPDUOutletControlTable} **sPDUOutletConfigIndex** **sPDUOutletPending** **sPDUOutletName**	View and configure each outlet individually: - Identifies the outlet number. - Identifies whether or not the outlet has a command pending. - Affect the outlet's current operation: **outletOn** (turns on the outlet's power) **outletOff** (turns off the outlet's power) **outletReboot** (cycles the outlet's power off and then back on) **outletUnknown** (always returned for a **GET**) - Identifies the outlet's name, a name defined by **sPDUOutletName** (see How to Use Outlet Configuration (**[sPDUOutletConfig]**) OIDs).

How to Use the Outlet Configuration ([sPDUOutletConfig]) OIDs

The **[sPDUOutletConfig]** category has a read-only OID and a tabled set of OIDs.

You Use These OIDs	To
sPDUOutletConfigTableSize	Identify the number of MasterSwitch outlets (always **8**).
{sPDUOutletConfigTable} **sPDUOutletConfigIndex** **sPDUOutletPowerOnTime** **sPDUOutletName**	View and configure each outlet individually: - Identifies the outlet number. - Defines how long the outlet will wait to provide output power in response to the return of master power to the outlet: **-1** (requires using a **SET** of **outletOn** (see How to Use Outlet Control (**[sPDUOutletControl]**) OIDs) to turn the outlet on) **0** (no delay) **15** (15-second delay) **30** (30-second delay) **45** (45-second delay) **60** (1-minute delay) **120** (2-minute delay) **300** (5-minute delay) - Defines an up to 20-character name for the outlet.

Chapter 6:

How to Download New Code to A PowerNet Adapter

This chapter describes how to use PowerNet MIB OIDs to download new agent code to a PowerNet SNMP 3.0 Adapter.

Overview

When APC releases new agent code for the PowerNet 3.0 Adapter, you can use SNMP to download the new code. To access the PowerNet MIB OIDs you use to download new code, select **[apcmgmt]** under **[apc]**. Two categories will appear: **[mconfig]** and **[mcontrol]**.

The [mcontrol] OID

This category has only one OID: **mcontrolRestartAgent**. You use a **SET** of **LoadandExecuteNewAgent (3)** to this OID to download new code.

The [mconfig] OIDs

You use two **[mconfig]** OIDs to define the TFTP server and view the results of a download.

You Can Use These OIDs	To
mconfigTFTPServer	Define the TFTP server's IP address.
newCodeAuthentViaTFTP	View the results of the last TFTP download: - **unknown** - **validNewAgentCodeImage** (new, valid APC code was downloaded) - **sameAgentCodeImage** (the new code matches the previous code) - **invalidNewAgentCodeImage** (the TFTP server's code is not APC code) *Note: Only if this OID's value reads **validNewAgentCodeImage** will the Adapter begin using the new code.*

Chapter 7:

PowerNet MIB Traps

This chapter describes the PowerNet MIB traps a PowerNet Adapter, PowerNet Agent or MasterSwitch can send to an NMS to alert the NMS that a specific event has occurred. It also describes how to define which NMSs can receiver those traps (see How to Define Trap Receivers).

Overview

The PowerNet MIB 3.0 supports sending seventy-eight APC enterprise-specific traps (the PowerNet MIB 2.2 supported only 32 traps). Each trap has a severity level:

Severe	Warning	Informational
Used to alert a trap receiver of an event which requires immediate attention to correct.	Used to alert a trap receiver of an event which currently does not adversely affect a device's operation but which can affect operation if the situation deteriorates.	Used to alert a trap receiver of an event which does not adversely affect a device's operation.

However, even a PowerNet 3.0 Adapter cannot generate all seventy-eight traps: Some traps report MasterSwitch events, and a MasterSwitch has its own SNMP agent. Also, because a device can send a trap does not mean a Network Management Station (NMS) will receive the trap: By default, all Adapters, Agents, and MasterSwitches come without having any trap receivers defined. Until at least one of the four trap receiver definitions exists, traps, essentially, go nowhere (see How to Define Trap Receivers).

A PowerNet 3.0 Adapter Can Generate	A PowerNet 2.2 Adapter Can Generate	A PowerNet Agent Can Generate	MasterSwitch Can Generate
All UPS traps	Only UPS traps supported by the PowerNet MIB 2.2	Only UPS traps supported for use by an Agent by the PowerNet MIB 2.2	MasterSwitch traps only
All Measure-UPS traps	The two Measure-UPS traps supported by the PowerNet MIB 2.2	The two Measure-UPS traps supported by the PowerNet MIB 2.2	Traps related to restarting the internal SNMP agent.
Traps related to restarting the SNMP agent or to downloading new code	Traps related to restarting the SNMP agent or to downloading new code		

How to Define Trap Receivers

Each Adapter, Agent, and MasterSwitch can send traps to up to four trap receivers. You define an NMS as a trap receiver using that NMS's IP address. You can also define other values for each trap receiver. For example, the password (community string) that traps sent to a specific trap receiver must use.

