Milpower Source

UPS SNMPv3 Agent

User's Manual

For M359-1 Rev E and higher

Agent Firmware version: 2.02.16

Doc: M359_SNMP_UM

Rev (5)

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1. <u>Table of contents</u>

2. <u>Introduction</u>

2.1. <u>Scope</u>

This document describes the SMNPv3 Agent of the M359-1 UPS.
 (SNMPv3 is supported only by M359-1 units of Rev E or higher. For backward compatibility, SNMPv1/2 is supported too. For SMNPv1/2 Agent's description see Milpower Document: "EmbedUPS-Manual"

2.2. <u>General</u>

The UPS's SNMP Agent allows the monitoring and control of Milpower Source's UPS from a PC station on the LAN by using either SNMP V3, or SNMP V2 protocol.

2.3. <u>Main Features</u>

- An SNMP V2/V3 Agent.
- A standard RS232 port is used as a Console interface for various configuration options, as well as users' management.
- 10/100 Base Tx Network interface
- SNMP V3 notifications for Network Management Systems (NMS) for remote alarming and monitoring.
- SNMP V1 alarms.
- Supports MD5 authentication protocol.
- Supports DES security protocol.

2.4. <u>Architecture notes</u>

The SNMP Agent module runs on a separate chip, dedicated to Ethernet communication, and provides the SNMP protocol support. This architecture ensures that communication problems do not affect essential UPS functions.

3. SNMP Preview

The UPS's SNMP Agent allows a UPS to be managed by various SNMP tools, using the milpowerUPS SNMP MIB. The Agent responds to standard SNMP commands (get, get next and set) and sends SNMP notifications / traps to all configured targets. The Agent can be configured to work either in SNMP V3 mode (with a new mib set), or in legacy SNMP V1/2 mode (supporting the old UPS mib).

When working in V3 mode, the Agent supports a subset of the notification defined in the standard UPS mib (as per RFC1628). When working in V2 mode, the Agent supports the traps defined in the legacy mib.

4. Installation and Configuration Management

4.1. How to access the UPS's Management?

4.1.1. The default "as shipped" setting is SNMP V2 mode, with IP address of 192.168.0.19. (Compatible with older M359-1 Revisions). To use SNMPv3, change the Agent configuration to SNMPv3, using one of the methods below. You may use the default SNMPv3 User for accessing the Agent's MIB or define a new one.

4.1.2. The Agent can be reconfigured using a dedicated Windows console program from a PC using an RS232 interface (see "M359_Console_UM").

4.1.3. Alternately, the Agent can be reconfigured by a PC using the UPS's Command Line Interface (CLI) via RS232 interface. The only software required for the configuration is a VT100 terminal so the configuration can be done both from Windows and from Linux (see "M359_CLI_UM").

4.1.4. To restart the Agent using the VT100 interface, enter "reboot <admin password>" (where <admin password> is the admin user password). You will see on terminal: "reboot *****".   Press Enter and the Agent will reboot.

5. V3 Objects List

5.1. MIB II Data

The system base OID is "1.3.6.1.2.1.1", denoted "**system**" (part of RFC1213)

Name	Type	OID	Value - Description
sysDescr	string [R]	system.1	" MilPower Source UPS SNMP Agent2"
sysObjectID	OID [R]	system.2	"1.3.6.1.4.1.23892.1.359"
sysUpTime	TimeTicks [R]	system.3	Agent uptime in 0.01 seconds (do not confuse with the UPS uptime).
sysContact	string [RW]	system.4	
sysName	string [RW]	system.5	
sysLocation	string [RW]	system.6	

5.2. UPS Notifications

The notification objects definitions are in accordance with the UPS Standard MIB (part of RFC1628).

Name	Type	OID	Value - Description
upsAlarmsPresent	Integer [R]	1.3.6.1.2.1.33.1.6.1	Number of active alarms
upsAlarmTable	Integer [R]	1.3.6.1.2.1.33.1.6.2.1.(FF)	A table holding all active alarms

List of supported alarms:
- **upsAlarmBatteryBad** (upsAlarm.3.1)
- **upsAlarmLowBattery** (upsAlarm.3.3)
- **upsAlarmDepletedBattery** (upsAlarm.3.4)
- **upsAlarmTempBad** (upsAlarm.3.5)
- **upsAlarmInputBad** (upsAlarm.3.6)
- **upsAlarmChargerFailed** (upsAlarm.3.13)

List of notifications:
- **upsTrapAlarmEntryAdded** (1.3.6.1.2.1.33.2.3)
- **upsTrapAlarmEntryRemoved** (1.3.6.1.2.1.33.2.4)

