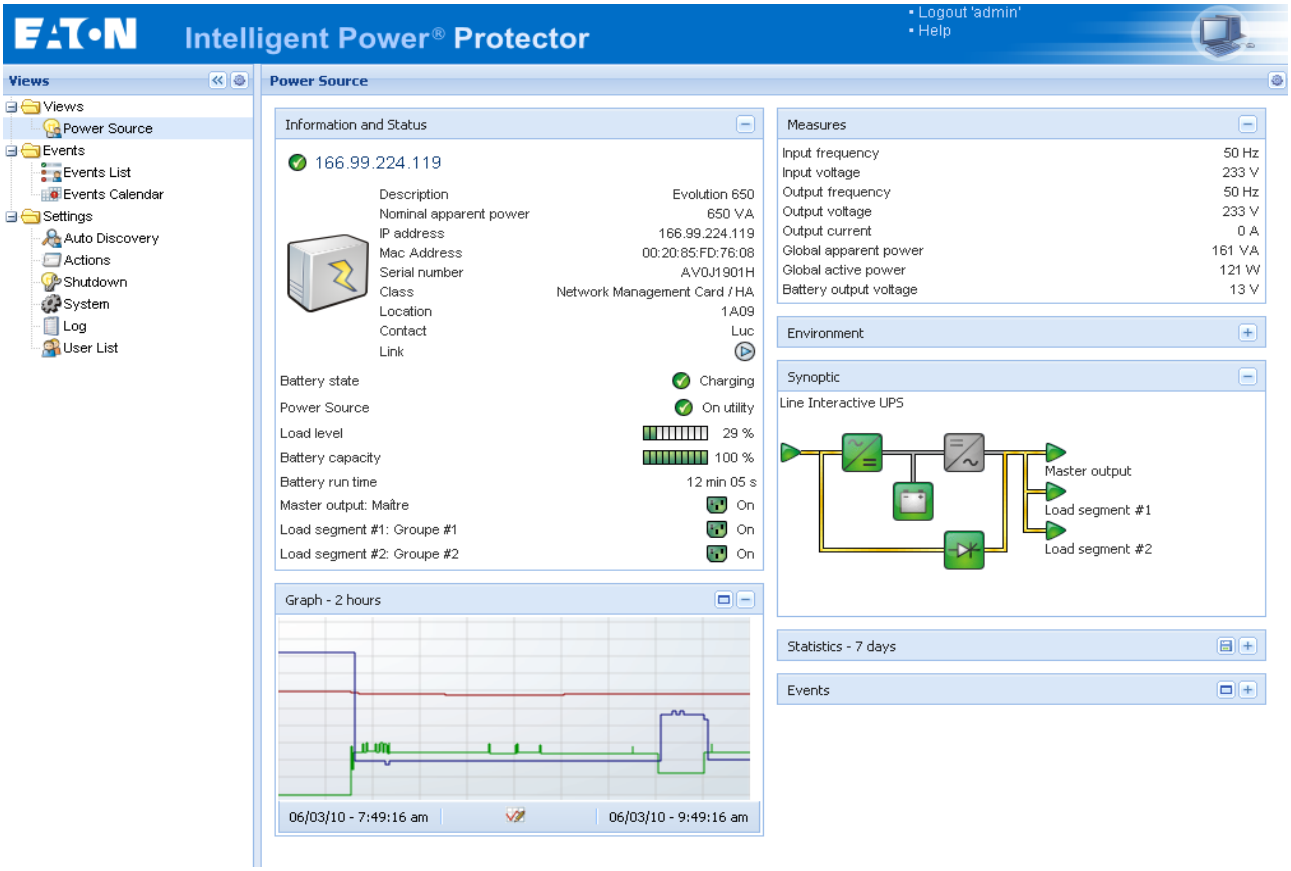
Powering Business Worldwide

Eaton Intelligent Power® Protector

User's Guide



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1 Introduction

The new Eaton graceful shutdown application is called "Intelligent Power® Protector"

Intelligent Power® Protector:

- Provides **local computer graceful shutdown**
  - acquisition through Eaton UPSs USB or RS232 communication ports (Pulsar & Powerware series)
  - acquisition through Web/SNMP Cards (Network Management Card NMC Network-MS (ex 66102 / 103006826) and Modbus-MS (ex 66103), Connect UPS XSlot, PXGX 2000 P/N 103005868-5591, PXGX-UPS … (*))

  (*) Please refer to the "Compatibility list" Chapter for a comprehensive list of the supported cards

- **Can be supervised** by Intelligent Power® Manager.
- **Can be managed** by Intelligent Power® Manager (mass configuration / mass update/ …)

2 Installation

2.1 Installation Prerequisites

2.1.1 On the System Hosting « Intelligent Power® Protector »

2.1.1.1 Supported Operating Systems:

Intelligent Power® Protector can be installed on following systems:

- **Windows (x86_64)** **8 / 2012 / 7 / 2008 /2008 R2 / Vista / 2003 / XP**
- **Windows (x86)** **8 / 2012 / 7 / 2008 / Vista / 2003 / XP / 2000**

- **Linux (x86/x86_64)**
  Debian GNU Linux: **5, 6**
  SUSE/Novell: **SLES 11, OpenSUSE 11.2, 11.4**
  RedHat Enterprise Linux: **RHEL 5.4, 5.5, 6 , Fedora core 14, 15**
  Ubuntu: **10.04 LTS, 10.10, 11.04**

- **Unix**
  HP-UX (PA-RISC) **11.31**
  IBM AIX (Power) **6.1**
  IBM AIX (Power) **7.1**
  Oracle (Sun) Solaris (x86) **11**
  Oracle (Sun) Solaris (Sparc) **10**

Virtual Environments:

- **VMware:** **ESX 5.1, 5.0, 4.0, 4.10, ESXi 4.0& 4.1 (pay version only) ESXi 5.1, 5.0 (pay version only)**
- **Hyper-V:** **Hyper-V and Hyper V Server R1, R2**
- **XEN** **Citrix XenServer 5.6, 6.0 Open Source Xen 2.6 on RHEL 5, Open Source Xen 3.2 on Debian 5.0**
- **KVM** **KVM 0.12.1.2 on RHEL 6 and Debian 5**

For the installation in these specific "Virtual Environments", please refer to the user manual appendix that describes the specific steps for those environments.

The Linux package is based on standard Linux mechanisms and therefore can be installed and used with other Linux distributions. Feedbacks / test or bug reports are welcome at EATON Support email address: (contacttechnical at eaton.com).

The following list is not exhaustive. Intelligent Power Protector **should be** compatible with:

- **Linux (x86/x86_64)**
  SUSE/Novell: **SLES 10, OpenSUSE 10.3**
  RedHat Enterprise Linux: **Fedora core 13**
  Ubuntu: **8.04 LTS**
  Mandriva: **2010, 2011**
  CentOS: **5.4, 5.5, 6**

- **Unix**
  HP-UX (PA-RISC) **11.11, 11.21**
  IBM AIX (Power) **5.3**

2.1.1.2 Software compatibility limitations:

To avoid network or serial port access conflicts, you can not install the Intelligent Power Protector on a machine that also hosts:

- the Eaton Intelligent Power Manager (or Eaton Enterprise Power Manager)
- the Eaton Network Shutdown Module
- the Network Management Proxy
- Personal Solution Pac
- LanSafe and LanSafe Web View
- Netwatch
- NUT (Network UPS Tools)

2.1.1.3 Standby configuration (Windows):

In Configuration Panel -> Power Option properties:

- You must unselect the Standby configuration of your Operating System to be compliant with the Intelligent Power Protector. With the standby configuration checked your system is not protected.
- If you want to save energy, please prefer the hibernate feature.

2.1.1.4 Driver installation

IPP installs all the necessary drivers (for USB communication). If Windows Operating System wants to install a driver from “Windows Update”, you can cancel this process.

2.1.2 On the System that Displays Web-based Graphical User Interface

The Eaton Intelligent Power® Protector graphical interface can be accessed remotely using a simple Web browser. Access to this interface can be secured through SSL connection and is also secured through Login & password.

The Intelligent Power® Protector graphical interface has been tested with:

- Google Chrome (tested with 14)
- Mozilla Firefox (tested with 5 and 6)
- Iceweasel
- Microsoft Internet Explorer (*) 7, 8, 9, 10
- Opera 10

For optimal performance, Google Chrome or Firefox 6 is recommended.
For good performance Internet Explorer 9 or any later version are recommended.
(*) IE6 should work, however, performance is limited

Note: IPP for Unix does not require the use of a web browser.

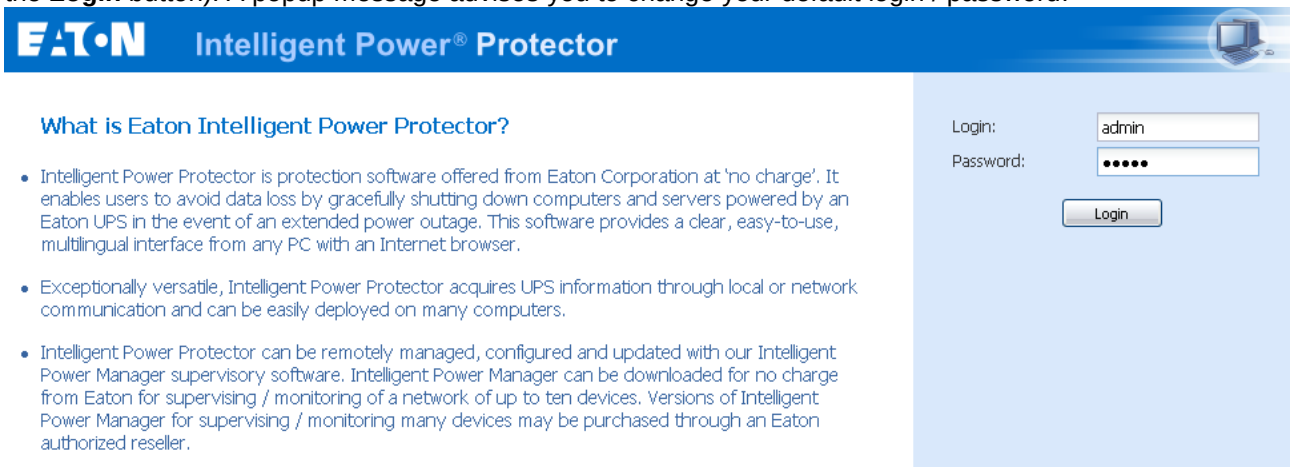
2.2 Quick Start & Installation

To start in 5 minutes, please perform the following steps:

Step 1 (Installation)

On a Windows 2000/XP/2003/Vista/2008/7/8, Linux, machine, run the "Intelligent Power® Protector" package under an administrator account.

A Web browser is automatically displayed (enter **admin** as Login **/ admin** as Password and click on the **Login** button). A popup message advises you to change your default login / password.



Step 2 (Configuration)

When started, the application automatically performs a **Quick scan**.

- *Using the Quick scan operation, you will discover:*

  =>Serial line connected UPSs (RS232 or USB)
  The discovered UPS connected through (RS232 or USB) is automatically assigned as the Power source (the Status icon is Green)

  => Networked UPSs *through broadcast within a few seconds*
  Quick Scan is compatible with following Web/SNMP Cards (Network-MS (ex 66102 / 103006826) and Modbus-MS (ex 66103), Connect UPS XSlot, PXGX 2000 P/N 103005868-

5591, PXGX-UPS Card)

The discovered UPS connected through (Network) are not automatically assigned as the Power source (You have to select the node and click on the button **Set as Power Source** the icon becomes Green)

The discovered nodes are displayed in **Settings → Auto Discovery**

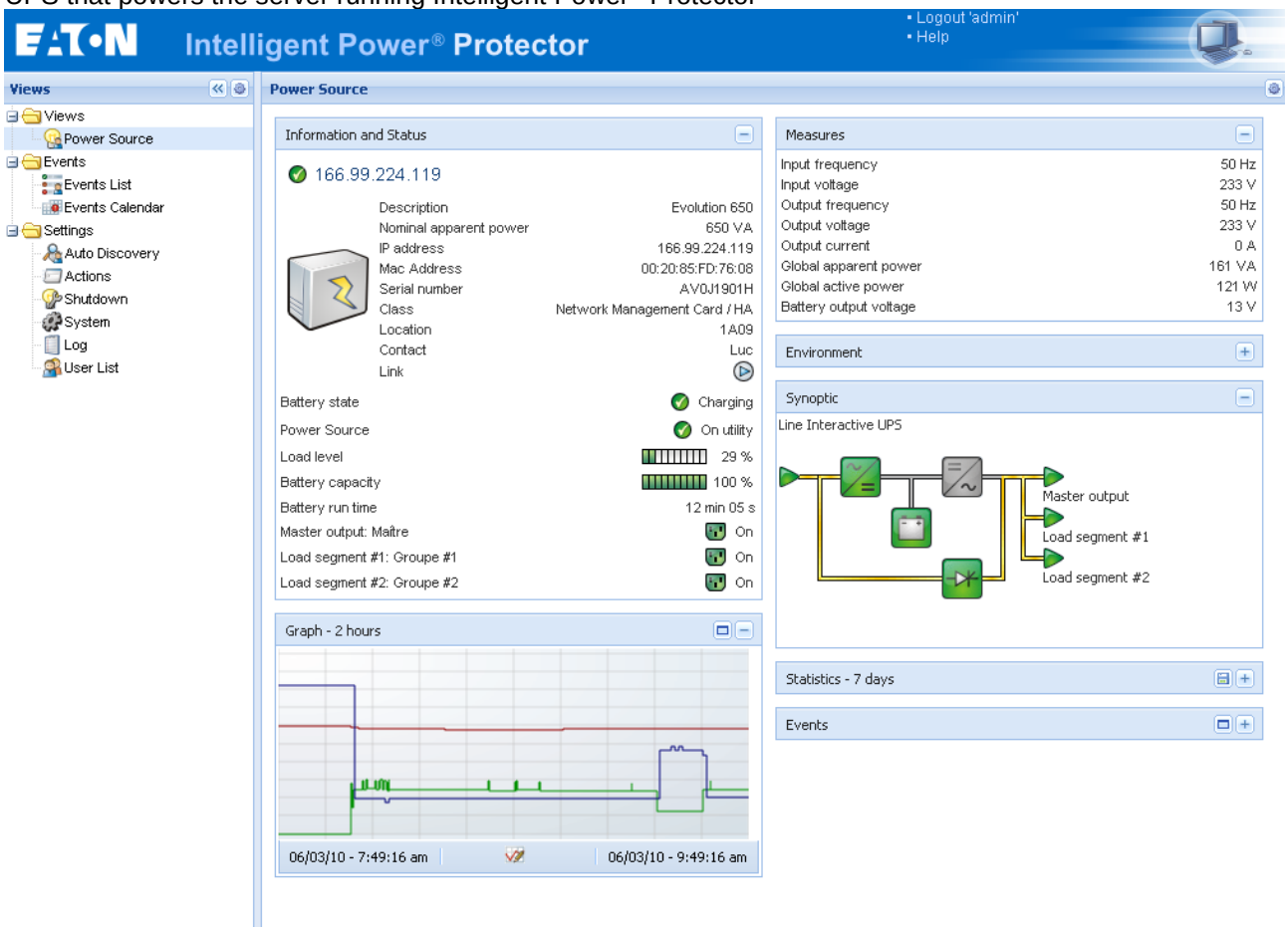
For the other nodes, please perform the discovery based on IP address ranges (**Range scan**)

- *Using the Range Scan operation you will discover the nodes that are outside of the Network segment*

In the **Settings → Shutdown** page, assign the IP address of the UPS that powers the local Computer.
In the **Settings → User List** page, assign the access rights through "login and password"

Step 3 (Operation)

The **Views → Power Source** menu item (optional) allows you to supervise the current state of the UPS that powers the server running Intelligent Power® Protector



The **Events → Event List** view allows you to view the device events.

2.3 Windows Installation

2.3.1 Graphical installation

Run the “Intelligent Power® Protector” package under an administrator account.

A Web browser is automatically displayed (enter **admin** as Login **/ admin** as Password and click on the **Login** button).
Note:
If the browser does not open as planned, it should be started manually and pointed to http://127.0.0.1:4679

2.3.2 Installation / Uninstallation from command line

It is possible to install or uninstall the product from a command line in order to deploy the software massively and/or without graphical interface.
This method also provides the ability to configure protection settings from the command line.

Detail of available command options can obtained using command:
`<packageName> -help`

`<packageName> [COMMAND] [OPTION]...`

Available commands:

`-install`	Launches the installation/upgrade process (default).
`-uninstall`	Launches the uninstallation process.

Available options:

`-debug`	Displays debugging information on the console.
`-silent`	Install the application silently.

Installation folder can be provided with:
`-dir <installPath>`

Example:
`<packageName> -install -silent -dir "C:\Program Files\MyFolder"`

will install IPP silently in `C:\Program Files\MyFolder`

Once the installation is completed, open a Web browser with the following URL `http://<host>:4679/` `<host>` is the host name or IP address of the machine hosting IPP.

Installation Result

- If you install a new Intelligent Power® Protector release without uninstalling the old one you will keep your product settings.

- At the end of the installation, the following shortcuts are created in the group:
  Start → Programs → Eaton → Intelligent Power Protector

Name	Description
Open Eaton Intelligent Power Protector	Opens the "Intelligent Power® Protector " web page from default browser
Start Eaton Intelligent Power Protector	Starts the service
Stop Eaton Intelligent Power Protector	Stops the service
Uninstall Eaton Intelligent Power Protector	Uninstalls the Program

- A service called « Eaton Intelligent Power Protector» is also created for the Database Acquisition Engine.
  This service automatically starts on machine boot-up.
  This service provides the Web Interface.

- An alarm notification box, accessible from the System Tray icon displays the alarms on the local computer.

2.3.3 Uninstalling the Product

- From the **Add/Remove** programs item of the control panel, execute the "Eaton Intelligent Power Protector Vx.xx" package.
- You can also uninstall from the shortcuts:
  Start → Programs → Eaton → Intelligent Power Protector → Uninstall Eaton Intelligent Power Protector.
  This will remove the product and the custom files if you confirm it.

2.4 Linux Installation

Introduction
IPP for Linux is available both in native package form (.deb or .rpm) and as a generic installer for Command Line Interface (CLI).

