

UPS Monitor

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General Information

Summary

The UPS monitor feature works with APC UPS units that support "smart" signaling over serial RS232 or USB connection. This feature enables the network administrator to monitor the UPS and set the router to 'gracefully' handle any power outage with no corruption or damage to the router. The basic purpose of this feature is to ensure that the router will come back online after an extended power failure. To do this, the router will monitor the UPS and set itself to hibernate mode when the utility power is down and the UPS battery is has less than 10% of its battery power left. The router will then continue to monitor the UPS (while in hibernate mode) and then restart itself after when the utility power returns. If the UPS battery is drained and the router loses all power, the router will power back to full operation when the 'utility' power returns.

The UPS monitor feature on the MikroTik RouterOS supports

- hibernate and safe reboot on power and battery failure
- UPS battery test and run time calibration test
- monitoring of all "smart" mode status information supported by UPS
- logging of power changes

Specifications

Packages required: *ups*
License required: *level1*
Home menu level: */system ups*
Standards and Technologies: [APC's smart protocol](#)
Hardware usage: *Not significant*

Description

Cabling

The serial APC UPS (BackUPS Pro or SmartUPS) requires a special serial cable (unless connected with USB). If no cable came with the UPS, a cable may be ordered from APC or one can be made "in-house". Use the following diagram:

Router Side (DB9f)	Signal	Direction	UPS Side (DB9m)
2	Receive	IN	2
3	Send	OUT	1
5	Ground		4
7	CTS	IN	6

Note that you may also connect with USB if available.

UPS Monitor Setup

Home menu level: */system ups*

Property Description

alarm-setting (*delayed* | *immediate* | *low-battery* | *none*; default: **immediate**) - UPS sound alarm setting:

- **delayed** - alarm is delayed to the on-battery event
- **immediate** - alarm immediately after the on-battery event
- **low-battery** - alarm only when the battery is low
- **none** - do not alarm

load (*read-only: percentage*) - the UPS's output load as a percentage of full rated load in Watts. The typical accuracy of this measurement is $\pm 3\%$ of the maximum of 105%

manufacture-date (*read-only: text*) - the UPS's date of manufacture in the format "mm/dd/yy" (month, day, year)

min-runtime (*time*; default: **5m**) - minimal run time remaining. After a 'utility' failure, the router will monitor the runtime-left value. When the value reaches the min-runtime value, the router will go to hibernate mode

- **0** - the router will go to hibernate mode when the "battery low" signal is sent indicating that the battery power is below 10%

model (*read-only: text*) - less than 32 ASCII character string consisting of the UPS model name (the words on the front of the UPS itself)

nominal-battery-voltage (*read-only: integer*) - the UPS's nominal battery voltage rating (this is not the UPS's actual battery voltage)

offline-after (*read-only: time*) - when will the router go offline

offline-time (*time*; default: **5m**) - how long to work on batteries. The router waits that amount of time and then goes into hibernate mode until the UPS reports that the 'utility' power is back

- **0** - the router will go into hibernate mode according the min-runtime setting and 10% of battery power event. In this case, the router will wait until the UPS reports that the battery power is below 10%

port (*name*) - communication port of the router

serial (*read-only: text*) - a string of at least 8 characters directly representing the UPS's serial number as set at the factory. Newer SmartUPS models have 12-character serial numbers

version (*read-only: text*) - UPS version, consists of three fields: SKU number, firmware revision, country code. The county code may be one of the following:

- **I** - 220/230/240 Vac
- **D** - 115/120 Vac
- **A** - 100 Vac
- **M** - 208 Vac
- **J** - 200 Vac

Notes

In order to enable UPS monitor, the serial port should be available.

Example

To enable the UPS monitor for port **serial1**:

```
[admin@MikroTik] system ups> add port=serial1 disabled=no
[admin@MikroTik] system ups> print
Flags: X - disabled, I - invalid
 0  name="ups" port=serial1 offline-time=5m min-runtime=5m
    alarm-setting=immediate model="SMART-UPS 1000" version="60.11.I"
    serial="QS0030311640" manufacture-date="07/18/00"
    nominal-battery-voltage=24V
[admin@MikroTik] system ups>
```

Runtime Calibration

Command name: `/system ups rtc`

Description

The **rtc** command causes the UPS to start a run time calibration until less than 25% of full battery capacity is reached. This command calibrates the returned run time value.

Notes

The test begins only if the battery capacity is 100%.

Example

```
[admin@MikroTik] system ups> rtc 0
```

UPS Monitoring

Command name: */system ups monitor*

Property Description

battery-charge (*percentage*) - the UPS's remaining battery capacity as a percent of the fully charged condition

battery-voltage - the UPS's present battery voltage. The typical accuracy of this measurement is $\pm 5\%$ of the maximum value (depending on the UPS's nominal battery voltage)

frequency (*percentage*) - when operating on-line, the UPS's internal operating frequency is synchronized to the line within variations within 3 Hz of the nominal 50 or 60 Hz. The typical accuracy of this measurement is $\pm 1\%$ of the full scale value of 63 Hz

line-voltage - the in-line utility power voltage

load (*percentage*) - the UPS's output load as a percentage of full rated load in Watts. The typical accuracy of this measurement is $\pm 3\%$ of the maximum of 105%

low-battery - only shown when the UPS reports this status

on-battery (*yes | no*) - Whether UPS battery is supplying power

on-line (*yes | no*) - whether power is being provided by the external utility (power company)

output-voltage - the UPS's output voltage

overloaded-output - only shown when the UPS reports this status

replace-battery - only shown when the UPS reports this status

runtime-calibration-running - only shown when the UPS reports this status

runtime-left (*time*) - the UPS's estimated remaining run time in minutes. You can query the UPS when it is operating in the on-line, bypass, or on-battery modes of operation. The UPS's remaining run time reply is based on available battery capacity and output load

smart-boost-mode - only shown when the UPS reports this status

smart-ssdd-mode - only shown when the UPS reports this status

transfer-cause (*text*) - the reason for the most recent transfer to on-battery operation (only shown when the unit is on-battery)

Example

When running on utility power:

```
[admin@MikroTik] system ups> monitor 0
  on-line: yes
  on-battery: no
  RTC-running: no
  runtime-left: 20m
  battery-charge: 100%
  battery-voltage: 27V
  line-voltage: 226V
```

```
output-voltage: 226V
  load: 45%
  temperature: 39C
  frequency: 50Hz
replace-battery: no
  smart-boost: no
  smart-trim: no
  overload: no
  low-battery: no
```

```
[admin@MikroTik] system ups>
```

When running on battery:

```
[admin@MikroTik] system ups> monitor 0
  on-line: no
  on-battery: yes
  transfer-cause: "Line voltage notch or spike"
  RTC-running: no
  runtime-left: 19m
  offline-after: 4m46s
  battery-charge: 94%
  battery-voltage: 24V
  line-voltage: 0V
  output-voltage: 228V
    load: 42%
  temperature: 39C
  frequency: 50Hz
replace-battery: no
  smart-boost: no
  smart-trim: no
  overload: no
  low-battery: no
```

```
[admin@MikroTik] system ups>
```