5.3. Controller data

Defined in MILPOWER-UPS-CONTROLLER-MIB - "m359Controller.mib" file
(Milpower Private MIB)

The controller data base OID is "1.3.6.1.4.1.23892.11", denoted "**controller**"

Name	Type	OID	Value - Description
ctrlUpTime	TimeTicks [R]	controller.1	UPS controller uptime since last turn on.
ctrlResets	Integer [R]	controller.2	Number of times that controller was turned on.
ctrlActiveTime	Integer [R]	controller.3	Aggregated uptime since last maintenance action. Measured in hours.
ctrlBattlemodeActiveTime	Integer [R]	controller.4	Aggregated battlemode time since last maintenance action. Measured in hours.
lastShutdownReasonTable	Table	controller.5.(FF)	Table holding the reasons for the last controller reset. This table would be cleared 5 minutes after recovery.
lastShutdownReasonIndex	Integer [R]	controller.5.(FF).1	Entry index
lastShutdownReason	Integer [R]	controller.5.(FF).2	1 – overload 2 – overTemperature 3 – overVoltage 4 – dcOffset 5 – outputShortage 6 – sourceFailed 7 – upsFailure 8 – standby
ctrlFirmware	String [R]	controller.6	Controller Firmware description.

5.4. Notification Targets

Defined in MILPOWER-NOTIFICATION-MIB – "m359NotificationTargets.mib" file (Milpower Private MIB)

- Notification targets base is 1.3.6.1.4.1.23892.21, denoted "**upsNotificationsDest**"
- Notification targets base is upsNotificationsDest.1, denoted "**notificationDestinationsTable**"
- Notification commands base is upsNotificationsDest.2, denoted "**notificationDestinationsCommands**"

Targets Table

Name	Type	OID	Value - Description
notificationDestinations Table	Table	notificationDestinationsTable.(FF)	Table holding notification targets
notificationDestinations Index	Integer [R]	notificationDestinationsTable.1.(FF).1	Index
notificationDestinations Address	IpAddress [R]	notificationDestinationsTable.1.(FF).2	Target IP (allow multiple users for same IP)
notificationUserName	String [R]	notificationDestinationsTable.1.(FF).3	User public name (allow multiple IPs for same user)

Targets Commands

Name	Type	OID	Value - Description
notificationDestTemp Address	IpAddress [RW]	notificationDestinationsCommands.1	Target IP
notificationDestTempUser	String [RW]	notificationDestinationsCommands.2	User (public) name
notificationDestCommand	Integer [RW]	notificationDestinationsCommands.3	1 – add 2 – remove 3 – nop
notificationDestCommand	Integer [RW]	notificationDestinationsCommands.3	1 – success 2 – nonexistingUserName 3 – userIPEntryNotFound 4 – invalidTarget 5 – tableIsFull 6 – userIPEntryExists 7 – generalFailure
notificationDestTemp Target	string [RW]	notificationDestinationsCommands.5	Reserved for future use

- Management of Users is done through the "**notificationDestinationsCommands**" structure.
- To add/remove a pair of (user, ip) from table, set the following fields:
  - "**notificationDestTempAddress**" to the target address (IP)
  - "**notificationDestTempUser**" the managed user (public) name.
  - "**notificationDestCommand**" – set to either 'add', or 'remove'.
- Action result is indicated in the "**notificationDestLastCommandResult**" field.

5.5. Commands List

Defined in MILPOWER-UPS-MIB – "m359.mib" file (Milpower Private MIB)

Commands base is 1.3.6.1.4.1.23892.22.1, denoted "**upsCommand**"

Name	Type	OID	Value - Description
upsAudioCmd	Integer [RW]	upsCommand.2	0 – unknown 1 – disable 2 – enable
upsUnderVoltageProtection	Integer [RW]	upsCommand.3	0 – unknown 1 – enable 2 – disable
upsSetEmptyBattLevelCmd	Integer [RW]	upsCommand.4	0 – unknown 1 – default0 2 – setTo10 3 – setTo20 4 – setTo30 5 – setTo40 6 – setTo50 7 – setTo60 8 – setTo70
upsSetLowBattLevelCmd	Integer [RW]	upsCommand.5	0 – unknown 1 – default35 2 – setTo10 3 – setTo20 4 – setTo30 5 – setTo40 6 – setTo50 7 – setTo60 8 – setTo70 9 – setTo80 10 – setTo90

upsAudioCmd – Enables or disables the audible alarm. Any one of the following conditions will activate the alarm. The conditions are listed in descending order of priority.