2.4.1 Native installation on a RedHat, SuSe, Mandriva or derivative system:

1) Graphical installation
To install graphically, double click on the “Intelligent Power® Protector” .rpm package,
The system will prompt for the root password, and then launch a graphical front-end, like RedHat's Package Installer below:

2) Command line installation

To install from a command line, use the following command (as root):

```
$ rpm -i ipp-linux_X.Y.Z.rpm
```

For example:

```
$ rpm -ivh ipp-linux-1.10.032-1.i386.rpm
Preparing...                ########################################### [100%]
   1:ipp-linux              ########################################### [100%]
```

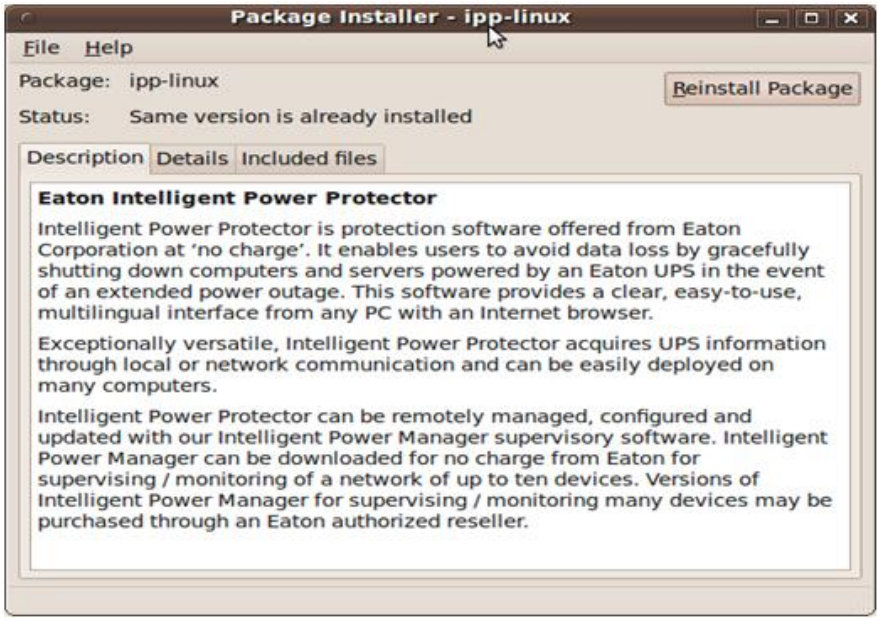
Once the installation is completed, open a Web browser with the following URL http://<@IP>:4679/
<@IP> is the IP address of the machine hosting IPP

2.4.2 Native installation on a Debian or derivative system:

1) Graphical installation

Pre-requisite: On Debian 5 (Lenny), there is no default graphical installer present.
So you should either use the command line installation described below, or install the package "gdeb" and "gdebi" and restart your graphical session to be able to complete the present procedure.
Note: This is a known Debian bug, which is registered in the Debian Bug Tracking System:
http://bugs.debian.org/585183

To install graphically, double click on the “Intelligent Power® Protector” .deb package.
The system will prompt for the root password, and then launch a graphical front-end, like Gdebi below:



Click on the « Install Package » button. Once the installation is completed, open the menu « Application → Eaton → Intelligent Power Manager → Open » (in Gnome) and follow the « Configuration » chapter.

2) Command line installation

To install from a command line, use the following command (as root):

```
$ dpkg -i ipp-linux_X.Y.Z.deb
```

For example:

```
$ dpkg -i ipp-linux_1.10.032-1_i386.deb
(Reading database ... 352242 files and directories currently installed.)
Preparing to replace ipp-linux 1.10.032 (using .../ipp-linux_1.10.032-
1_i386.deb)...
Unpacking replacement ipp-linux ...
Setting up ipp-linux (1.10.032)...
```

Once the installation is completed, open a Web browser open a Web browser with the following URL
http://<@IP>:4679/
<@IP> is the IP address of the machine hosting IPP

2.4.3 Generic installation on Linux

If your system doesn't derive from RedHat (using .rpm) or Debian (using .deb); you can install **IPP** using the generic package.

Note: this method is only supported from the command line.

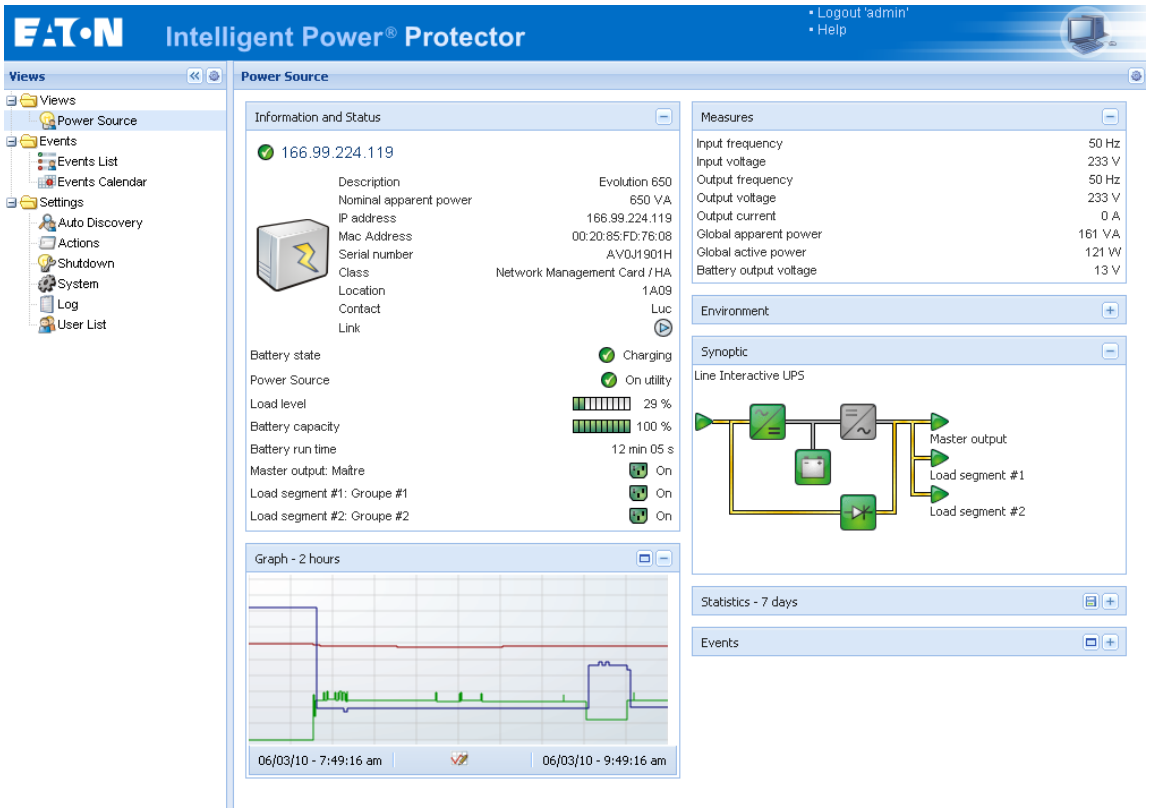
To install from a command line in interactive mode, use the following command from where the generic installer is located (as root):

```
$ ipp-linux-1_10_035-i386.run -install
```

For silent installation, add the `-silent` parameter as shown below (as root):

```
$ ipp-linux-1_10_035-i386.run -install -silent
```

Once the installation is completed, open a Web browser open a Web browser with the following url http://<@IP>:4679/
<@IP> is the IP address of the machine hosting IPP



2.4.4 Uninstalling the Product

As for the product installation, if you have chosen the native packages, you can use your favorite packages management application to remove the « ipp-linux » package.

You can also do the same from the command line.
For example, on RedHat and derivatives, use:

```
$ rpm -e ipp-linux
```

On Debian and derivatives, use:

```
$ dpkg -r ipp-linux
```

Note: After uninstalling the native .deb or .rpm packages, some user's configuration and data are not removed, due to technical constraints.
If you want to fully remove these, use (as root):

```
$ rm -rf /usr/local/Eaton/IntelligentPowerProtector
```

If you have chosen the generic installer, use the following command for interactive uninstall (as root):

```
$ /installation/path/mc2 -uninstall
```

For silent uninstall add the `-silent` parameter as shown below (as root):

```
$ /installation/path/mc2 -uninstall -silent
```

2.5 Unix Installation

Introduction
IPP for Unix is available as a tar archive, that includes native package (.depot, .local or .rpm) and a script to guide you through the installation and configuration process.

2.5.1 Installation on HP-UX, Solaris and IBM AIX

On a supported Unix machine (HP-UX, Solaris, Aix), install the “Intelligent Power® Protector - Unix” package from a terminal, under the root account, by following the steps below.

Note: This procedure assumes an installation on Solaris Sparc. Please adapt the tar archive file name according to your situation.

- Uncompress the tar archive

  gunzip ipp-solaris-1.40-4.sparc.tar.gz
  tar xvf ipp-solaris-1.40-4.sparc.tar

- Switch to the package directory

  cd ipp-solaris-1.40-4.sparc

- Execute the installer

  ./install.sh

A Welcome text screen will be displayed, to assist you in configuring Intelligent Power Protector for Unix.

2.5.2 Uninstalling the Product

You can uninstall IPP – Unix by using the following command line, as root.

```
$ /usr/local/ups/bin/uninstall-ipp
```

3 Configuration

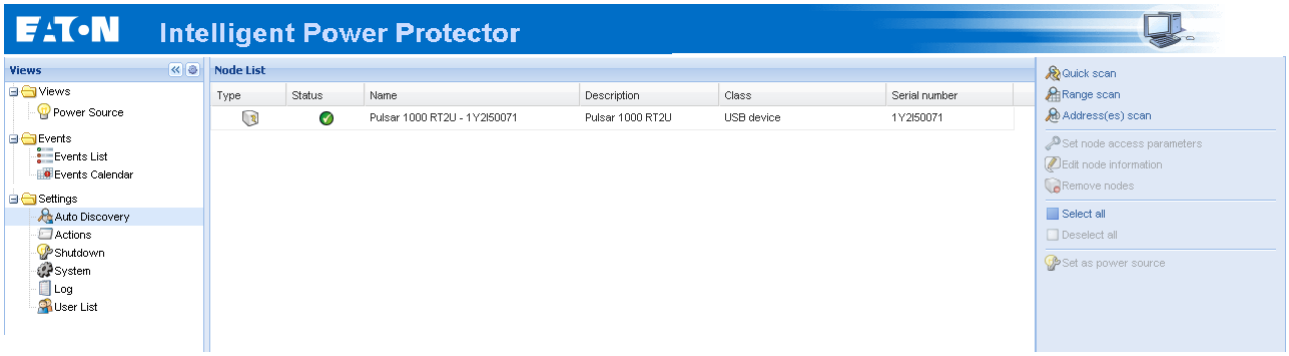
3.1 Intelligent Power® Protector Settings

Note: This chapter does not apply to IPP for Unix. Please refer to chapter 3.2.

Start the "**Intelligent Power® Protector**" main graphical interface from the previously created shortcut, and then click on the **Settings-> Auto Discovery** menu item.

3.1.1 Discover the UPSs connected through USB/Serial

The first discovered UPS connected through (RS232 or USB) is automatically assigned as the Power source (the Status icon is Green -)



3.1.2 Discover the nodes Connected on the Network

From the **Settings → Auto Discovery** item; the following discovery methods are available:
- Quick Scan (automatically performed when application starts)
- Range Scan
- Address Scan

Notes:
- Each network node (Web/SNMP Card …) must have a valid IP address (or a DNS name) in the range that you have entered for auto-discovery. Refer to the compatibility list.
  "Intelligent Power® Protector" automatically receives the alarms (through notification or polling)

- Required Connect UPS XSlot/BD configuration:
  - ⇨ Set the IPP discovery password to the same value as the Web /SNMP read community name (default is public)
  - ⇨ In ConnectUPS Write Access Managers control menu (via telnet, ssh or serial connection): disable SNMP access restricted by IP/Hostname (this is the default setting since firmware version 2.02) or configure it correctly (IPP has to be configured in trusted host list)

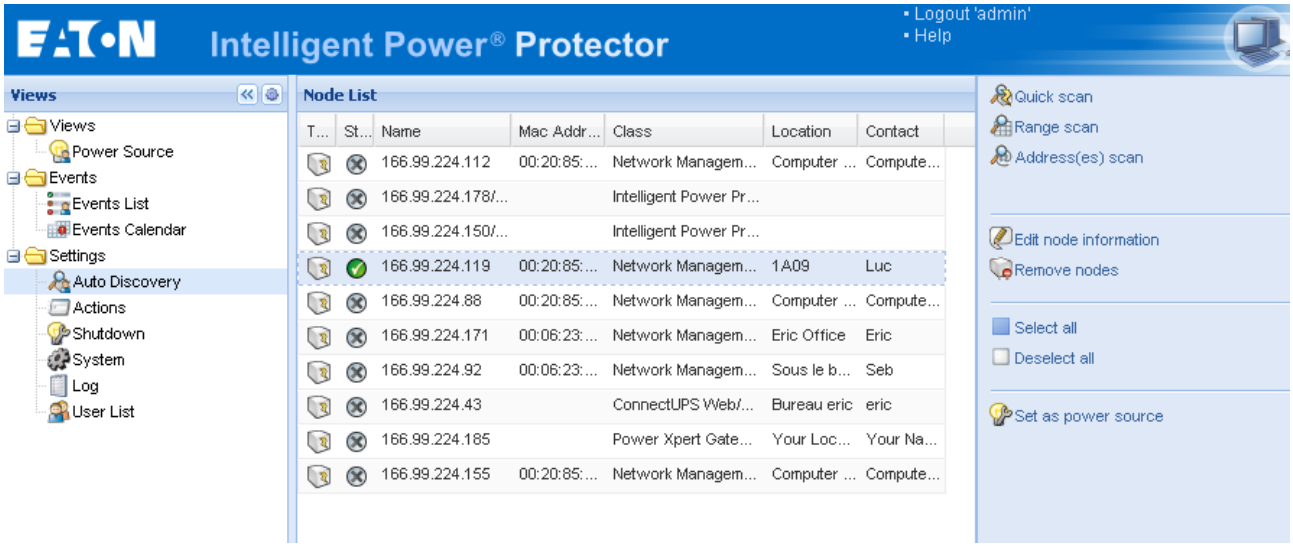
- Required PXGX 2000 & PXGX-UPS cards configuration:
  - ⇨ Set the IPP discovery password to the same value as the PXGX read community name (default is public)
  - ⇨ In PXGX Access control page: disable SNMP access restricted by IP/Hostname or configure it correctly (IPP has to be configured in trusted host list)
  - ⇨ In PXGX Take care to configure PXGX2000 in SNMP V1 or SNMP V1 + V3

- The Quick scan request is a Broadcast frame on 4679 IANA reserved port and 69 standard TFTP port. Using the Quick scan operation, you will discover through broadcast within a few seconds following Web/SNMP Cards (Network-MS (ex 66102 / 103006826) and Modbus-MS (ex 66103), Connect UPS XSlot P/N 116750221-001, PXGX 2000 P/N 103005868-5591, PXGX-UPS, …)

- For the nodes outside of the Network segment, please perform the discovery based on IP address ranges (**Range scan**)

- Address Scan performs a single address scan

The discovered UPS connected through (Network) are not automatically assigned as the Power source (you have to select the node and click on the button **Set as Power Source**.
- The "Edit shutdown configuration" window opens automatically when the Power source is set. Please refer to the next paragraph to configure correctly the parameters.
- Once the power source is configured, the icon becomes Green or Grey if the communication fails).


Intelligent Power® Protector
Logout 'admin'
Help
Views
Views
Power Source
Events
Events List
Events Calendar
Settings
Auto Discovery
Actions
Shutdown
System
Log
User List
Node List
T... St... Name Mac Addr... Class Location Contact
166.99.224.112 00:20:85:... Network Managem... Computer ... Compute...
166.99.224.178/... Intelligent Power Pr...
166.99.224.150/... Intelligent Power Pr...
166.99.224.119 00:20:85:... Network Managem... 1A09 Luc
166.99.224.88 00:20:85:... Network Managem... Computer ... Compute...
166.99.224.171 00:06:23:... Network Managem... Eric Office Eric
166.99.224.92 00:06:23:... Network Managem... Sous le b... Seb
166.99.224.43 ConnectUPS Web/... Bureau eric eric
166.99.224.185 Power Xpert Gate... Your Loc... Your Na...
166.99.224.155 00:20:85:... Network Managem... Computer ... Compute...
Quick scan
Range scan
Address(es) scan
Edit node information
Remove nodes
Select all
Deselect all
Set as power source

3.1.3 Shutdown

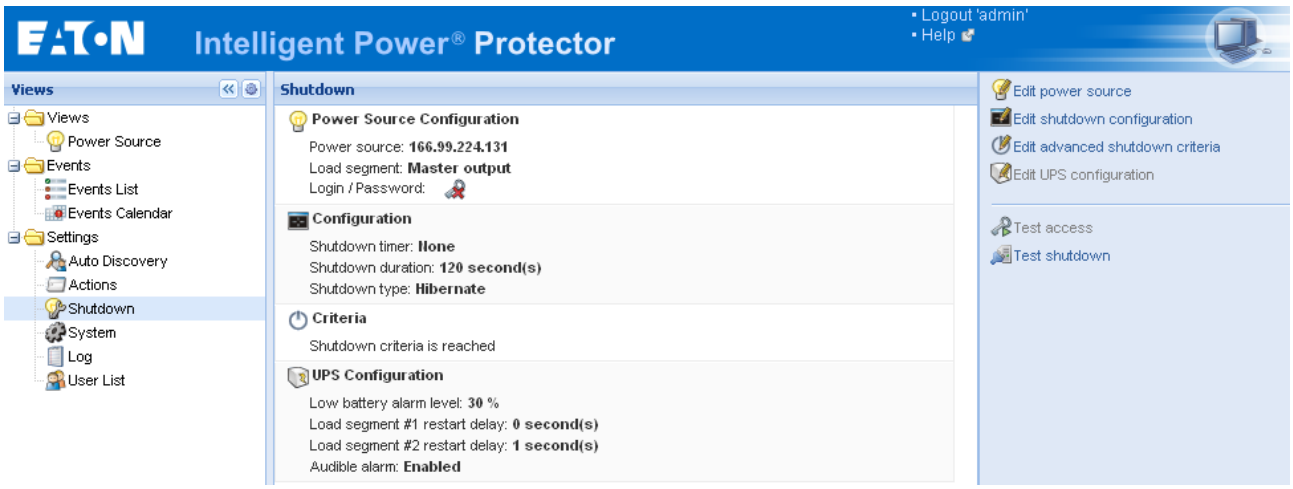
3.1.3.1 Introduction

Intelligent Power® Protector provides **local computer graceful shutdown** with an acquisition through:

- USB/Serial
- or Network (Web/SNMP Cards)

To configure shutdown, proceed as follows:

- Login with an administrator user profile
- From the **Settings** menu Item, select the **Shutdown** menu item then the following page is displayed:



From this page, the configuration options are provided:

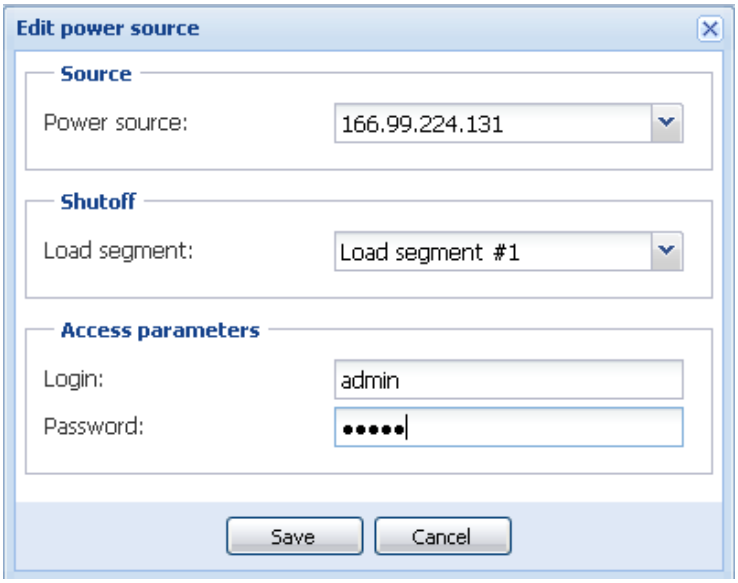
- Edit power source
- Edit shutdown configuration.
- Edit advanced shutdown criteria.
- Edit UPS configuration
- Test Access.
- Test shutdown.

These configuration options are described hereafter.

3.1.3.2 Power source

To configure Power Source, perform the following actions:

- Click on **Edit Power Source**.



- In the **Power source** field select the UPS that powers the computer hosting Intelligent Power® Protector (This settings is also accessible through **Settings -> Auto-Discovery -> Set as PowerSource**)
- Check other parameters.
- Click on Save

Other parameters:

Load Segment: (Optional) the load segment that powers the server hosting IPP
Note: When “Master” is selected the entire UPS will switch off.