To access the PowerNet MIB OIDs you can use to define a trap receiver:

1) Select **[apcmgmt]** under **[apc]**.
2) Then select **[mconfig]**.

You Use These OIDs	To
[mconfigNumTrapReceivers]	Identify the number of NMSs to send traps (always **4**).
{mconfigTrapReceiverTable} **trapIndex** **receiverAddress** **communityString** **severity** **acceptThisReceiver** **receiveTrapType**	Define each trap receiver: - Identifies the trap receiver's number. - Defines the trap receiver by the NMS's IP address (**0.0.0.0**, the default value, means that no NMS can receive traps) - Defines the password a trap must use. - Identifies the trap severity (**information**, **warning**, or **severe**). - Enables (**yes**) or disables (**no**) sending traps to the defined NMS. - Defines the trap type (**powernet**, **ietf**, or **both**). *Note: The **receiveTrapType** OID must use the **powernet** value when used with a PowerNet 3.0 Adapter. For a PowerNet 2.2 Adapter, the OID can use RFC1628 MIB traps (the **ietf** value). Therefore, a PowerNet 2.2 Adapter can use all three **receiveTrapType** OID values.*

PowerNet MIB Trap Definitions

A PowerNet 3.0 Adapter can generate all of the UPS, Measure-UPS, and Adapter traps, including traps related to downloading new agent code or restarting current agent code. A PowerNet 2.2 Adapter or a PowerNet Agent can only generate UPS and Measure-UPS traps supported by the PowerNet MIB 2.2 (traps 1 through 32). In addition, a PowerNet Agent can only generate the PowerNet MIB 2.2 traps for events an Agent can perform. For example, an Agent never generates a **upsSleeping** trap because an Agent cannot put a UPS to sleep.

A MasterSwitch can generate MasterSwitch traps and traps related to restarting the device's internal SNMP agent.

UPS Trap	Severity	Index Number - Description
communicationLost	Severe	1 - Adapter's SNMP Agent lost communication with the UPS.
upsOverload	Severe	2 - UPS sensed a load greater than the rated-load capacity.
upsDiagnosticsFailed	Severe	3 - UPS failed self-test.
upsDischarged	Severe	4 - A low-battery condition exists and sufficient runtime cannot be guaranteed should input power fail.
upsOnBattery	Warning	5 - UPS switched to battery power.
smartBoostOn	Warning	6 - UPS enabled SmartBoost.
lowBattery	Severe	7 - Batteries will soon be exhausted if power is not restored.
communicationEstablished	Informational	8 - Adapter's SNMP Agent established communication with the UPS.
powerRestored	Informational	9 - Utility power restored.
upsDiagnosticsPassed	Informational	10 - UPS passed self-test.
returnFromLowBattery	Informational	11 - UPS returned from a low battery condition.
upsTurnedOff	Warning	12 - UPS turned off by an NMS.
upsSleeping	Warning	13 - UPS entered sleep mode.
upsWokeUp	Informational	14 - UPS exited sleep mode.
upsRebootStarted	Warning	15 - UPS started a reboot sequence.
upsDipSwitchChanged	Warning	16 - DIP switch setting has changed; could alter UPS performance.
upsBatteryNeedsReplacement	Severe	17 - Battery needs replacement.
contactFault	Severe	18 - Measure-UPS contact '*x*' has changed from its normal position.
contactFaultResolved	Informational	19 - Measure-UPS contact '*x*' has returned to its normal position.
hardwareFailureBypass	Severe	20 - Matrix-UPS went on bypass due to a hardware failure.
softwareBypass	Warning	21 - Matrix-UPS put on bypass by software or by UPS front panel.
switchedBypass	Warning	22 - Matrix-UPS put on bypass by UPS rear-panel switch.
returnFromBypass	Informational	23 - Matrix-UPS returned from bypass mode.
bypassPowerSupplyFailure	Severe	24 - Matrix-UPS base module bypass power supply needs repair.
baseFanFailure	Severe	25 - Matrix-UPS base module fan needs repair.
batteryPackCommLost	Severe	26 - Communication with external battery packs lost (Matrix-UPS or Smart-UPS XL).
batteryPackCommEstablished	Informational	27 - Communication with external battery packs regained (Matrix-UPS or Smart-UPS XL).
calibrationStart	Informational	28 - Runtime calibration started.
restartAgent	Informational	29 - Adapter's SNMP agent restarting as commanded by the NMS
upsTurnedOn	Informational	30 - UPS turned on.
smartTrimOn	Warning	31 - UPS enabled SmartTrim.
codeAuthenticationDone	Informational	32 - Authentication of TFTP agent file code image is done.
upsOverloadCleared	Informational	33 - UPS overload condition has cleared.
smartBoostOff	Informational	34 - Smart-UPS returned from using SmartBoost.
smartAvrReducingOff	Informational	35 - Matrix-UPS returned from using Smart-AVR.
upsBatteryReplaced	Informational	36 - Bad battery replaced.
calibrationEnd	Informational	37 - Runtime calibration ended.
dischargeCleared	Informational	38 - UPS discharge condition ended.
gracefullShutdown	Informational	39 - Graceful shutdown started.