> Over Temperature Warning / Shutdown
> Low Battery
> Input Power Loss (battery operation)

upsUnderVoltageProtection – Enables or disables the Undervoltage Protection Feature. When enabled, causes the UPS to disconnect the output and go into "Standby Mode" whenever an Undervoltage condition (Vout <= 103Vac) is detected for at least three seconds.

upsSetEmptyBattLevelCmd – Sets the "Empty Battery Level" (in percent of battery charge). When the "Empty Battery Level" is set to any value other than the default (0%) and the battery charge drops below this level, the battery will be disconnected in order to preserve some of its charge. If the UPS is fed from the battery at that time, this will cause a shutdown.
When the "Empty Battery Level" is set to the default value "**default0**" the actual battery disconnect will occur only when the battery monitor circuit senses that the battery is fully depleted and should be disconnected to avoid over-discharge.

> *Note 1:* "upsSetEmptyBattLevelCmd" should not be set higher than "upsSetLowBattLevelCmd".

> *Note 2:* Setting the SNMP protocol to V2 will reset the "upsSetEmptyBattLevelCmd" to "**default0**".

upsSetLowBattLevelCmd – Sets the "Low Battery Level" (in percent of battery charge).When the battery charge drops below this level, the "Low Bat" panel indicator turns on, the audible alarm sounds and the "**upsBatteryState**" sets to "**batteryLow**" value.

> *Note:* "upsSetLowBattLevelCmd" should not be set to a value lower than the value of "upsSetEmptyBattLevelCmd"

5.6. One-shots List

Defined in MILPOWER-UPS-MIB – "m359.mib" file (Milpower Private MIB)

Oneshot base is 1.3.6.1.4.1.23892.22.2, denoted "**upsOneshot**"

Name	Type	OID	Value - Description
upsBattlemode	Integer [RW]	upsOneshot.2	0 – nop 1 – disableBattlemode 2 – setTo10minutes
upsBattTestCmd	Integer [RW]	upsOneshot.3	0 – nop 1 – doBatteryTest
upsProtectionResetCmd	Integer [RW]	upsOneshot.4	0 – nop 1 – sendCommand
upsStandbyCmd	Integer [RW]	upsOneshot.5	0 – nop 1 – standby 2 – normal
upsImmediateShutdownCmd	Integer [RW]	upsOneshot.6	0 – nop 1 - shutdownNow 2 - shutdownCountAbort
upsDelayedShutdownCmd	Integer [RW]	upsOneshot.7	Set shutdown counter to future time. Unit is seconds. '-1' value is a 'nop' (relevant for reading only).
upsExtendedShutdownCmd	Integer [RW]	upsOneshot.8	Set shutdown counter to future time. Unit is seconds. '-1' value is a 'nop' (relevant for reading only).

upsBattlemode – Enables or disables Battle Mode. This command remains in effect for ten minutes from the last time it was issued (see upsBattlemodeLease field), and then it resets. While in Battle Mode, the following conditions will not cause the UPS to switch to the Standby Mode (and disconnect the output):
1. Over Temperature
2. Undervoltage Protection
3. Prolonged Overload
4. Empty Battery Condition. This means that if the Empty Bat Level is set to any value other than 0% (**default0**), the UPS will not shutdown if the battery charge drops below the set level, provided that the UPS operates on battery power and battle mode is active. However, the UPS will

shutdown unconditionally if the battery protection circuit detects an over-discharge condition.

upsBattTestCmd – Causes the UPS to initiate a single battery test sequence. Upon completion of the test, the UPS will set the **upsBattTestRslt** field according to the test result.

upsProtectionResetCmd – This command allows the UPS to recover from a shutdown caused by a fault condition (e.g. overload, overvoltage, output shorted, etc.). If issued following a shutdown due to a protection tripping, the UPS will attempt to reset the protection circuit and turn on the output.

upsStandbyCmd – This command will drive the UPS into Standby mode. In Standby mode the UPS output is disconnected, but communications and battery charging are still active.

upsImmediateShutdownCmd - Setting this command to "**shutdownNow**" value allows the host to shutdown the UPS (in case of input power loss) prior to complete depletion of the battery. The UPS responds to this command by disconnecting the UPS output and battery. If input power is not available, this will cause an immediate and total UPS shutdown. When input power recovers, the UPS will automatically turn on and provide output power. If input power is available when the Remote Shutdown command is received, the UPS will reconnect the output and battery after a minimum delay of five seconds and resume "Normal" operation (assuming other internal conditions do not prevent this.)   Setting this command to "**shutdownCountAbort**" value allows the host to abort the **upsDelayedShutdownCmd** (as long as the delay set by **upsDelayedShutdownCmd** hasn't expired)

upsDelayedShutdownCmd – This command is similar to **upsImmediateShutdownCmd** but the shutdown is executed after a delay specified by the command. This shutdown command will override any previous shutdown request. To abort the command; set the **upsImmediateShutdownCmd** to "**shutdownCountAbort**".