Access parameters: (When Power Source is managed through the network)

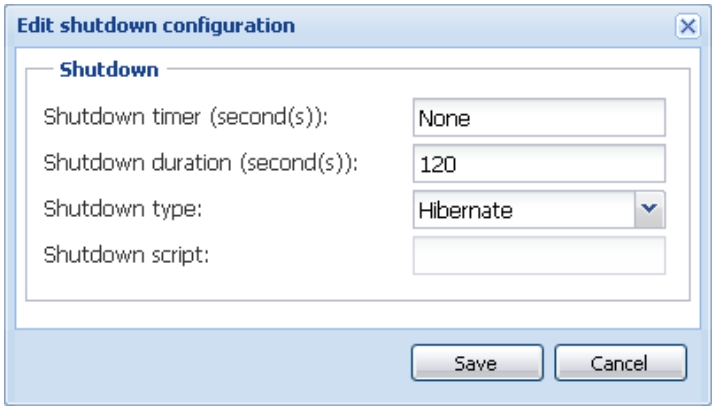
- If the Power source is a Web/SNMP Cards (Network-MS (ex 66102 / 103006826) and Modbus-MS (ex 66103)), Login and password are needed only if Intelligent Power® Protector has to set values in the Web/SNMP Card. (e.g. when changing the shutdown duration value)
- If the Power source is another Intelligent Power® Protector with “shutdown controller” feature activated, then Login and password are **mandatory.** The Login must be the “admin” account.

In case of a misconfigured Shutdown feature, the software signals a communication error.
Check that power source and access parameters (if needed) are correctly set.

3.1.3.3 Edit Shutdown Configuration

To configure Shutdown parameters, perform the following actions:

- Click on **Edit shutdown configuration**.



Shutdown timer: (Optional) The time period from the time of the power failure until the launch of the UPS shutdown sequence.

Shutdown duration: The shutdown delay needed to properly shut down the computer.

Shutdown type:

- **Hibernate** (default option)
  If available with your operating system, is better to use the hibernation feature (first available with Windows 2000) as there are a number of advantages. If the system is shut down, all work in progress and system information are automatically saved to the disk. The computer itself is also de-energized. When mains power returns, all the applications re-open exactly as they were and the user placed back in their work environment.
  Hibernate function must first have been activated in the operating system. In the power options on the Windows control panel, check that **hibernate** option is activated on the Hibernate tab sheet.
  Note: If you select hibernate, but your computer does not have this function, Intelligent Power® Protector will still protect the installation by carrying out the normal (default) shutdown.
  Note: For Windows Vista, please refer to the FAQ section of this manual.

- **Shutdown.** This option shuts down your applications and the system, but does not de-energize the computer. The system offers the user the choice to de-energize the computer, in which case it is the UPS that cuts power.
  On most computers, this configuration is necessary if you want the server to restart as soon as mains power returns.

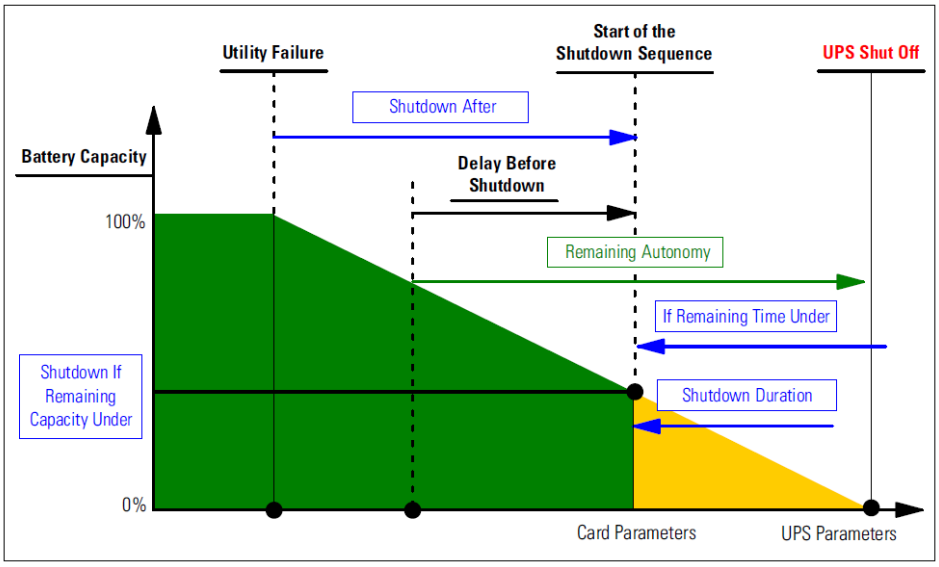
- **Power-off** This option shuts down your applications and the system, and de-energizes the computer. This configuration is advised if you wish to be on hand when the system re-starts. (or for load shedding)

- **Script**: This option manages the shutdown in a custom script that you can create to fit with your own shutdown sequence.
  You can integrate the standard Windows shutdown command (more info with shutdown /? in a Windows Command Line interpreter). **Shutdown script:** the absolute path of the script.

Outlet shutoff Active: Using this option, IPP will send a delayed shutoff command to the outlet. This delayed command is sent to the UPS at the beginning of the shutdown sequence, and this is the point of no return for this sequence. The outlet is turned off at the end of the shutdown sequence.

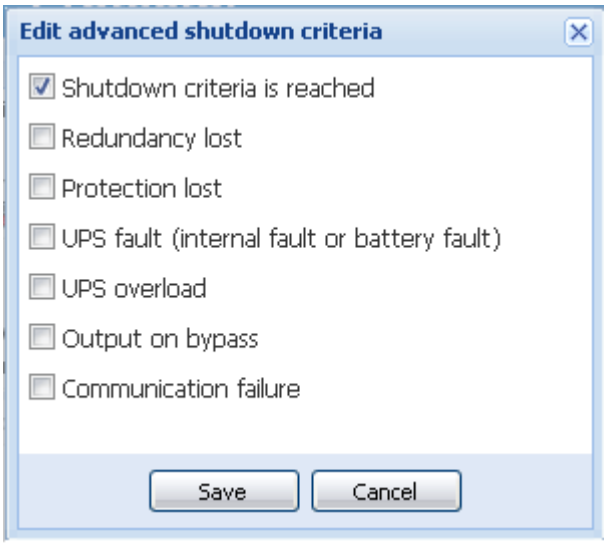
Shutdown sequence trigger:
When a power utility failure occurs, the shutdown sequence is started as soon as the first of the two following condition is reached.

- After the **Shutdown timer** (if configured).
- When **WEB / SNMP UPS CARD or UPS shutdown criteria is reached** (UPS / WEB / SNMP UPS CARD Decision according to many criteria see next figure)



3.1.3.4 Edit advanced Shutdown Criteria

Edit advanced Shutdown Criteria opens the “Edit advanced Shutdown Criteria” window:



Criteria definition:

- **Shutdown criteria is reached**: (enabled by default) this is the standard shutdown sequence taking into account “time based criteria” and “UPS low battery level criteria”

In addition, the user can also select one or several events in the following events list. If these events are selected, they will trigger an immediate shutdown sequence when they occur.

- **Redundancy lost** (For Eaton MX Frame only)
- **Protection lost** (For Eaton MX Frame only)
- **UPS fault (internal fault or battery fault)**
- **UPS overload**
- **Output on bypass**
- **Communication failure**

Note:
When using a Virtual Power Source (in redundant configuration), only following criteria can be used:

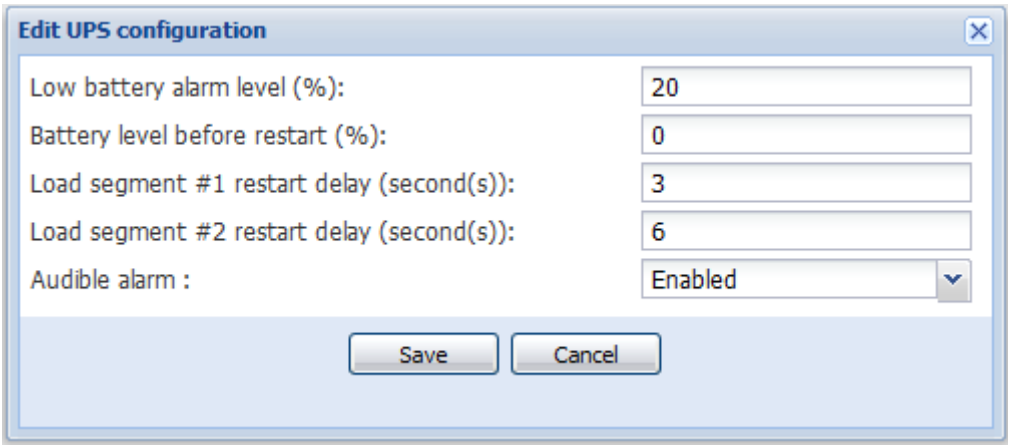
- Shutdown criteria is reached
- Redundancy lost
- Protection lost

3.1.3.5 Edit UPS Configuration

Edit UPS Configuration opens the “UPS Configuration” screen. It is available for some UPSs connected through USB or serial. Otherwise, the parameters are displayed on “read only” through Network or if the UPS doesn’t support this feature.

You can configure following UPS parameters:

- Low Battery alarm level
- Load Segment restart delays
- Audible alarm



3.1.3.6 Test access

Test access checks if “Login and password” are correctly configured so that:

- IPP can update his shutdown configuration on the **card** or
- IPP can remotely access to the IPP **shutdown controller**.

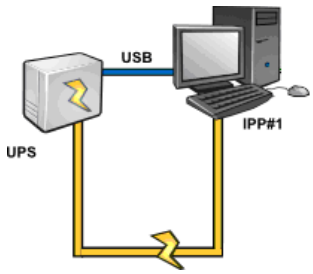
3.1.3.7 Test shutdown

Test shutdown starts a shutdown procedure (According to the IPP parameters)

3.1.4 Shutdown Use case

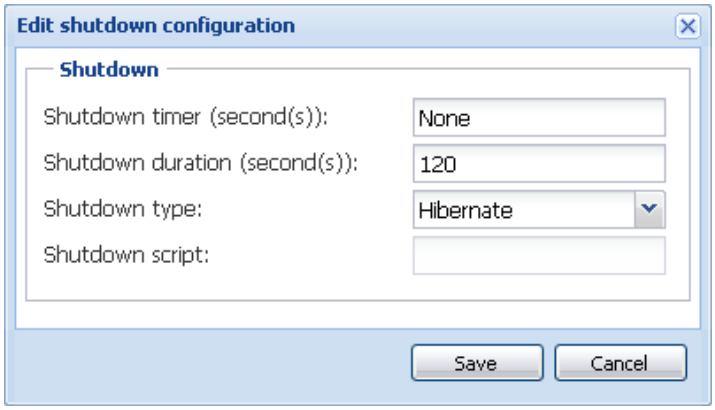
According to different architecture, we describe several typical use cases that will help you to configure properly the shutdown sequence according to your needs.

3.1.4.1 Architecture #1 (local attached UPS through serial /USB)



Use Case #1: *You want to keep your computer hosting IPP#1 alive as long as possible.*

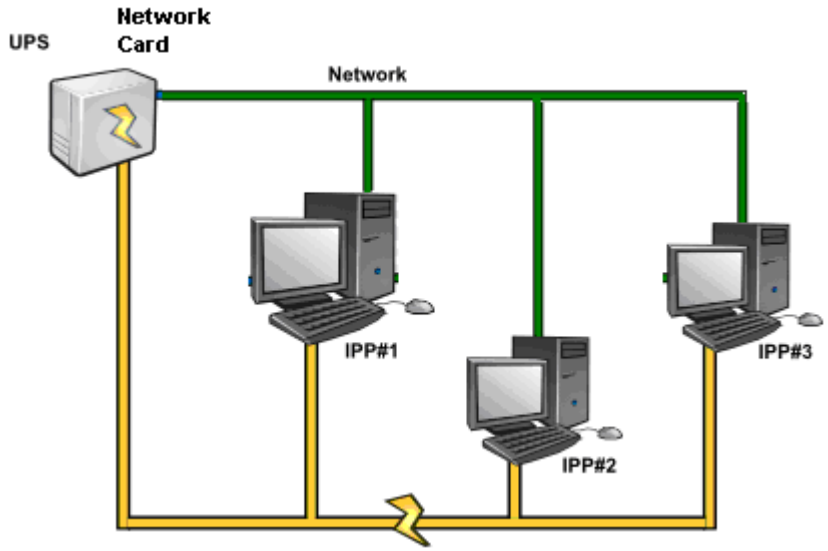
- ⇨ This is the default IPP#1 configuration.
  The next screenshot illustrates this IPP default configuration available from **Settings -> Shutdown -> Edit Shutdown Configuration**.



Use Case #2: *To save battery backup time, you want to perform load shedding (stop your computer after a predefined time)*

- ⇨ Configure a **Shutdown timer** value on IPP#1 (this configuration parameter is available from **Settings->Shutdown->Edit Shutdown Configuration**)

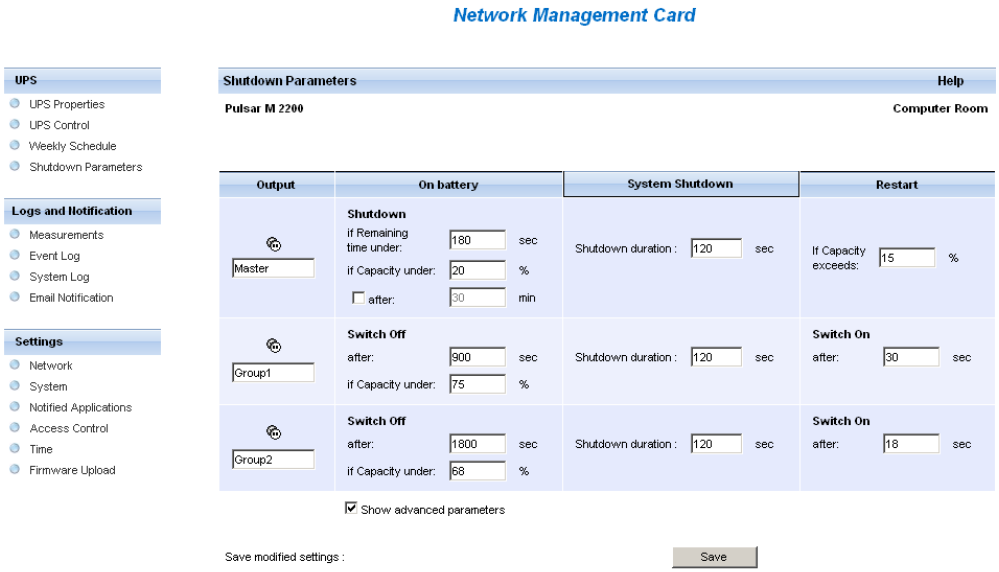
3.1.4.2 Architecture #2 (Network attached UPS Web SNMP Card)



Use Case #1: *You want to keep all your computers alive as long as possible*

⇨ This is the default configuration for the IPPs and the Network-MS

IPP default configuration is available from **Settings -> Shutdown -> Edit Shutdown Configuration**. e.g. Network-MS (ex 66102 / 103006826) and Modbus-MS (ex 66103), WEB / SNMP UPS CARD default shutdown configuration is available from **UPS-> Shutdown Configuration** as illustrated on next screenshot:



Use Case #2: *To save battery backup time, you want to stop all your computers after a predefined time.*

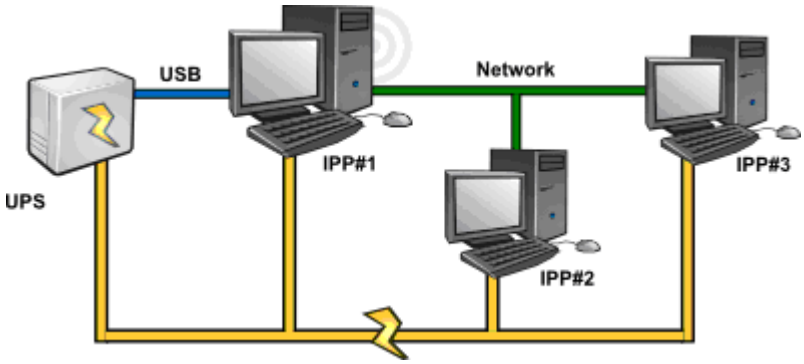
- ⇨ On the WEB / SNMP UPS CARD, configure a Shutdown Criteria.
  e.g. Network-MS (ex 66102 / 103006826) and Modbus-MS (ex 66103) WEB / SNMP UPS CARD shutdown configurations are available from **UPS-> Shutdown Configuration**
  Note: In this case the computer automatic restart is guaranteed.

Use Case #3: *You want to perform load shedding on the specific computer hosting IPP#2 (i.e. stop the computer hosting IPP#2 after a predefined time)*

- ⇨ On IPP#2, configure a **Shutdown timer** value (this configuration parameter is available from **Settings->Shutdown->Edit Shutdown Configuration**)
  Note: In this case the automatic restart for the computer hosting IPP#2 is not guaranteed

Note: Use Case 3 can be combined with Use Case 1 or Use Case 2

3.1.4.3 Architecture #3 (Network attached UPS through Shutdown Controller)



Use Case #1: *You want to keep all your computers alive as long as possible.*

- ⇨ This is the default shutdown configuration for the Shutdown Controller IPP#1 and other IPPs
  IPP default configuration is available from **Settings -> Shutdown -> Edit Shutdown Configuration**.

Use Case #2: *To save battery backup time, you want to stop all your computers after a predefined time.*

- ⇨ On IPP#1 (Shutdown Controller) configure a **Shutdown timer** value. (this configuration parameter is available from **Settings->Shutdown->Edit Shutdown Configuration**)
  Note: In this case the automatic restart for all the computers is guaranteed

Use Case #3: *You want to perform load shedding on the specific computer hosting IPP #2 (stop the computer hosting IPP#2 after a predefined time).*

- ⇨ On IPP#2, configure a **Shutdown timer** value (this configuration parameter is available from **Settings->Shutdown->Edit Shutdown Configuration**)
  Note: In this case the automatic restart for the computer hosting IPP#2 is not guaranteed

Note: Use Case 3 can be combined with Use Case 1 or Use Case 2

Use Case #4: *Typical example with 4 computers. According to the servers' roles, you may want to shutdown the servers at different times:*

Computer hosting IPP#1: is directly attached to the UPS (USB/Serial) The shutdown Controller has to be installed on the server that will be the last one to shutdown.
Note: On Pulsar series this computer has to be powered by the master outlet.