Trap (continued)	Severity	Index Number - Description
Not currently used.		**40 -** No value.
outletOn	**Informational**	**41 -** MasterSwitch outlet turned on (**sPDUOutletControlIndex** value defines which outlet, unless this value equals **0**, for all outlets turned on).
outletOff	**Informational**	**42 -** MasterSwitch outlet turned off (**sPDUOutletControlIndex** value defines which outlet, unless this value equals **0**, for all outlets turned off).
outletReboot	**Informational**	**43 -** MasterSwitch outlet rebooted (**sPDUOutletControlIndex** value defines which outlet, unless this value equals **0**, for all outlets rebooted).
configChange	**Warning**	**44 -** MasterSwitch SNMP configuration changed.
configChangeOutlet	**Warning**	**45 -** MasterSwitch outlet configuration changed (**sPDUOutletControlIndex** value defines which outlet, unless this value equals **0**, then master outlet configuration changed).
accessViolationConsole	**Warning**	**46 -** Three unsuccessful MasterSwitch console login attempts occurred.
accessViolationHTTP	**Warning**	**47 -** An unsuccessful MasterSwitch HTTP login attempt occurred.
passwordChange	**Warning**	**48 -** MasterSwitch console password has changed.
badVoltage	**Warning**	**49 -** UPS output voltage is not within the acceptable range.
badVoltageCleared	**Informational**	**50 -** UPS output voltage returned to within the acceptable range.
chargerFailure	**Warning**	**51 -** UPS battery charger has failed.
chargerFailureCleared	**Informational**	**52 -** UPS battery charger has returned to normal operation.
batteryOverTemperature	**Warning**	**53 -** UPS battery temperature violated the temperature threshold.
batteryOverTemperatureCleared	**Informational**	**54 -** UPS battery temperature violated the temperature threshold.
smartRelayFault	**Warning**	**55 -** Smart-UPS SmartBoost or SmartTrim relay failed.
smartRelayFaultCleared	**Informational**	**56 -** Smart-UPS SmartBoost or SmartTrim relay failure cleared.
humidityThresholdViolation1	**Warning**	**57 -** Measure-UPS probe1 humidity threshold violated.
humidityThresholdViolationCleared1	**Informational**	**58 -** Measure-UPS probe1 humidity threshold violation cleared.
TemperatureThresholdViolation1	**Warning**	**59 -** Measure-UPS probe1 temperature threshold violated.
TemperatureThresholdViolationCleared1	**Informational**	**60 -** Measure-UPS probe1 temperature threshold violation cleared.
humidityThresholdViolation2	**Warning**	**61 -** Measure-UPS probe2 humidity threshold violated.
humidityThresholdViolationCleared2	**Informational**	**62 -** Measure-UPS probe2 humidity threshold violation cleared.
TemperatureThresholdViolation2	**Warning**	**63 -** Measure-UPS probe2 temperature threshold violated.
TemperatureThresholdViolationCleared2	**Informational**	**64 -** Measure-UPS probe2 temperature threshold violation cleared.
mUpsCommunicationEstablished	**Informational**	**65 -** Measure-UPS communication established.
mUpsCommunicationLost	**Warning**	**66 -** Measure-UPS communication lost.
batteryIncrease	**Informational**	**67 -** Number of Symmetra battery packs increased.
batteryDecrease	**Informational**	**68 -** Number of Symmetra battery packs decreased.
powerModuleIncrease	**Informational**	**69 -** Number of Symmetra power modules increased.
powerModuleDecrease	**Informational**	**70 -** Number of Symmetra power modules decreased.
IntelligenceModuleInserted	**Informational**	**71 -** Intelligence module was inserted into a Symmetra.
IntelligenceModuleRemoved	**Informational**	**72 -** Intelligence module was removed from a Symmetra.
rintelligenceModuleInserted	**Informational**	**73 -** Redundant intelligence module was inserted into a Symmetra.
rintelligenceModuleRemoved	**Informational**	**74 -** Redundant intelligence module was removed from a Symmetra.
extBatteryFrameIncrease	**Informational**	**75 -** External battery frame was added to a Symmetra.
extBatteryFrameDecrease	**Informational**	**76 -** External battery frame was removed from a Symmetra.
abnormalCondition	**Severe**	**77 -** Symmetra has an abnormal condition.
abnormalConditionCleared	**Informational**	**78 -** Symmetra abnormal condition cleared.