upsExtendedShutdownCmd – This command is similar to **upsImmediateShutdownCmd** but the shutdown is executed after a delay specified by the command. If when the command is received the UPS has a shutdown count already running, this command will either extend the grace period (if longer than the current count), or will do nothing (if the current shutdown count is longer). To abort the command set the **upsImmediate ShutdownCmd** to "**shutdownCountAbort**".

5.7. Monitor List

Defined in MILPOWER-UPS-MIB – "m359.mib" file (Milpower Private MIB)
Monitor base is 1.3.6.1.4.1.23892.22.3, denoted "**upsMonitor**"

Name	Type	OID	Value - Description
upsInput	Integer [R]	upsMonitor.1	0 – unknown 1 – ok 2 – fail
upsChargeLevel	Integer [R]	upsMonitor.2	0 – unknown 1 – below5 2 – between5and14 3 – between15and24 4 – between25and34 5 – between35and44 6 – between45and54 7 – between55and64 8 – between65and74 9 – between75and84 10 – between85and94 11 – over94
upsLoadLevel	Integer [R]	upsMonitor.3	0 – unknown 1 – below5 2 – between5and14 3 – between15and24 4 – between25and34 5 – between35and44 6 – between45and54 7 – between55and64 8 – between65and74 9 – between75and84 10 – between85and94 11 – between95and104 12 – between105and114 13 – between115and124 14 – between125and134 15 – over134
upsOutputStatus	Integer [R]	upsMonitor.4	0 – unknown 1 – normal 2 – onBattery 3 – Out Fail 4 – other

Monitor List (continued)

Name	Type	OID	Value - Description
upsBatteryState	Integer [R]	upsMonitor.5	0 – unknown 1 – batteryNormal 2 – batteryLow 3 – batteryDepleted
upsAmbTemperature	Integer [R]	upsMonitor.6	[-20, 150] Celsius -40 is unknown
upsBattTestRslt	Integer [R]	upsMonitor.7	0 – unknown 1 – testNotMade 2 – passed 3 – failed 4 – Denied – Charge Too Low 5 – Denied – Battery In Use 6 – Denied – Load Too Low 7 – Test Not Completed 8 – generalFailure
upsShutdownDelay	TimeTicks [R]	upsMonitor.8	Time left before shutdown A 0 value means that UPS is not counting down (or status unknown)
upsBattlemodeLease	TimeTicks [R]	upsMonitor.9	Time left before exiting battlemode. A 0 value means that UPS is not in battlemode (or status unknown)
upsStandbyStatus	Integer [R]	upsMonitor.10	0 – unknown 1 – standby 2 – normal

6. Revisions History

6.1. Rev(4) to Rev(5)

6.1.1. Changed "**upsShutdownDelay**", and "**upsBattlemodeLease**" type in Monitor List Table from 'Integer' to 'TimeTicks'. This is a typo fix, there were no actual change in the mib.

6.1.2. A detailed description of "**upsCommand**" and "**upsOneshot**" members added.

6.1.3. Added an Extended Shutdown Command - OID 1.3.6.1.4.1.23892.22.2.8. This field is denoted "**upsExtendedShutdownCmd**".

6.2. Rev(3) to Rev(4)

6.2.1. Changed ' sysContact', 'sysName', and 'sysLocation' type in 'system' (OID 1.3.6.1.2.1.1) from 'Read' (R) to 'Read Write' (RW).

6.2.2. Added a 'nop' value to 'upsDelayedShutdownCmd', and updated documentations.

6.2.3. Changed 'lastResetReason' to 'lastShutdownReason'. OID remained 1.3.6.1.4.1.23892.11.5

6.2.4. Added a Firmware version – OID 1.3.6.1.4.1.23892.6. This field is denoted 'ctrlFirmware'.

6.2.5. Added an Agent VT100 reboot command. See Chapter 3 (a.3) for more information.

6.2.6. Improved upgrade procedure robustness. Agent is susceptible to power failures during upgrade only for several milliseconds, instead of the during whole procedure.

6.2.7. Improved serial interface to be more robust (can now handle communication errors), as well as more flexible for future extensions.

6.2.8. Set system description to a fixed value for backward compatibility (with MPS UPS Monitor Server).