Computer hosting IPP#2: is a computer that requires a long delay to shutdown (e.g. hosting database or VM-Ware)

Computer hosting IPP#3: is a computer that requires being the last one to be shutdown (as other servers depend on it) (e.g. File server)

Computer hosting IPP#4: is another server that has be stopped before computer B or C (Web server)

or this computer can also be stopped for load shedding purpose. (Workstation)

⇨ Recommended configuration:

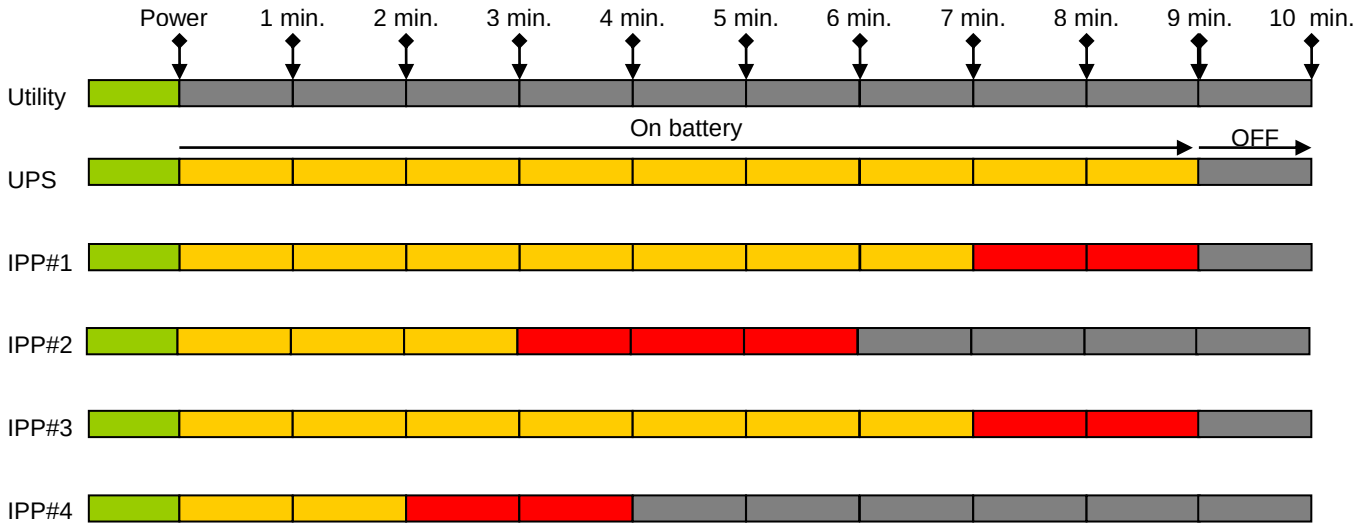
On IPP#1: Configure **Shutdown Timer** to None and **Shutdown Duration** to 120 s

On IPP#2: Configure **Shutdown Timer** to 180 s and **Shutdown Duration** to 180 s

On IPP#3: Configure **Shutdown Timer** to None and **Shutdown Duration** to 120 s

On IPP#4: Configure **Shutdown Timer** to 120 s and **Shutdown Duration** to 120 s

The following time diagram summarizes this configuration:

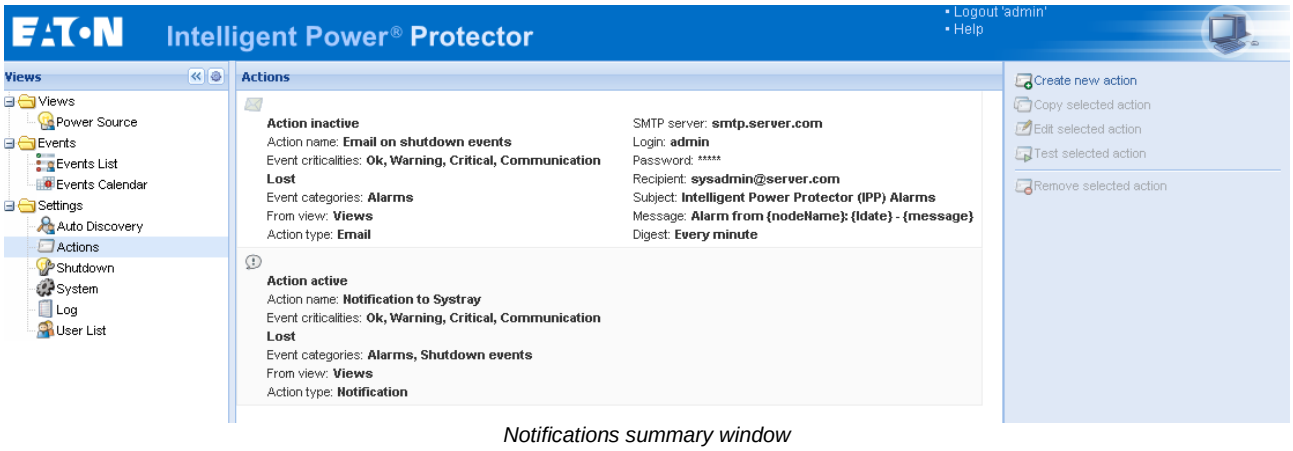


3.1.5 Configure Actions

You can define the way users will be notified when node events happen.

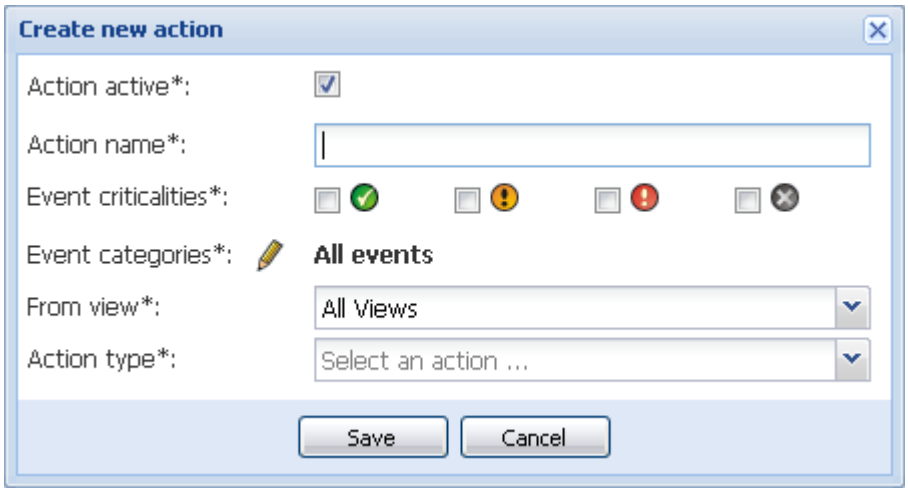
From the **Settings → Actions** item; the following channels are available:

- E-mail
- Execute script/program
- Notification to the local alarm notification box, available from the System Tray icon.



Notifications summary window

The **Create new action button** will display following interface:



Notes:

- The "*" fields are required.
- Clicking on the pen icon starts an assistant to fill the field.

Action active: enables/disables the action.
Action name: user friendly name for the action.

Events filter:
You can filter the action according to:
- The **Event criticalities**. (Critical, Warning, Normal, Communication Lost).
- The **Event category** (All Events, Alarms, Shutdown events, Power events, Measures) refer to the list hereafter.
- The view that triggers the event (**From view**).

Note on Event Criticality parameter:
With this parameter, you can filter the notification according to the event level. Refer to the event list provided below in this document. If you select “Critical” as filter you will not receive the associated “Normal” event informing that the device status changes from “Critical” to “Normal”.

Action type: you can select following action: (Email / Command / Notification). According to your choice, specific settings are available for each action. The configuration of these 3 actions is detailed hereafter.

Detailed Alarms and events list in “Event category”:
Alarms:
- Utility failure
- Communication lost
- Shutdown Imminent
- Battery Low
- Internal Failure
- Overload
- Output On/Off
- Outlets On/Off
- Battery Fault
- On Automatic Bypass
- On Manual Bypass
- Redundancy Lost
- Protection Lost

Shutdown Events:
- Utility failure
- Battery Low
- Shutdown Imminent
- Local Run Time to Shutdown

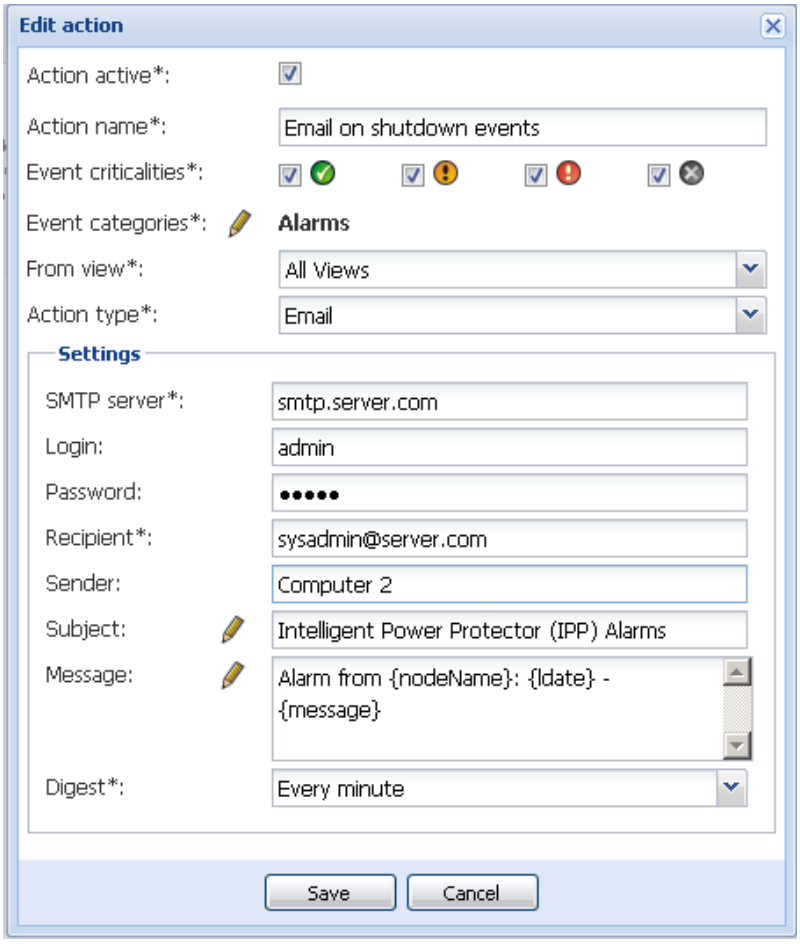
Power Events:
- Output Percent Load
- Output Apparent Power
- Output Active Power
- Output Power Factor
- System Defined Output Overload Alarm

Measures:
- Output Percent Load
- Battery Remaining Capacity
- Battery Run Time to Empty
- Main 1: Voltage, Current and Frequency
- Main 2: Voltage, Current and Frequency
- Output: Voltage, Current and Frequency
- Output Apparent Power

- Output Active Power
- Output Power Factor

E-mail:

This action is not active by default. Some of the fields are preconfigured by default.



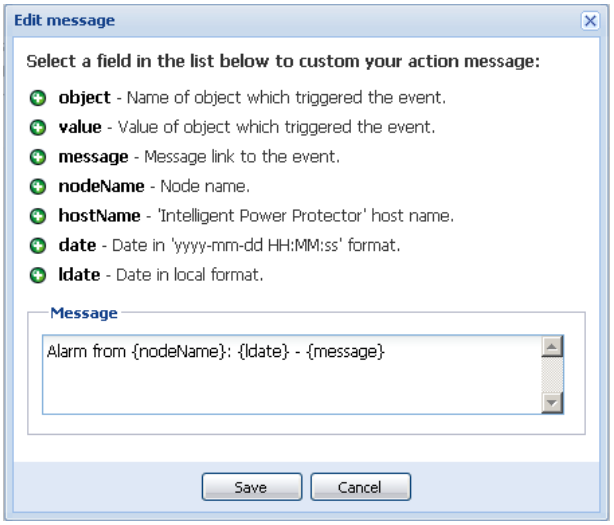
For the “generic” fields at the top of the window, please refer to “create new action” section

Specific "email action" settings:

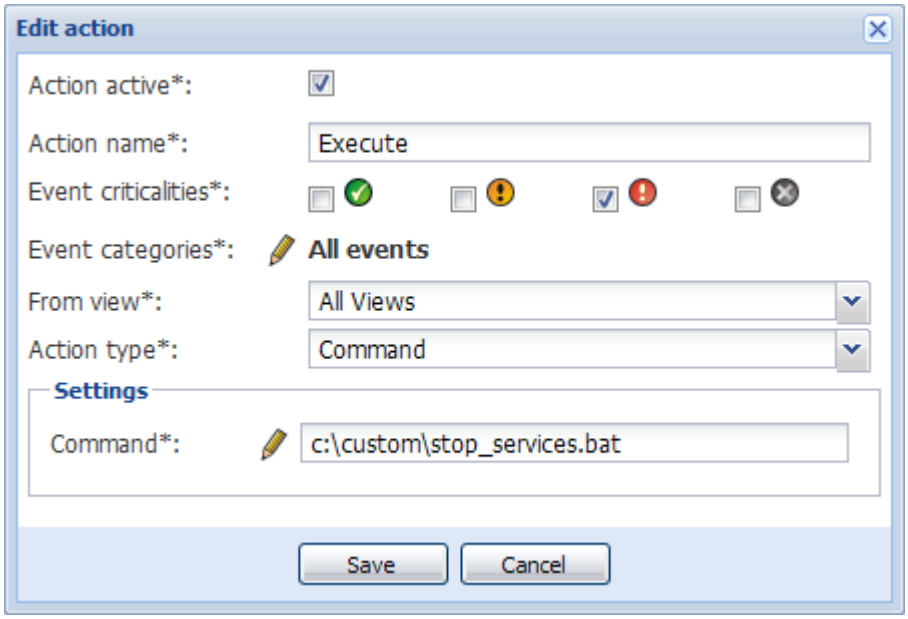
- **SMTP Server**: To receive emails on UPS events you have to indicate the SMTP server IP address
- **Login, Password**: authentication information of the SMTP server
- **Recipient**: Receiver Email address.
  Note: you can specify multiple receivers by separating them with coma.
- **Sender**: (Optional field) the email sender
  Note that your SMTP server may require a valid email address.
- **Subject**: The email subject (can be customized with pre-defined variables).
- **Message**: The email message body (can be customized with pre-defined variables).
- **Digest**: you can specify that you want to receive a consolidation of the alarms that occurred during a delay that you can choose (if you specify **none**, each alarm will generate an e-mail. With this setting you will receive more emails for the same number of events.
  Possible values are: None / Every 10 seconds / Every minutes / Every hour / Every day

Notes:

- It is possible to duplicate an existing action already configured and just change some parameters.
- For advanced use, you can Customize the **subject** and **Message** e.g. if you have to translate an e-mail into an SMS (using an email to SMS external provider).
  Clicking on the pen icon starts the **Edit message** assistant to fill the field with some variables.
  Click on the button to add a variable.



Command (Execute script/program):



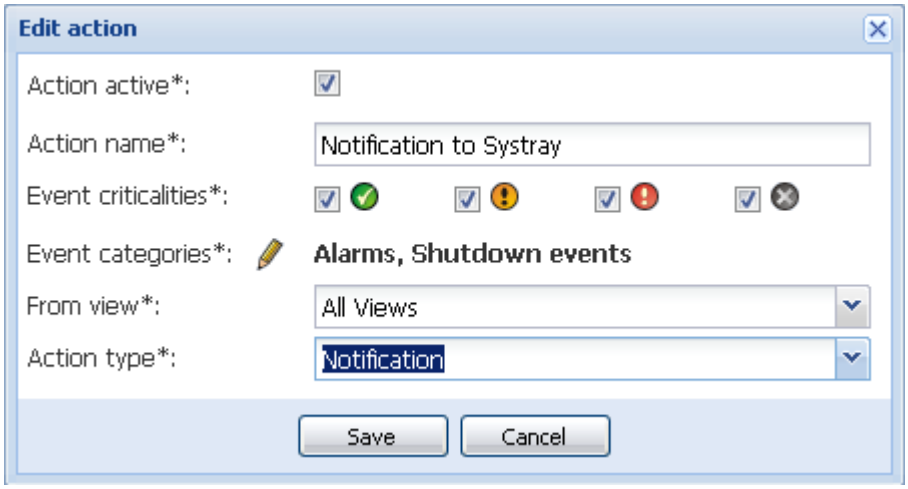
In order to execute a program on UPS events the program path will be required.

Example to play sound alarms on events:
Create a batch command file containing the command: `mplay32.exe /play /close C:/WINDOWS/Media/<sound>.wav`
Create an action of type command calling this batch file.

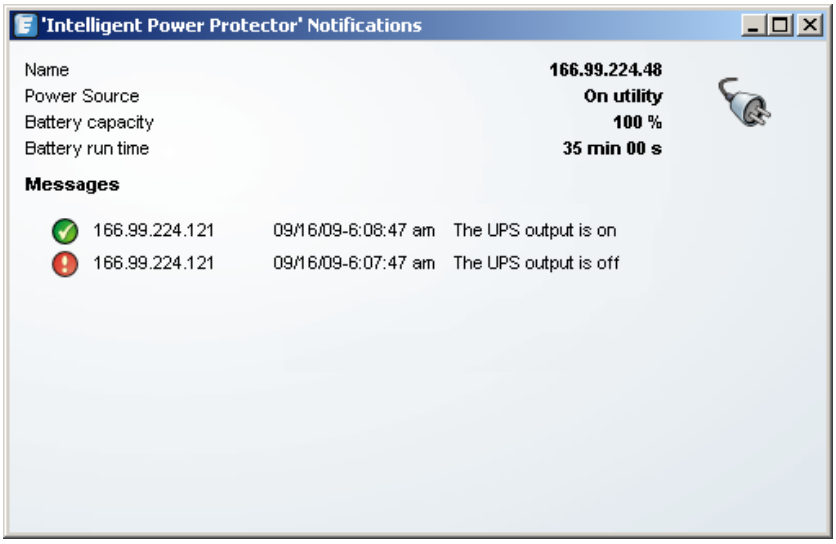
Notes:

- **For Windows,** the program is executed under the SYSTEM account. For the right execution of some privileged commands, you may have to apply following procedure:
  It may be necessary to modify the context before certain actions can be run.
  To allow a user to run specific tools and programs with permissions that are different from those assigned to the user's account use the Windows “RunAs” Command which allows you to save the password (Windows XP Service Pac 2 and more recent versions).
  Use the following Microsoft command:
  `runas /profile /user:<my login> /savecred <my_program.exe>`
  On first execution a password is required, it is saved for subsequent executions.
- **For Linux,** the IPP process is running under root privilege (`sudo` command is not needed to execute a program or shell script).

Notification (Alarm box notification):
The Notification action is active by default.

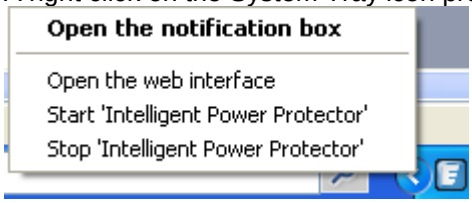


The alarms are displayed on the local computer in an alarm box.
This alarm box displays the last 10 alarms. It takes the focus when a new alarm occurs. From the event section you can view more than 10 alarms.



The alarm notification box is accessible from the System Tray icon. Click on the icon to open the window that displays the alarms on the local computer.

A right click on the System Tray icon provides you a fast access to following functions:



If a Power source has been declared, System Tray Icon can have following states:

	The System Tray Icon correctly receives alarms from Intelligent Power® Protector (AC is present on the Power source)
	The System Tray Icon correctly receives alarms from Intelligent Power® Protector (The Power Source runs in battery mode)
	The System Tray Icon correctly receives alarms from Intelligent Power® Protector (A Warning event occurred on Power Source)
	The System Tray Icon correctly receives alarms from Intelligent Power® Protector (A critical event occurred on Power Source)
	Communication with Power source has failed

Advanced events and actions customization:

In Intelligent Power® Protector installation folder, you can see a *configs/scripts* folder containing a sample user-defined action script (*sample_user_script.js*).
You have the possibility to modify this script or create new scripts that define very specific events and actions. The sample script provides details about the expected structure and syntax for defining new actions and triggers.
To activate the execution of a script you have to set the enabled property to true as follows:

```
UserScript =
{
  name: "MyScript",
  enabled: true, // Set this property to true to enable the script
```

3.1.6 Configure User Accounts

Multiple user accounts can be configured.

From the **Settings** menu Item, select the **User List** item, then perform the following steps:

- Click on Add user.
- Set the **User Login** and the **User password**.
- Select the **User's Profile** level. The following levels are available:
  => **admin** (the user will be able to access all the features)
  => **user** (the user will only access the supervision and is not able to set parameters to the system or nodes).
- Click on **Create new user** button.