The last two traps listed in the previous table have subtraps which define what Symmetra *Power Array* abnormal condition has occurred (for the **abnormalConditionCleared** trap), or what condition was cleared (for the **abnormalConditionCleared** trap).

Symmetra Subtrap	Description
SYMtrapstr1	An installed power module has failed.
SYMtrapstr2	A failed power module condition has been cleared.
SYMtrapstr3	Installed intelligence module has failed.
SYMtrapstr4	A failed intelligence module condition has been cleared.
SYMtrapstr5	Installed redundant intelligence module has failed.
SYMtrapstr6	A failed redundant intelligence module condition has been cleared.
SYMtrapstr7	Installed battery has failed.
SYMtrapstr8	A failed battery condition has been cleared.
SYMtrapstr9	Load is above alarm threshold.
SYMtrapstr10	Load above alarm threshold has been cleared.
SYMtrapstr11	Loss of redundancy.
SYMtrapstr12	Loss of redundancy condition cleared.
SYMtrapstr13	Redundancy below threshold.
SYMtrapstr14	Redundancy below threshold condition has been cleared.
SYMtrapstr15	Bypass not in range.
SYMtrapstr16	Bypass not in range condition has been cleared.
SYMtrapstr17	Bypass contactor stuck in bypass position.
SYMtrapstr18	Bypass contactor stuck in bypass position condition cleared.
SYMtrapstr19	Bypass contactor stuck in on-line position.
SYMtrapstr20	Bypass contactor stuck in on-line position condition cleared.
SYMtrapstr21	In bypass mode due to an internal fault.
SYMtrapstr22	In bypass mode due to an internal fault condition has been cleared.
SYMtrapstr23	In bypass mode due to an overload.
SYMtrapstr24	In bypass mode due to an overload condition has been cleared.
SYMtrapstr25	System is in maintenance bypass.
SYMtrapstr26	System in maintenance bypass condition has been cleared.
SYMtrapstr27	Input circuit breaker tripped open.
SYMtrapstr28	Input circuit breaker tripped open condition has been cleared.
SYMtrapstr29	System level fan failure.
SYMtrapstr30	System level fan failure condition cleared.
SYMtrapstr31	The redundant intelligence module is in control.
SYMtrapstr32	The redundant intelligence module is no longer in control.
SYMtrapstr33	I2C failure.
SYMtrapstr34	I2C failure condition has been cleared.
SYMtrapstr35	A battery is over temperature.
SYMtrapstr36	Battery over temperature has been cleared.
SYMtrapstr37	Load shutdown. AC input was lost while in bypass.
SYMtrapstr38	Load shutdown condition has been cleared.
SYMtrapstr39	Runtime below alarm threshold.
SYMtrapstr40	Runtime below alarm threshold condition has been cleared.

Symmetra Subtrap	Description
SYMtrapstr41	Bit 20 of the Abnormal Condition register is set.
SYMtrapstr42	Bit 20 of the Abnormal Condition register has been reset.
SYMtrapstr43	Bit 21 of the Abnormal Condition register is set.
SYMtrapstr44	Bit 21 of the Abnormal Condition register has been reset.
SYMtrapstr45	Bit 22 of the Abnormal Condition register is set.
SYMtrapstr46	Bit 22 of the Abnormal Condition register has been reset.
SYMtrapstr47	Bit 23 of the Abnormal Condition register is set.
SYMtrapstr48	Bit 23 of the Abnormal Condition register has been reset.
SYMtrapstr49	Bit 24 of the Abnormal Condition register is set.
SYMtrapstr50	Bit 24 of the Abnormal Condition register has been reset.
SYMtrapstr51	Bit 25 of the Abnormal Condition register is set.
SYMtrapstr52	Bit 25 of the Abnormal Condition register has been reset.
SYMtrapstr53	Bit 26 of the Abnormal Condition register is set.
SYMtrapstr54	Bit 26 of the Abnormal Condition register has been reset.
SYMtrapstr55	Bit 27 of the Abnormal Condition register is set.
SYMtrapstr56	Bit 27 of the Abnormal Condition register has been reset.
SYMtrapstr57	Bit 28 of the Abnormal Condition register is set.
SYMtrapstr58	Bit 28 of the Abnormal Condition register has been reset.
SYMtrapstr59	Bit 29 of the Abnormal Condition register is set.
SYMtrapstr60	Bit 29 of the Abnormal Condition register has been reset.
SYMtrapstr61	Bit 30 of the Abnormal Condition register is set.
SYMtrapstr62	Bit 30 of the Abnormal Condition register has been reset.
SYMtrapstr63	Bit 31 of the Abnormal Condition register is set.
SYMtrapstr64	Bit 31 of the Abnormal Condition register has been reset.