User Accounts window

Intelligent Power® Protector contains a default Administrator profile with:

- admin as login
- admin as password

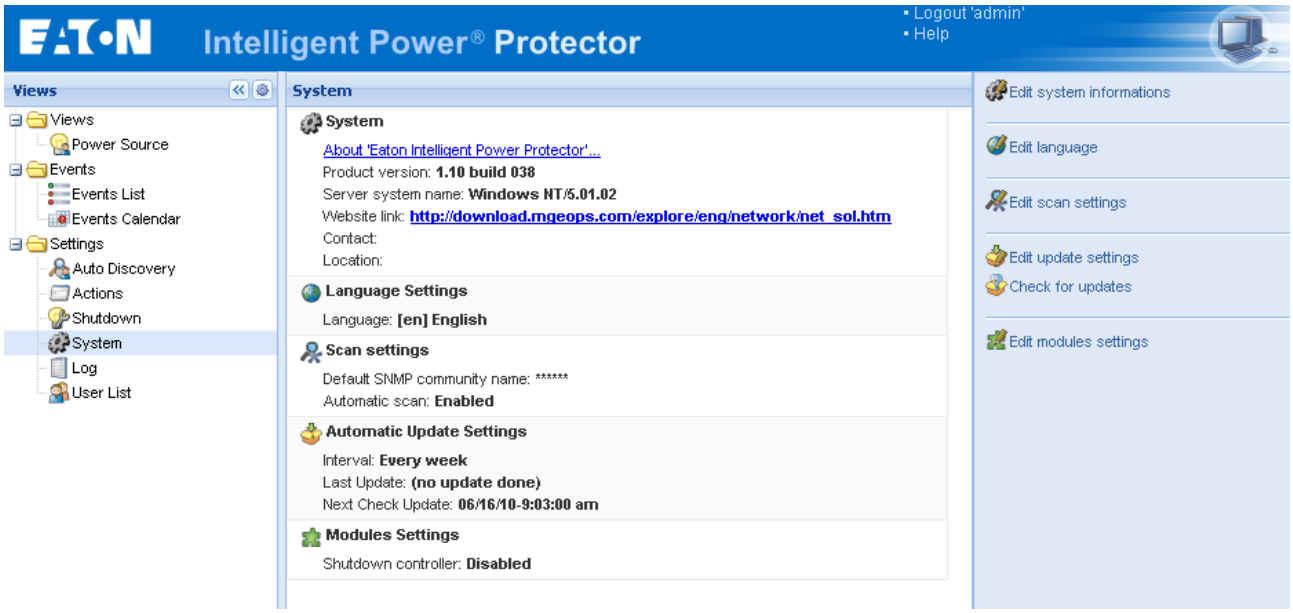
Warning:

- For security reasons, it is strongly recommended to change default password immediately after the installation.
- A Popup warns you on security if the password contains less than 8 characters.

Notes:

- The Login and Password is case sensitive
- The original admin account login value is fixed (admin) and its Password has to be modified
- There is no limit in the accounts number

3.1.7 System settings



System settings

Select one of the items, and then click on the corresponding button on the right:

- **Edit system information:** to enter contact and location information for IPP software.
- **Edit language** allows the user to change the user language.
  (Czech, English, French, German, Japanese, Korean, Polish, Portuguese, Russian, Simplified Chinese, Spanish, Traditional Chinese are currently supported)
- **Edit scan settings** changes the default SNMP community name for discovery and enables/disables periodic scan of new nodes.

- **Edit update settings** will customize Automatic Updates Features.
  This feature gives you access to Eaton software updates.
  Intelligent Power® Protector will always be up to date if you select the **Check automatically** option.
  When a new software version is detected on www.eaton.com, just follow the wizard instructions.
  Notes:
  Intelligent Power® Protector settings will be retained with this operation
  Intelligent Power® Manager can manage updates with large number of computers (refer to chapter 5)
- **Check for updates** will check if a more recent version of the product is available on Eaton Web site
- **Module Settings** enables optional modules (e.g. Shutdown Controller)

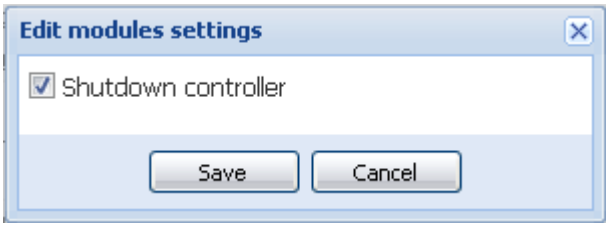
3.1.8 Shutdown Controller

3.1.8.1 Introduction

Intelligent Power Protector can acquire UPS alarms from a UPS (**through USB or RS232 or from SNMP/Web card (*) or Virtual Power Source (*)**) and forward the shutdown alarms to the other Intelligent Power Protectors. This specific Intelligent Power Protector is called the "Shutdown Controller".
(*) Note: This is a new feature available since IPP 1.20.

3.1.8.2 Activating Shutdown Controller feature

You have to activate the **Shutdown Controller** feature on the IPP 1 that relays the alarms (connected to the UPS through USB or RS232).
This option can be activated from **Settings-> System -> Module Setting**
Double click on **Module settings** then check the checkbox.



When this feature is activated on one IPP:

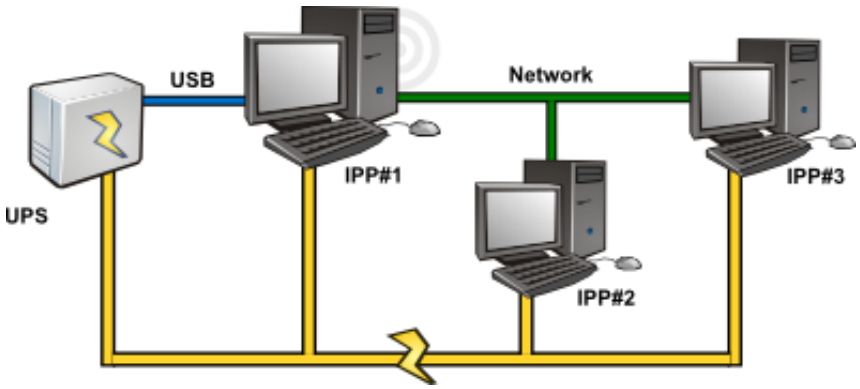
- A new view called "Notified Applications" appears in the menu of the **Shutdown Controller** IPP and the IPP top banner is updated with this graphical sign:

- Other IPPs will discover this IPP through a network scan.
  From these other IPPs configure the parameters in **Setting-> Shutdown-> Configuration.**
  The main parameters are:
  * Power Source (indicate the IP address of IPP1 that is the Shutdown Controller)
  * Load Segment
  * Login and Password (You must use "admin" account)
  Click on **Save**. Now your IPP is registered in the Notified Application view of the Shutdown Controller (refer to the next chapter).

Example with 3 computers (refer to the Shutdown Use Case for Architecture #3) :

A UPS is locally connected (through USB) to computer 1 hosting IPP1 (Shutdown Controller)

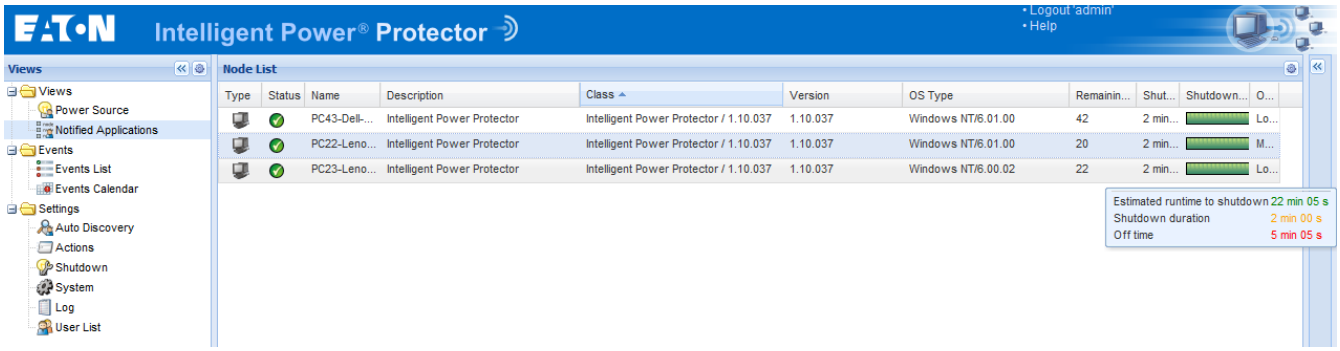
- the IPP 1 automatically detects its UPS
- the user has to activate the "Shutdown Controller" feature for IPP1
- In IPP2 interface the user will have to indicate the IP address of IPP1 computer, the load segment and IPP1 Login and Password
- In IPP3 interface the user will have to indicate the IP address of IPP1 computer, the load segment and IPP1 Login /Password
- IPP1 will forward Shutdown alarms to remote IPPs (IPP2) (IPP3)
- As a consequence the 3 servers powered by this UPS are protected.



This is the corresponding Power flow view where 1 UPS powers 3 single feed Servers:

3.1.8.3 Notified Application view

The notified application View appears when the Shutdown Controller feature is activated.
When the user selects a line, the right hand panels will be refreshed according to the selection.



Notified Applications View

Status:

- Green icon indicates that communication is OK between Local and Remote IPP
- Grey icon indicates that communication is lost between Local and Remote IPP

Shutdown Diagram: 

The shutdown diagram is a time illustration of the shutdown sequence of the selected computer. It aims to present a visual representation of the shutdown sequencing between the different computers.

- The total width is the remaining runtime to empty of the power source (in case a power failure would happen or is in progress).
- The green part is the runtime to shutdown duration of the computer
- The orange part represents the computer shutdown duration.
- The red part is the computer off time.

Note:
The **Notified Applications** list is persistent.

The status of this remote IPP will change from OK to Communication Lost if you uninstall a remote IPP or if there is a communication lost event between the shutdown controller IPP and the remote IPP. With this mechanism the IT administrator will be able to monitor any change in the IT distributed architecture.

3.2 Intelligent Power® Protector - Unix Settings

During IPP – Unix installation process, you will be guided through the configuration of your power protection.

3.2.1 Select the type of installation

- Select if you want to directly communicate with your UPS or if you wish to connect to an IPP server.
- Enter the time needed for your operating system to shut-down.

- If you have chosen to communicate directly with your UPS, you can then choose to act as a protection proxy or stay in a standalone mode.

3.2.2 For direct communication configuration

- Select the communication type: serial or network
    - For serial communication: enter the serial port name or let IPP scan serial ports and choose in a list.
    - For network communication, let IPP scan for available UPS. Then choose your device and enter its login/password. If your device is not in the list try to scan for more UPS (using SNMP protocol). In this case:
        - enter the network addresses and SNMP community name to automatically detect SNMP agents on the network
        - Then, select the desired agent from the list
- Select UPS password: This administrative password is used to secure settings and commands sent to the UPS.by the “admin” user.

3.2.3 For Client configuration

- enter the network addresses to automatically detect IPP Servers on the network
- Then, select the desired IPP Server from the list

Finally, review your configuration. IPP will be started, and you will be able to supervise IPP.

4 Supervision

Note: This chapter does not apply to IPP for Unix. Please refer to chapter 4.5.

4.1 Access to the monitoring interface

To monitor the Power Source, start the main “Intelligent Power® Protector” interface. You can access the same interface locally or remotely.

4.1.1 Local access

- From the system where Intelligent Power® Protector is installed, you can use the following shortcut: Start -> Programs -> Eaton -> Intelligent Power Protector ->Open Eaton Intelligent Power Protector
- From a local machine, you can type the following URL in a Web browser
  https://127.0.0.1:4680/
  or
  http://127.0.0.1:4679/

4.1.2 Remote access

- From a remote machine, you can type the following URL in a Web browser
  https://<name or IP address of computer hosting IPP>:4680/
  or
  http://<name or IP address of computer hosting IPP>:4679/

- In SSL mode, accept the certificate (by clicking on Yes)

Accepting the SSL Certificate

e.g. To install the certificate on IE7, you need to perform the following steps:

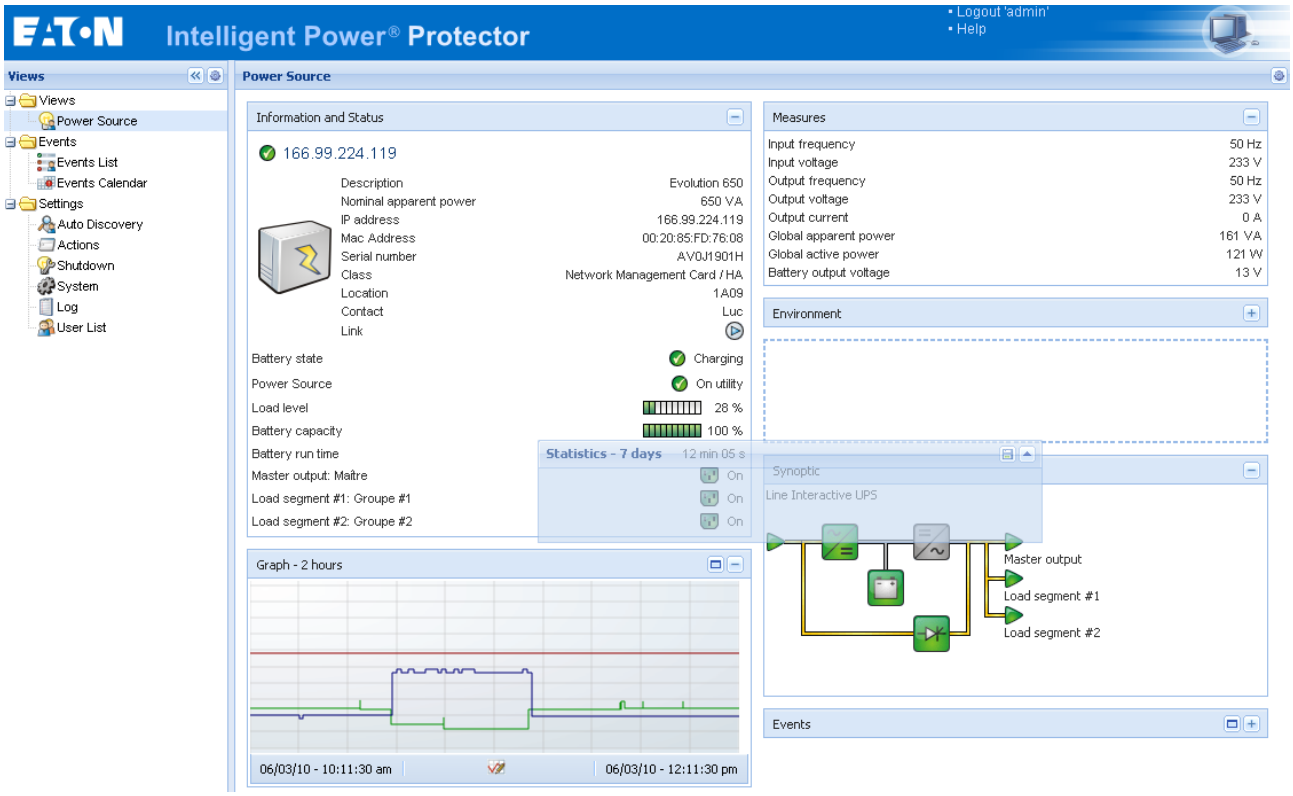
> Run IE as an administrator (Right-click the desktop icon)
> Visit the IPP site.
> Click through the certificate error
> Click the "Certificate Error" button in the address bar.
> Click View Certificate
> Click Install Certificate
> Click the “Place all certificates in the following store” radio button, and choose the “Trusted Root Certification Authorities” store. If you don’t do this, the certificate goes in your personal store, and it isn’t trusted by IE.

- Enter the Login and Password

4.1.3 Power Source View

From the **Views** menu Item, select the **Power Source** item:
You will be able:

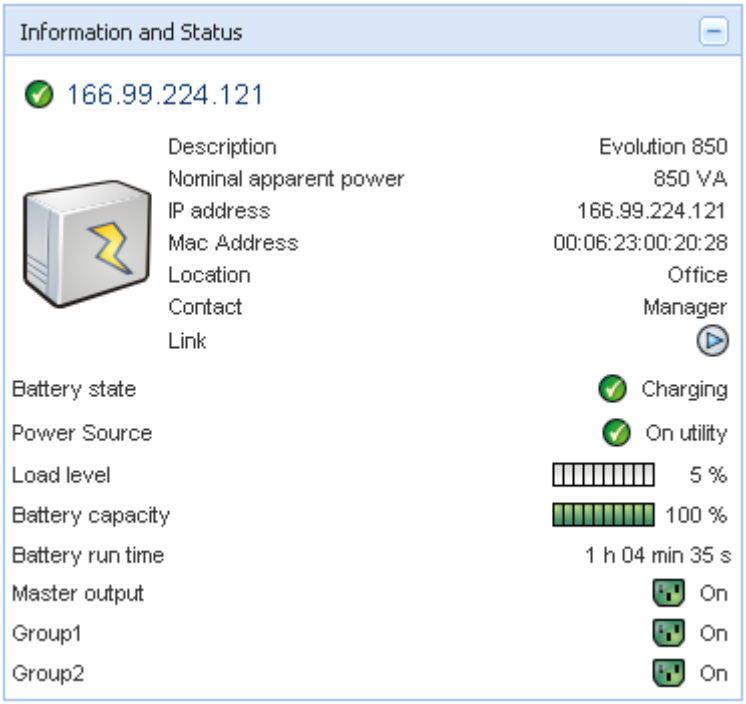
- to supervise the information from the UPS that powers the Intelligent Power® Protector computer
- to drag and drop the panels in this window



4.2 Panels list:

4.2.1 Information and status

This panel displays information on the device that powers the server running IPP.



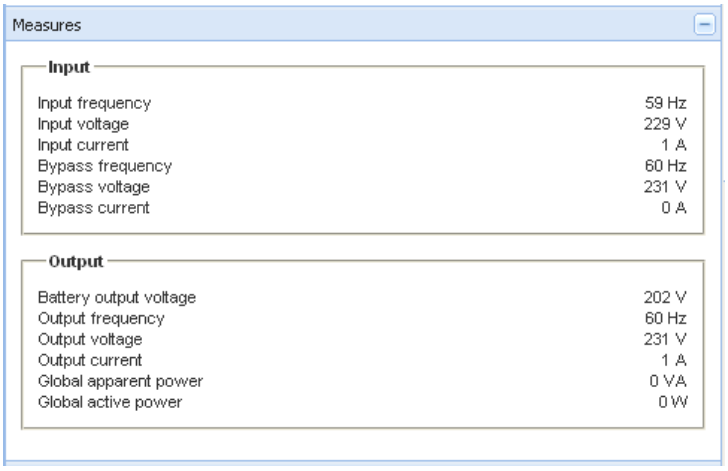
Information Panel

The following node information is displayed in this panel:

- 166.99.224.121 — the DNS name (or IP address) is displayed near the “status icon”
- Description — the commercial product name
- Nominal Apparent Power — the UPS Nominal Apparent Power (in VA or KVA)
- IP address — (if network acquisition) the Web/SNMP card IP address
- Mac address — (if network acquisition) the Web/SNMP card Mac address
- Location — the device location (value of syslocation object or can also be configured in the Device page)
- Contact — the device contact (value of syscontact object or can also be configured in the Device page)
- Serial Number — The device Serial Number (if available)
- Link — link to the device Web site (if available)
- Battery state — Charging / Discharging / Default / Floating / Resting
- Power source — AC Power / Battery
- Load Level — the output load level of the device
- Battery capacity — Battery capacity of the device
- Battery run time — the device remaining backup time
- Master Output — Main output status (ON/OFF/Internal Failure/On Automatic Bypass/Manual By Pass/Overload)
- Group #x — output outlet status (ON/OFF)

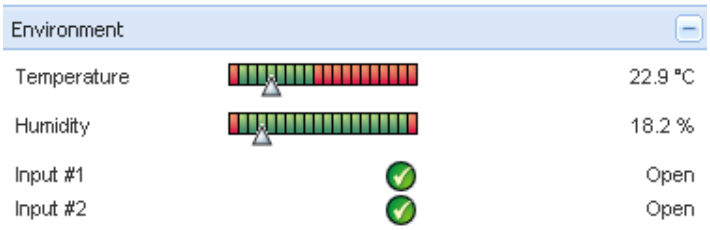
Note: The information displayed in this panel depends on the UPS capabilities.

4.2.2 Measures



This panel displays the selected device electrical parameters (single phase or 3 phases) depending on the node capabilities.

4.2.3 Environment



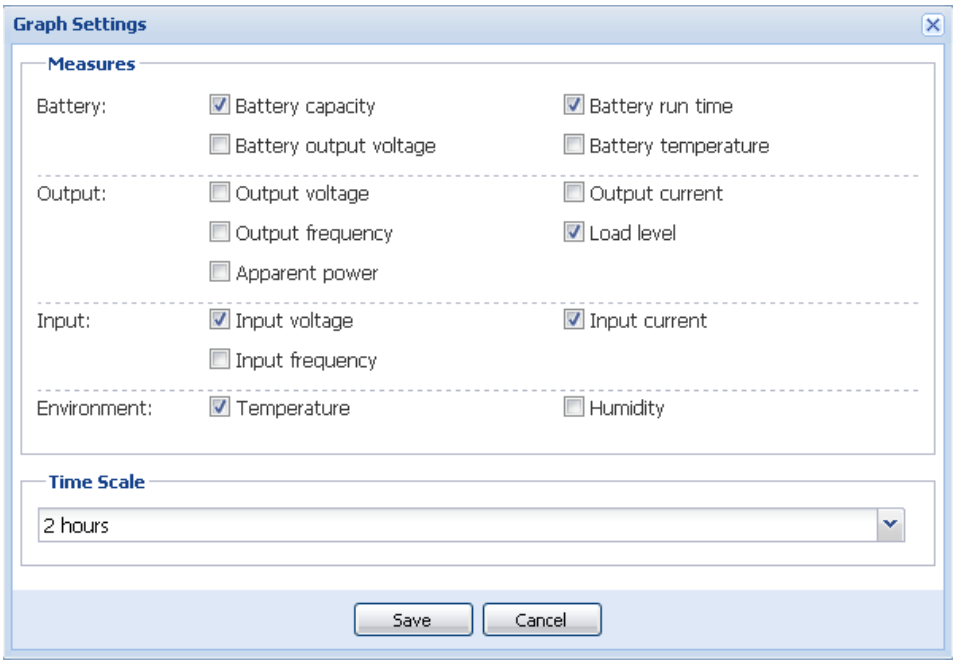
This panel displays the selected device sensor information: Temperature, Humidity level, Dry contact status (Open/Closed) (This panel is only available when the source is a Web / SNMP card)

- Temperature Sensor temperature (in °C)
- Humidity Humidity level
- Input #1 Status of first contact (open / closed)
- Input #2 Status of second contact (open / closed)

4.2.4 Graph

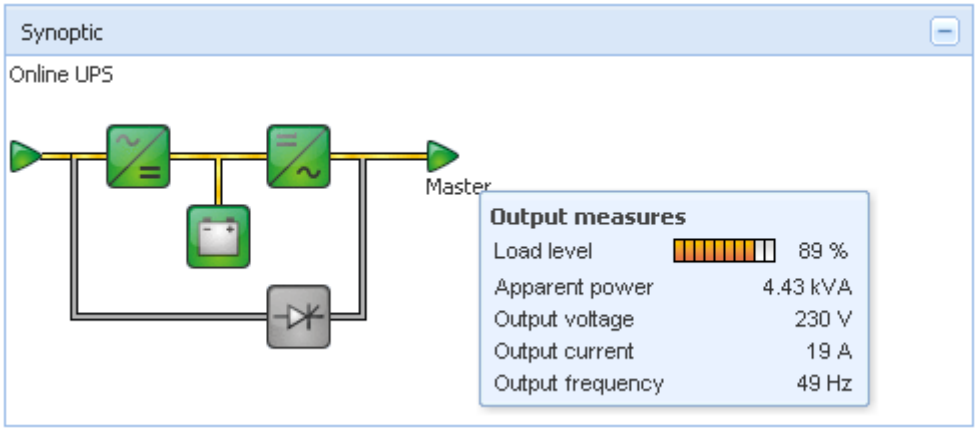
This panel displays the graph of the main measures of the selected device.
To read the values, proceed as follows: Place your mouse cursor over the graph, a vertical line appears over it and you can read the values in the box for the selected date.

The button allows you to zoom in the graph.
The button allows you to select the data you want to display in the graph (refer to following screenshot)



In this window, you can select up to 6 measures simultaneously
Time scale possible values are 1 hour / 2 hours / 6 hours / 12 hours / 24 hours / 2 days / 1 week

4.2.5 Synoptic



This panel displays the selected device synoptic.
In the top left corner, the UPS electrical topology is indicated (Online UPS, Line Interactive UPS, …).
A tool tip is displayed when the mouse is over one of the functional block.

Synoptic Color codes:

- UPS modules:

AC/DC	DC/AC	By-Pass	Color	Description
			Green	Status OK & Active
			Red	Internal fault & Inactive
			Grey	Status OK & Inactive or Unknown

- Battery module:

Symbol	Color	Description
	Green	Status OK
	Orange	Battery charge is less than 50%
	Red	Battery fault or End-of-backup
	Grey	Battery status unknown

- Electrical flows:

Symbol	Color	Description
	Yellow	Current flow through the cable Note: the object animation gives the direction of current flow
	Grey	No current flow through the cable (Warning the cable may be under voltage)

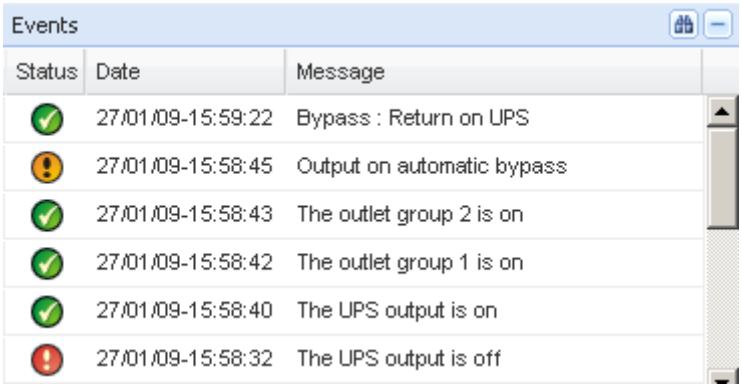
- Electrical power source at UPS input:

Symbol	Color	Description
	Green	Source powered. Status OK
	Grey	Source not powered or status unknown
	Examples of combinations between flow status and power source status:	
	Green/ Yellow	The electrical power source is powered and provides electrical flow
	Green/ Grey	The electrical power source is powered and does not provide electrical flow

- Load at UPS output: (its status is linked to that of the UPS output status)

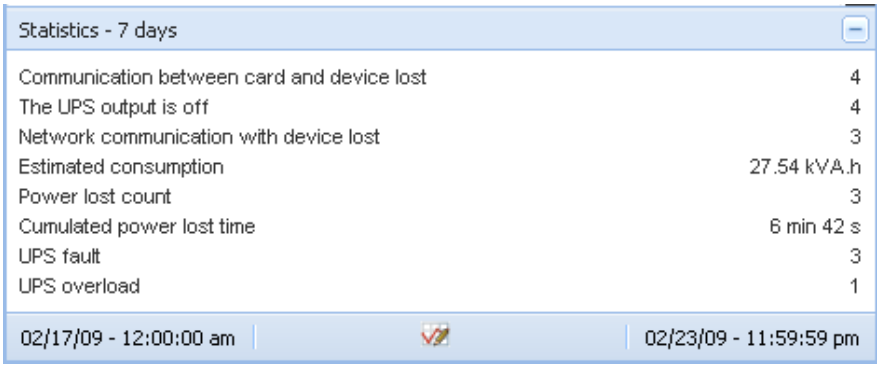
Symbol	Color	Description
	Green	Load powered and protected. Status OK
	Red	Load not powered
	Grey	Load status unknown
	Examples of combinations between flow status and load status:	
	Yellow/ Green	Load powered and protected
	Grey/ Red	Load not powered

4.2.6 Events



This panel displays the events list of the selected node. You can sort the events according to Status, Date, and Message by clicking on the column header.

4.2.7 Statistics



This panel displays the statistics of the selected node.
The button allows you to select the time interval for the statistics.
You can adjust the time interval by clicking on the 2 buttons with the “From” and “To” dates.

Here is the list of Statistics Computed Data:

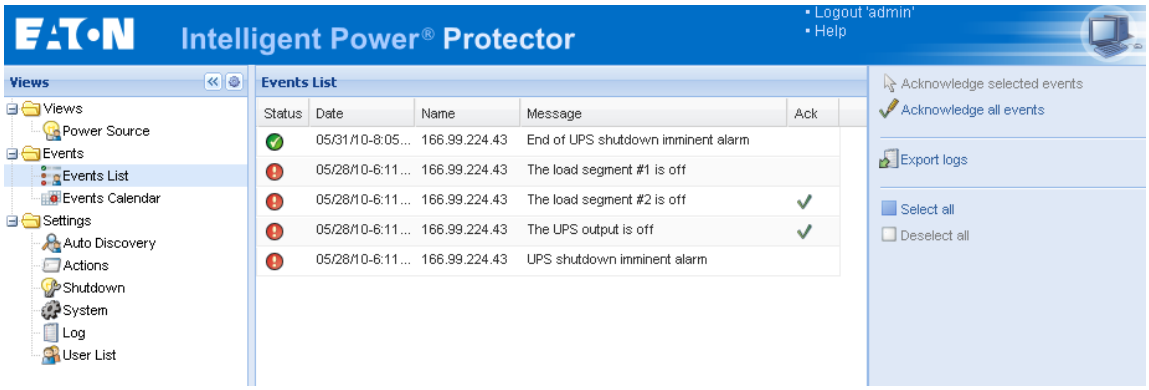
- Apparent Consumption (or Active Consumption in next release)
- Average Apparent Power (or Average Active Power in next release)
- Power Failure Count
- Power Failure Cumulated Duration
- Battery Fault Count
- Internal Failure Count
- Overload Count
- Warning Alarm Count
- Critical Alarm Count
- Output Off Count
- Communication Lost Count

Note: This information depends on device capabilities

4.3 Events

4.3.1 List representation

Select the **Events -> Events List** and the following page appears:



Alarms list.

Buttons on the bottom toolbar allow filtering on unacknowledged alarms of the corresponding level.

All new alarms are stored in this log.

You can sort the alarms according to **Status**, **Date, Name**, **Message and Ack.**

The following functions are available:
Acknowledge selected events will add a check box in the **Ack** column for selected events
Acknowledge all events will add a check box in the **Ack** column for all events

Note: When an alarm is acknowledged, it is marked with a checkbox but it is still viewable in this Event list
It decreases the number of non acknowledged alarms at the bottom of the Web page
The acknowledged alarms disappear in the PowerSource -> Event panel

Export Logs will create a logs.csv file with the following syntax:

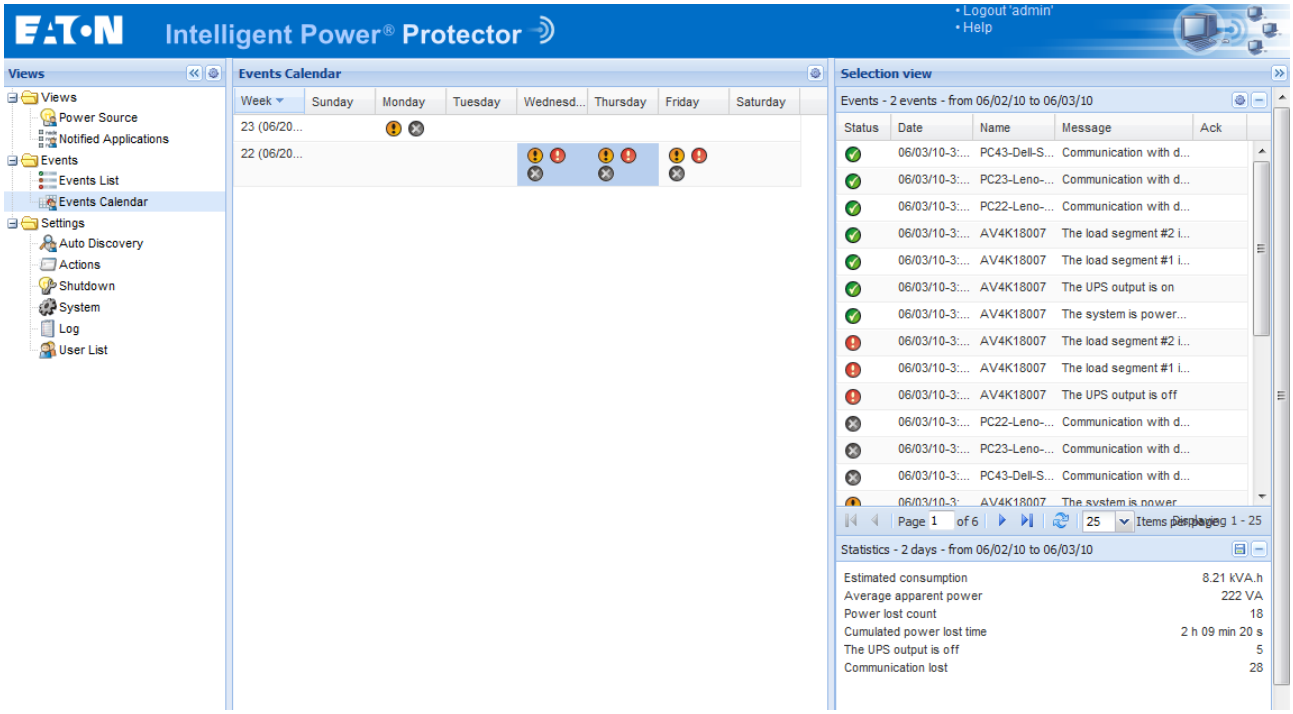
```
"Date";"Node";"Type";"Level";"Object";"Value";"Message";
"2009/01/27-18:35:20.840";"166.99.250.83";"Measure";"0";"UPS.PowerConverter.Input[1].Frequency";"49";"";
```

Select all will select all displayed events
Deselect all will deselect all selected events

Tips:
You can select one alarm by clicking on it
You can select several alarms with Shift Click or Alt click
Then the selected lines appear in dark blue

4.3.2 Calendar representation

Select the **Events -> Events Calendar** and the following page appears:
In this matrix representation, each line is a week and each column is a day in the week.
If you select a day or an interval (with date picker or shift+click command), events and statistics panels will give you all information for this selection and will automatically refresh when new statistics have been computed.



4.3.3 Nodes Events list

The icons in the different views represent the event severity.

Icon	Event status
	**Normal**. With this event, the UPS device is coming back to a normal status. **Event list (UPSs):** ▪ Communication with device is restored ▪ Communication restored with UPS ▪ The system is powered by the utility ▪ The UPS output is on ▪ Communication restored with UPS ▪ Battery OK ▪ UPS returns to normal load ▪ UPS OK ▪ Bypass : Return on UPS ▪ End of low battery alarm ▪ The outlet group 1 is on ▪ The outlet group 2 is on ▪ Communication failure with environment sensor ▪ Communication restored with environment sensor ▪ Humidity is in normal range ▪ Temperature is in normal range ▪ Input #x on ▪ Input #x off ▪ End of warning alarm ▪ End of critical alarm ▪ Redundancy restored ▪ Protection restored

Warning. A problem occurred on the UPS device. Your application is still protected.

Event list (UPSs):

- The system is powered by the UPS battery
- Output on automatic bypass
- Output on manual bypass
- Humidity is below low threshold
- Humidity is above high threshold
- Temperature is below low threshold
- Temperature is above high threshold
- Warning Alarm *(a generic Warning alarm is active on the device)*
- The device is under its load alarm threshold
- The device is over its load alarm threshold
- Protection lost
- Redundancy lost
- Shutdown in {time}
- Remote Communication Error (remote communication or configuration issue is detected)

Critical. A serious problem occurred on the UPS device. This problem requires an urgent action. Your application might NOT BE powered anymore.

Event list (UPSs):

- The UPS output is off
- The outlet group 1 is off
- The outlet group 2 is off
- Battery fault
- UPS overload
- UPS fault
- Low battery alarm
- Applications must stop immediately...
- System shutdown in progress...
- Critical alarm *(a generic Critical alarm is active on the device)*

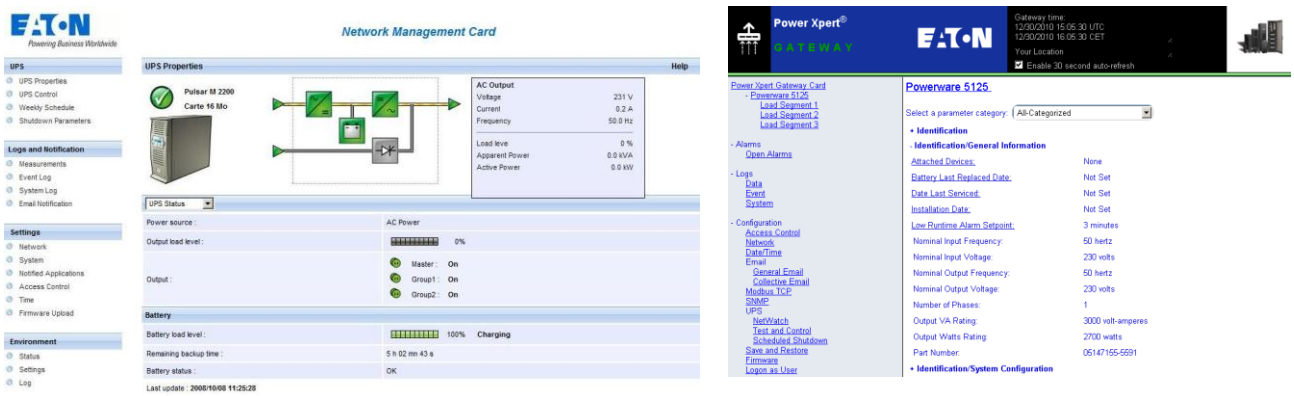
Communication lost

Event list:

- Communication failure with Device or Application

4.4 Launching Device Web interface

From the **Status** panel, you can access the Web Page for Eaton cards including an on-board web server. Click on the web **Link** associated to this blue icon (http access) or this yellow one (https access).



Opening different Web interfaces from Intelligent Power® Protector.

4.5 IPP – Unix status interface

To view the current state of the UPS that powers the server running Intelligent Power® Protector, use the following command, from a terminal (if ipp-status is not found, try to open a new terminal):

```
$ ipp-status
```

A status text screen will be displaying, providing essential information on the power protection:

```
$ ipp-status
Your system is protected

Devices status:

Identifier          Status              Runtime
----------          ------              -------
UPS1                online              6:38:37
UPS2                online              1:03:27
$
```

The script offers several switches that may be useful for further scripting (easy extraction of the provided information).
The full usage information is obtained via the –h switch:

```
$ ipp-status –h
```

```
$ ipp-status -h
Usage: ipss-status [OPTIONS]

OPTIONS:
    -h                Print this help and exit
    -S                Don't show overall status
    -s                Show overall status in short form of "(un)protected"
    -q                Do not print anything; instead, exit with 0/non-0
                      if the system is/isn't protected, respectively
    -D                Don't show devices status
    -d                Show devices report in scripting-friendly form

Full devices status report consists of the device ID, its status
(as readable meaningful string) and on-battery runtime in form [[H:]MM:]SS.
In the short form (for scripting), the runtime is shown in seconds
and the fields are separated by colon.

$
```

For example, the following invocation provides easily parsed device info :

$ ipp-status –Sd

```
$ ipp-status  -Sd
UPS1:online:23917
UPS2:online:3681
$
```

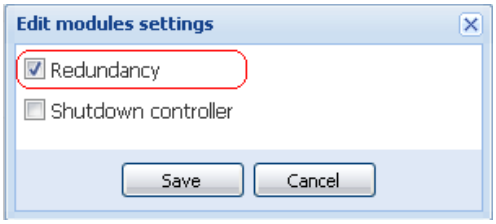
5 Redundancy

Note: This chapter does not apply to IPP for Unix. Please refer to chapter 5.7.

5.1 Introduction

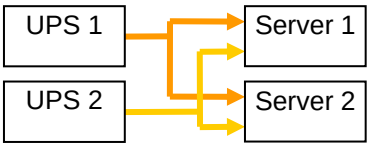
Intelligent Power® Protector provides management for composite devices. Composite devices are virtual nodes composed of nodes mounted with specific redundancy schemas (*Redundant Supplies*, *Hot Standby* or *Static Transfer Switch* for two components and *Parallel* for two or more components) and a dedicated redundancy level.

This Redundancy feature has to be Enabled from the **Settings** -> **System -> Modules Settings** Intelligent Power Protector will then shutdown a local computer powered by several UPSs (composite device).

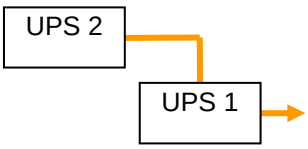


Here are illustrated the electrical redundancy topologies:

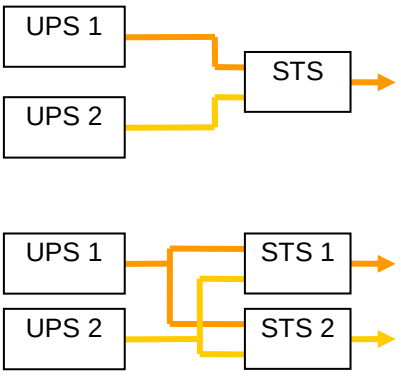
- Redundant Supplies

	In this case the two UPSs provide power on one or several multiple feed servers.

- Hot Standby

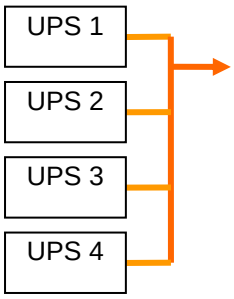
	For "Hot Standby" mode, when the upstream UPS powers the load, the downstream UPS is on bypass.

- Static Transfer Switch for two components



For "STS" mode there are several cases with single STS or multiple STSs.

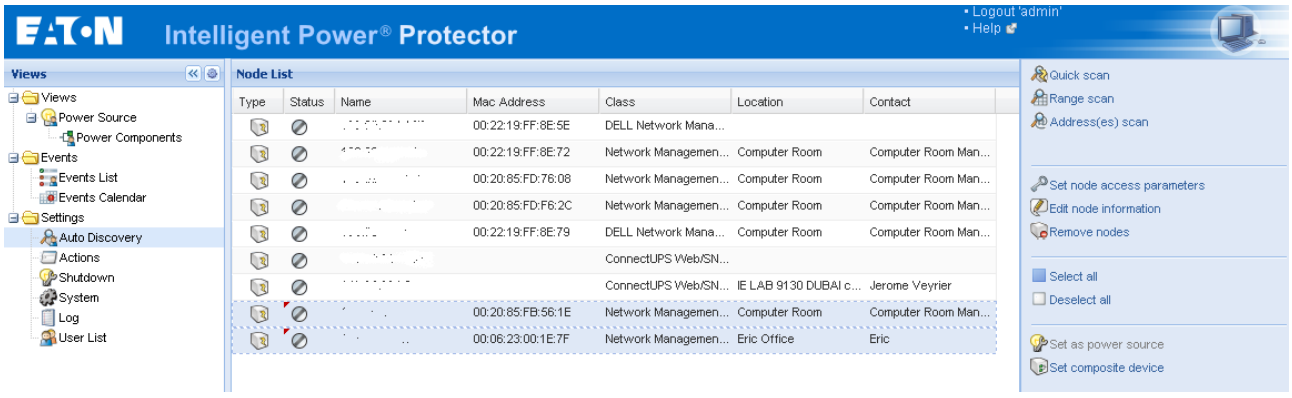
- Parallel for two or more components



All the UPSs power the load at the same time.

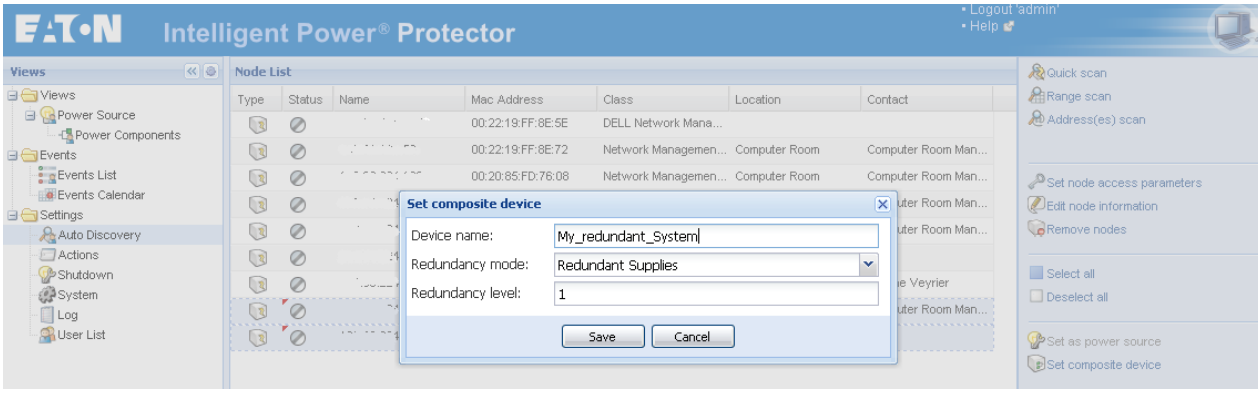
5.2 Redundancy configuration

- Login with an administrator user profile
- Select two or more nodes and click on the *"Set composite device"* menu item:



- In the dialog box, enter redundancy mode and level, eventually specify a device name
  Device name: User name of the composite device
  Redundancy mode: Refer to the Introduction chapter to select the correct electrical topology

(Parallel / Redundant Supplies / Hot Standby / Static Transfer Switch)
Redundancy Level: It is the minimal number of redundant UPSs powering your system:
The default value is 0.
If you set this parameter to a higher level you will receive the Redundancy Lost alarm when you don't have enough redundant UPSs.



- Then the new node is created.
- You can see it in the *"Auto discovery"* node list:

You can select it as power source.

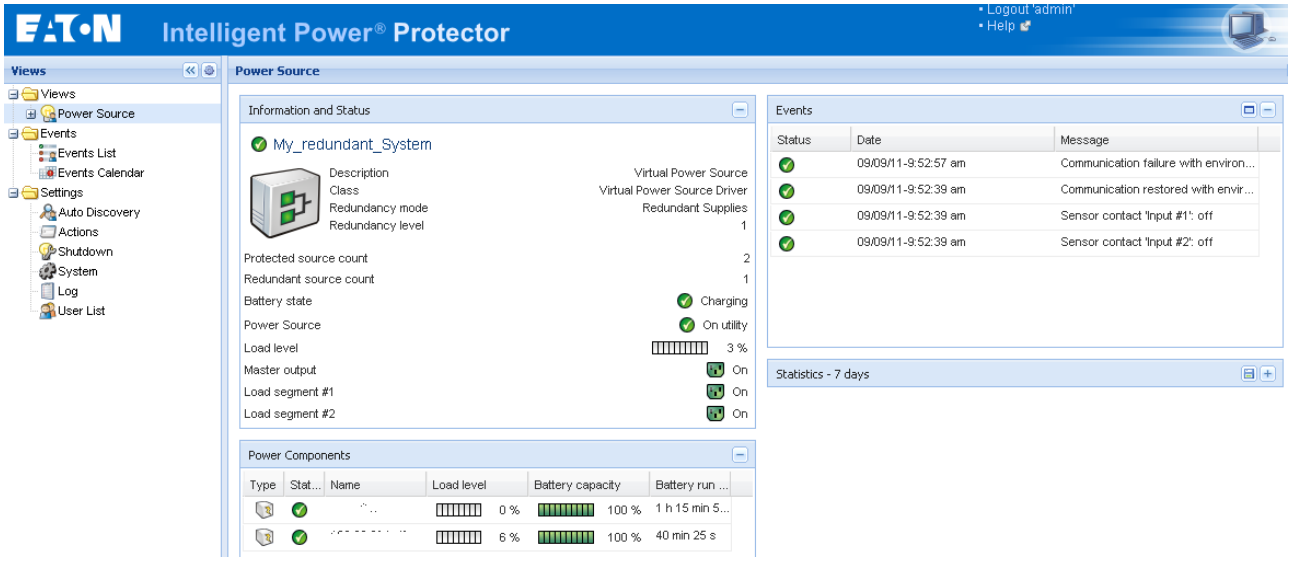
You can edit composite device properties by selecting it in the discovery view then click again on the *"Set composite device"* menu item.

If you select components of a composite device and click on the *"Set composite device"* menu item again, properties of existing composite device are shown; no new composite device is created so no composite device duplication is possible.

5.3 Redundancy views

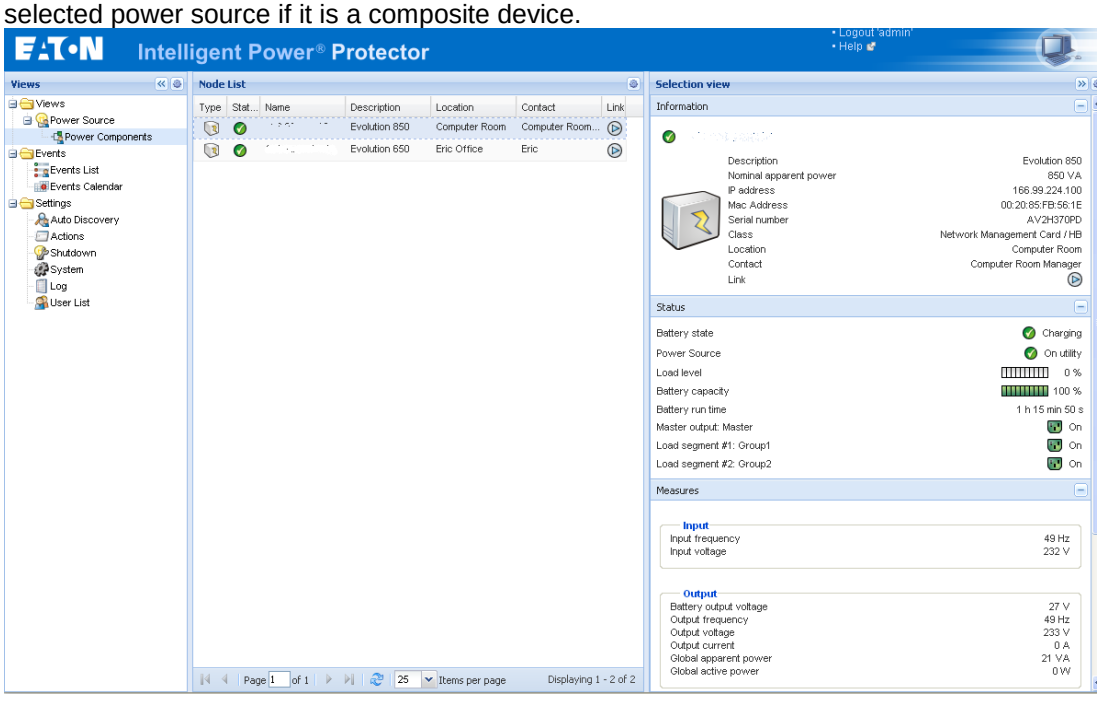
5.3.1 Composite device in *Power source view*

When *"Redundancy"* module is activated, a composite device can be selected as power source. The user can show it in the *"Power Source"* view.
In this case, *Information"*, *"Status"*, "*Events"* and *"Power components"* panels are displayed with specifics data.



5.3.2 Power components sub view

When *"Redundancy"* module is activated, a new view called *"Power components"* is available as a sub view of *"Power source"*. This view shows a list of nodes with their properties but just with components of the selected power source if it is a composite device.

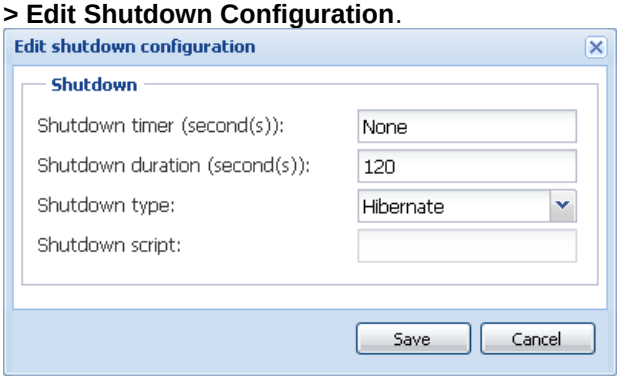


5.4 Redundancy use case

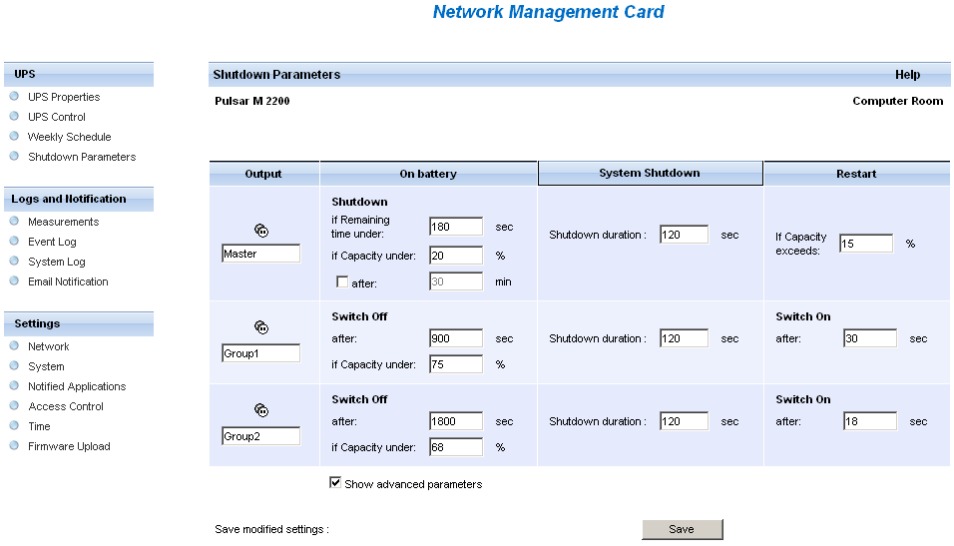
We describe several typical use cases that will help you to configure properly the redundant shutdown sequence according to your needs.

Use Case #1: The user wants to have the longest backup time with the redundant configuration

⇨ This is the default IPP configuration.
The next screenshot illustrates this IPP default configuration available from **Settings -> Shutdown -> Edit Shutdown Configuration**.

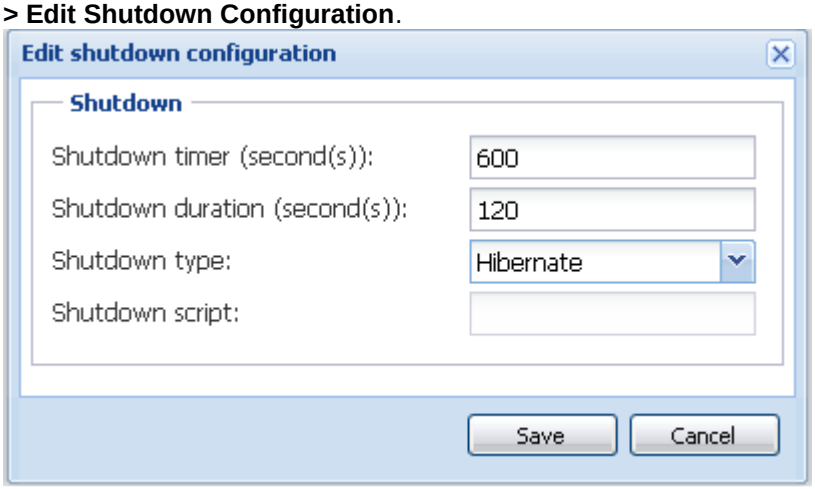


⇨ This is the default configuration on WEB / SNMP UPS CARD
e.g. with Network-MS (ex 66102 / 103006826) and Modbus-MS (ex 66103), WEB / SNMP UPS CARD default shutdown configuration is available from **UPS-> Shutdown Configuration** as illustrated on next screenshot:



Use Case #2: The user wants to have a shutdown after a predefined time of 10 mins. The shutdown has to occur even if only one UPS is on battery**.**
In this case, each server can have its own shutdown timer (10 mins, 8 mins, 6 mins…)

- ⇨ The user has to configure a shutdown timer of 10 mins in IPP.
  The next screenshot illustrates this IPP default configuration available from **Settings -> Shutdown -> Edit Shutdown Configuration**.

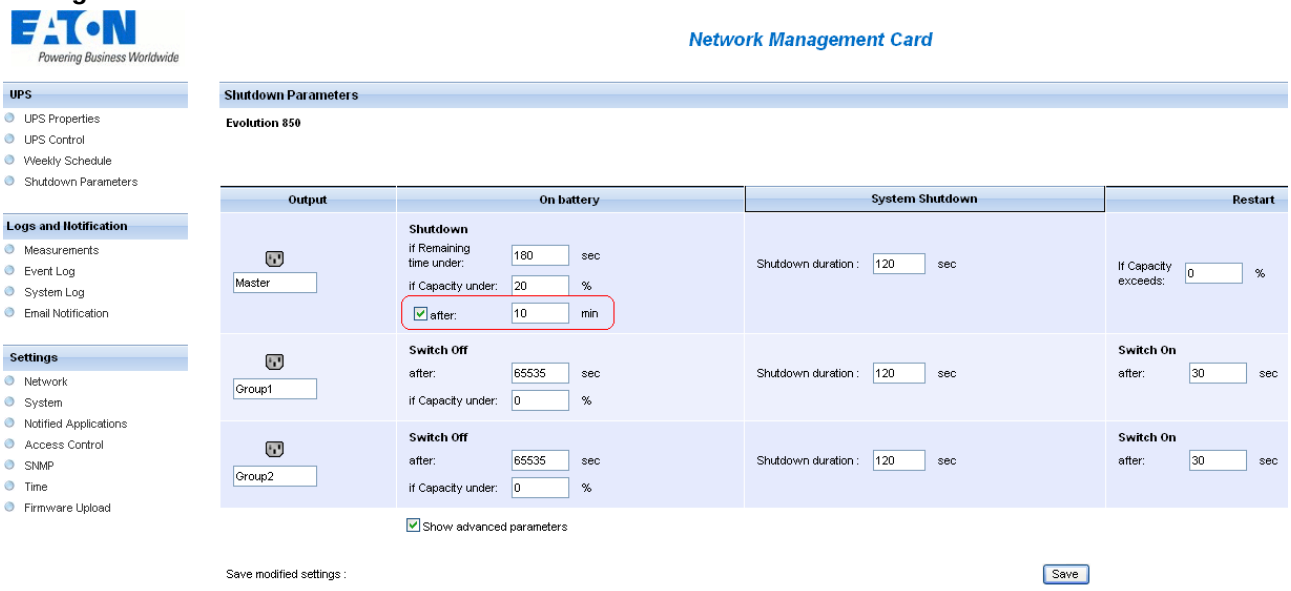


- ⇨ this is the default configuration on WEB / SNMP UPS CARD (refer to previous use case)

Use Case #3: The user wants to have a shutdown starting 10 mins from the last detected Utility failure event. (We have 2 UPSs, one of them is redundant)
In this case, all servers shut down at the same time.

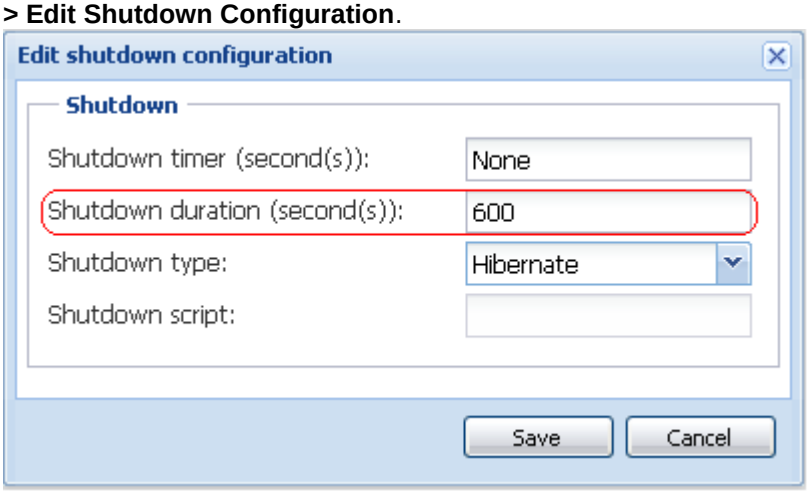
- ⇨ This is the default IPP configuration
- ⇨ The user has to configure a shutdown timer of 10 mins in all the WEB / SNMP UPS Cards
  In this case; the last UPS will send the shutdown order after 10 min. if it runs on battery. If the last UPS never run on battery, the first UPS will simply shutdown at the end of autonomy and the last UPS will take the load.(if it has the capacity, otherwise the shutdown will occur sooner)
  WEB / SNMP UPS CARD Shutdown configuration is available from **UPS-> Shutdown**

Configuration as illustrated on next screenshot:



Use Case #4: The user wants to have a shutdown when the remaining time of the last UPS is 10 minutes In this case, each server can have its own shutdown duration (10 mins, 8 mins, 3 mins…)

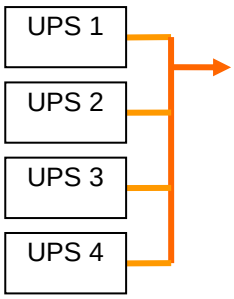
⇨ The user has to configure a shutdown duration of 10 mins in IPP.
The next screenshot illustrates this IPP default configuration available from **Settings -> Shutdown -> Edit Shutdown Configuration**.



⇨ This is the default configuration on WEB / SNMP UPS CARD (refer to previous use case)

5.5 Redundancy advanced behavior

For the following tables we take a parallel UPS configuration with 4 UPSs (Each UPS is 20 kW)
For this parallel topology, the Load can vary between 0 and 80 KW.



Redundancy alarm Management with 4 modules:

According to the user defined “Redundancy Level” and the “Load”, we detail following information:

- R is the number of redundant UPSs
- Status of Redundancy lost alarm

Load / Redundancy Level	Load < 20 KW	20 KW < Load < 40 KW	40 KW < Load < 60 KW	60 KW < Load < 80 KW
0	R=3	R=2	R=1	R=0
1	R=3	R=2	R=1	R=0 → Redundancy Lost active
2	R=3	R=2	R=1 → Redundancy Lost active	R=0 → Redundancy Lost active
3	R=3	R=2 → Redundancy Lost active	R=1 → Redundancy Lost active	R=0 → Redundancy Lost active

Protection alarm Management with 4 modules:

According to the “Load” and the “Number of failed UPSs”, we detail following information:

- P is the number of UPSs protecting the load
- R is the number of redundant UPSs
- Status of Protection lost alarm

Load / Failures	Load < 20 KW	20 KW < Load < 40 KW	40 KW < Load < 60 KW	60 KW < Load < 80 KW
No failure.	P=4; R=3	P=4; R=2	P=4; R=1	P=4; R=0
1 failure.	P=3; R=2	P=3; R=1	P=3; R=0	P=3; R=0 → Protection Lost active
2 failures.	P=2; R=1	P=2; R=0	P=2; R=0 → Protection Lost active	P=2; R=0 → Protection Lost active
3 failures.	P=1; R=0	P=1; R=0 → Protection Lost active	P=1; R=0 → Protection Lost active	P=1; R=0 → Protection Lost active
4 failures.	P=0; R=0 → Protection Lost active	P=0; R=0 → Protection Lost active	P=0; R=0 → Protection Lost active	P=0; R=0 → Protection Lost active

5.6 Redundancy compatibility list

Eaton has tested in redundant mode following UPSs and topologies
Other topologies or UPSs may work but have not been tested

UPS	Parallel	Multiple Feed	Hot Standby	STS
9120, 9130, 9135	NA	✓NET ✓USB	NA	✓NET ✓USB
Eaton 5PX, Evolution, Evolution S	NA	✓NET ✓USB	NA	✓NET ✓USB
Pulsar 700 / 1500 (Intl. & US)	NA	✓NET ✓USB	NA	✓NET ✓USB
Pulsar M / EX	NA	✓NET ✓USB	NA	✓NET ✓USB
Pulsar MX 1+1	✓NET	NA	NA	NA
Pulsar MX Frame 16 U	NA	✓NET ✓USB	NA	✓NET ✓USB
EX RT	NA	✓NET	✓NET (*)	✓NET

UPS Compatibility List for Redundancy on 1-phase UPSs

UPS	Parallel	Multiple Feed	Hot Standby	STS
Blade UPS	✓NET	✓NET	NA	NA
9x55 (9155 and 9355)	✓NET	✓NET	NA	NA
9390	✓NET	✓NET	NA	NA
9395	✓NET	✓NET	NA	NA
Eaton 9E Essential	NA	✓NET	NA	NA

UPS Compatibility List for Redundancy on 3-phases UPSs

✓NET: Acquisition through the Network Card
✓USB: Acquisition through USB
NA: Not Applicable
✓NET (*): Behavior has been implemented, but has not been tested

5.7 IPP – Unix and redundancy

When IPP is directly connected to UPS (either via network or serial connection), you may configure it with several UPS. Whenever you set-up more than one UPS, IPP will ask you to give the number of power supplies that must be receiving power to keep your system running.
This is useful in case you have a server with redundant power supplies which allow it to run with only one of the power supply available. In this case you can set the number of power supply needed to less than the number of UPS configured.

6 Advanced Management

The Intelligent Power® Manager (1.12 minimum version) can **remotely**:

- Display an Intelligent Power® Protector configuration.
- Configure a single Intelligent Power® Protector.
- Synchronize multiple Intelligent Power® Protector configurations.
- Trigger the Intelligent Power® Protector Upgrade

More details are available in Intelligent Power® Manager user's manual. (You can evaluate the free version to manage up to 10 nodes from http://powerquality.eaton.com)

7 Compatibility List

Eaton has tested the compatibility of Eaton Power Protector with the following devices and applications:

7.1 Eaton Serial line Devices

Eaton Equipment designation	Connectivity
Eaton **Powerware** series: 3105, 5110, 5115, 5130, 9130, 9135, 9140 and legacy 9120, 9125	USB or RS232
Eaton **Powerware** series: BladeUPS, 5125, 9155, 9355, 9390, 9395	RS232 only
Eaton **Pulsar** Series: Eaton 5PX Evolution 650 / 850 / 1150 / S 1250 / 1550 / S 1750 / 2000 / S 2500 / S 3000 Pulsar 700 / 1000 / 1500 / 1000 RT2U / 1500 RT2U (intl. & US Models) Pulsar M / EX Pulsar MX & Pulsar MX Frame 16 U / MX	USB or RS232
Eaton **Pulsar** Series: EX RT Comet EX RT 1:1 / 3:1 / EX 5 RT (Asia/Pacific)	RS232 only

Notes:

- XSlot-USB Module for Powerware series is unsupported by Intelligent Power® Protector 1.10
- Ellipse ASR 600/750/1000/1500 USBS, Ellipse MAX, Protection Station, Protection Center, NOVA AVR, are currently supported by Personal Solution Pac software.

7.2 Eaton Network Devices

Eaton equipment designation	Type	Illustration
Network Management Card MiniSlot SNMP/Web – Network-MS (ex 66102) (DA firmware revision and above) And associated Environment Sensor	UPS Option Card Eaton **Pulsar**	
Network Management Card & Modbus/JBus –Modbus-MS (ex 66103) (through Ethernet Network) And associated Environment Sensor 66846	UPS Option Card Eaton **Pulsar**	
ConnectUPS-MS MiniSlot Network Management Card Network-MS (ex 103006826) And associated Environment Sensor	UPS Option Card Eaton **Powerware**	
ConnectUPS-BD Web /SNMP P/N 116750222-001 (**) And associated Environment Sensor	UPS Option Card Eaton **Powerware**	
ConnectUPS-XSlot Web /SNMP/xHubCard, P/N 116750221-001 (*) (**) And associated Environment Sensor	UPS Option Card Eaton **Powerware**	
PXGX-UPS Card	UPS Option Card Eaton	

PXGX2000 P/N 103005868-5591 (*) (***)	UPS Option Card Eaton **Powerware**	

Note: Connect-UPS-E for Powerware series should be compatible, but Eaton didn't perform official testing on it.

(*) With Intelligent Power Protector 1.10, the Eaton Powerware 3 phase UPSs compatibility is officially available according to the following solution:

- ***Cards:*** *ConnectUPS-X v4.32 or PXGX2000 v1.4.2.1*
- ***UPSs:*** *Blade UPS, PW9155 Dual Phase, PW9355 10-30 kVA, PW9390 40-160 kVA, PW9395 225-1100 kVA & SBM*
- ***Known limitation:*** *PW9315 will not be supported by this 1.10 release.*

(**)Required Connect UPS XSlot/BD configuration:

- ⇨ Set the IPP discovery password to the same value as the Web /SNMP read community name (default is public)
- ⇨ In ConnectUPS Write Access Managers control menu (via telnet, ssh or serial connection): disable SNMP access restricted by IP/Hostname (this is the default setting since firmware version 2.02) or configure it correctly (IPP has to be configured in trusted host list)

(***)Required PXGX 2000 / PXGX-UPS configurations:

- ⇨ Set the IPP discovery password to the same value as the PXGX read community name (default is public)
- ⇨ In PXGX Access control page: disable SNMP access restricted by IP/Hostname or configure it correctly (IPP has to be configured in trusted host list)
- ⇨ In PXGX Take care to configure PXGX in SNMP V1 or SNMP V1 + V3

7.3 Eaton Legacy cards

These cards should be compatible, but Eaton didn't perform official testing on them.

Eaton equipment designation	Type	Illustration
MGE Network Management Card MiniSlot SNMP/Web – 66244 And associated Environment Sensor	UPS Option Card (legacy)	
Network Management Card Transverse SNMP/Web – 66074 And associated Environment Sensor	UPS Option Card (Legacy)	

7.4 Network Ports

Here is the list of Network ports used by IPM and IPP:

Protocol	Mode/Port	Network MS/ NMC	PXGX2000, PXGX-UPS, ConnectUPS BD, ConnectUPS XSlot	IPP with Shutdown controller	IPP	IPM
SMTP	TCP/25	OUT	OUT	OUT	OUT	OUT
DHCP/BOOTP	UDP/67	OUT	OUT	x	x	x
TFTP	UDP/69	IN	x	OUT	OUT	OUT
HTTP	TCP/80	IN	IN	OUT	OUT	OUT
NTP	UDP/123	OUT	OUT	x	x	x
SNMP	UDP/161	IN	IN	OUT	OUT	OUT
SNMP Traps	UDP/162	OUT	OUT	x	x	x
UNMP	UDP/200	x	OUT	IN/OUT	IN/OUT	IN/OUT
HTTPS	TCP/443	IN	IN	OUT	OUT	OUT
EATON Supervision	TCP/4679	x	x	IN/OUT	IN/OUT	IN/OUT
EATON Notification Broadcast	UDP/4679	IN/OUT	x	IN/OUT	IN/OUT	IN/OUT
EATON SSL Supervision	TCP/4680	x	x	IN/OUT	IN/OUT	IN/OUT
EATON Alarms Broadcast	UDP/4680	OUT	x	IN	IN	IN
EATON Connected Alarms	TCP/5000	IN	x	OUT	OUT	OUT
EATON Connected Alarms	TCP/5001	x	x	IN	OUT	OUT

8 FAQ and Error messages

In the HTML pages:

Cannot display the UPS properties page. HTTP 404 error with IE.
Solution: Check the URL entered. > https://<name or IP of the computer hosting IPP>:4680/ or > http://<name or IP of the computer hosting IPP>:4679/

In Ubuntu's Software Center:

Message "The package is of bad quality"
Solution: This is a known issue specific to Ubuntu Software Center. Just click the "ignore and install" button.

In the Linux Graphical System integration:

Linux (Debian and Ubuntu, with Gnome) Eaton-Intelligent Power Manager - "Open" shortcut is not present
Solution: The menu shortcut will appear the next time you will launch Gnome. In the meantime, simply open a web browser and enter the following URL: http://localhost:4679/

Linux (OpenSuSe 11, with KDE) Eaton-Intelligent Power Manager - "Open" shortcut is not visible
Solution: To find IPP icon, use the 'Search' function from the Application Menu. You should then find IPP icon in the Favorites section.

Linux (Red Hat, OpenSuSe and Mandriva) Notification icon ("system tray icon") is not started upon installation or upgrade
Solution 1: Launch the following command, as your standard user, from a terminal or using a "Launch" feature: `$ /usr/local/Eaton/IntelligentPowerProtector/mc2 -systray` Note that if you launch this command from a terminal, you will need to add an ampersand (" &") at the end of the command line, in order to detach the process. **Solution 2:** Close your graphical session, and log into a new one. The notification icon will be automatically started with the new graphical session.

Linux (Unity desktop) Eaton-Intelligent Power Manager - "Open" shortcut is not present

Solution: Open a terminal and type the following line :
 	
`sudo xdg-desktop-menu install --novendor`
`/usr/local/Eaton/IntelligentPowerProtector/desktop/Eaton.directory`
`/usr/local/Eaton/IntelligentPowerProtector/desktop/IPP.directory`
`/usr/local/Eaton/IntelligentPowerProtector/desktop/Open.desktop`
 	
After this you can type "open" in the search box of the unity menu to retrieve the "Open" shortcut.
 	
You can also simply open a web browser and enter the following URL: http://localhost:4679/

In the Linux Network System integration:

Linux: Network proxy not detected If your network proxy was not detected during installation, you will not be able to access automatic update and other Internet resources from IPP. This can be validated by the absence of `proxy.cfg` under `/usr/local/Eaton/IntelligentPowerProtector/configs/`

Solution:
Create a file name `'proxy.cfg'` under `/usr/local/Eaton/IntelligentPowerProtector/configs/` with the following content:
 	
`{`
`  'proxyHost': "your.proxy.address.com",`
`  'proxyPort': "proxy_port"`
`}`
 	
For example:
 	
`{`
`  'proxyHost': "proxy.domain.com",`
`  'proxyPort': "8080"`
`}`
 	
Then restart IPP to reload the configuration

Linux: IPP Linux displays the Network Communication lost alarm after 20 minutes only
Solution: Improvement in a next release

When activating Shutdown Controller under Linux

When you enable the Shutdown Controller optional module, a problem in the IPP service initialization occurs on Linux.
Solution: The issue can be easily solved by restarting the IPP daemon once the “Shutdown Controller” module has been activated. There is no need to restart the IPP daemon when disabling this feature.

In Events and actions with some Windows x64 bits OS

When the shutdown command is called from the IPP context, the system doesn't find it because it is searched in "C:\Windows\SysWOW64" even if the specified path is explicitly "C:\Windows\System32\shutdown.exe". This is a problem of some Windows x64 OS versions (e.g. XP x64 and 2003 x64). This problem doesn't appear on Windows 7 x64 for example.
Solution: Retrieve "shutdown.exe" from the "C:\Windows\System32\" folder and copy it into "D:\IPP\" for example. Then modify "shutdown.bat" to explicitly call "D:\IPP\shutdown.exe"

In Windows Vista Hibernate sequence:

By default IPP runs an Operating System hibernate. Unfortunately, the Hibernate option of Windows Vista is sometimes no more available after a "Disk Cleanup". In this case Windows Vista hibernate fails.
Solutions: Change the IPP shutdown configuration from "Hibernate" to "Shutdown" Or Execute the command "Powercfg -h on" under an administrator account, to restore the Windows Vista hibernate option. http://support.microsoft.com/default.aspx?scid=kb;EN-US;928897#LetMeFixItMyself

In shutdown sequence:

PW 9130 UPS doesn't shutoff as expected when IPP is connected through USB/Serial and when a Web SNMP card is plugged into the slot
Solution: you have to disable the UPS shutoff command from the card interface to ensure a proper shutdown of your machine protected by IPP. For that, go to the "Configuration/UPS Shutdown and Restart Settings" page of the card and select "No" for the parameter "Load Segment to Turn Off after OS Shutdown". Note: If you have chosen to use the USB/serial connector for communication between IPP and your UPS which also has a web card inside, it is better to disable the shutdown criteria of the card to ensure the shutdown and the restart of your machine.

When connected through Serial RS232, sometimes Pulsar UPSs don't shutoff as expected. In this case the UPS does not take into account "Shutdown Duration" parameter of Intelligent Power Protector.
Solution: Use USB connection. Next IPP version will implement this correction in RS232.

9 Glossary

IP address
When TCP/IP is installed on a computer, an address is assigned to the system. Each address is unique and is made up of four numbers, each between 0 and 256 (e.g. 168.8.156.210).

NMS (Network Management System)
The NMS supervises SNMP devices connected to the TCP-IP Network.

Network Shutdown Module
The Network Shutdown Module is a software module that uses the information transmitted by the Network Management Card/Proxy to inform computer users on the current status of the electrical power supplied to the computer.
If the supply of the electrical power from the UPS is at risk, the Network Shutdown Module initiates an orderly shutdown of the computer under the most secure conditions possible.

SSL (Secure Socket Layer, created by Netscape)
A solution for securing transactions over the internet. SSL is a communication protocol that authenticates the data exchanged, as well as ensuring its confidentiality and integrity. The protocol uses a recognized encryption method, the **RSA algorithm with a public key** (where RSA means Rivest, Shamir and Adleman, the inventors). An RSA key is the result of operations involving prime numbers. SSL is built into the Internet browsers on the market. The padlock in the bottom of your browser screen is automatically displayed if the server sending information uses SSL.

TCP/IP (Transmission Control Protocol / Internet Protocol)
Family of protocols for the transport and network layers.

10 Acknowledgements

Huge thanks from the Eaton software development team to the following projects:

Spider Monkey

JSMiniNSPR

Ext JS

SQLite
the SQLite Project http://www.sqlite.org/.
Their generous donation of the source code to the public domain helped us for this project.

Open SSL
- This IPP product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/)
- This IPP product includes cryptographic software written by Eric Young (eay@cryptsoft.com)
- This IPP product includes software written by Tim Hudson (tjh@cryptsoft.com)

Lib USB

Net SNMP

The full License version for each of these projects is available from Intelligent Power Protector (Settings -> System -> About)