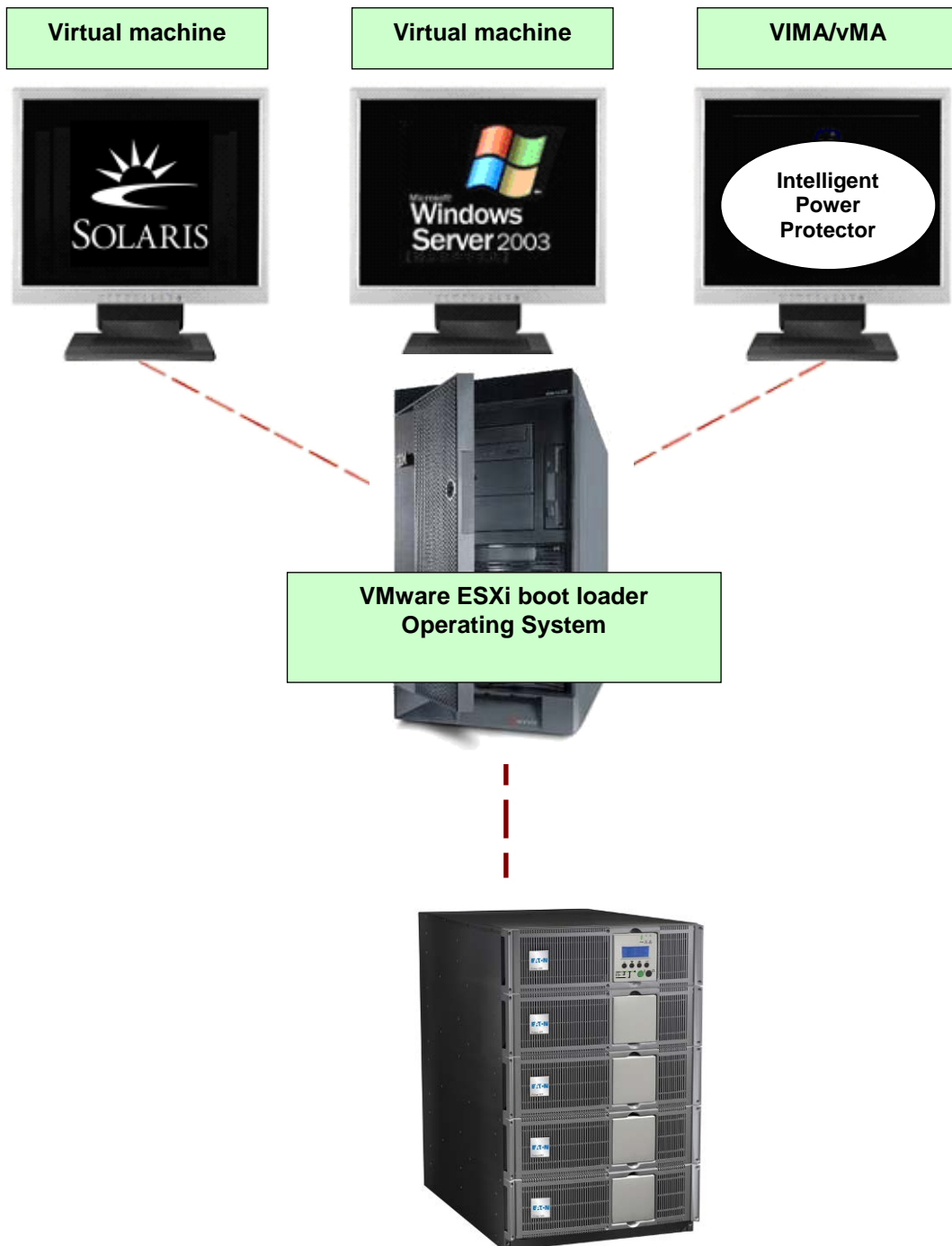


# Intelligent Power Protector(IPP)

IPP Installation and Configuration Guide  
VMware ESXi virtual architecture



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## 1. Introduction

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EATON is a world first class supplier of hardware and software to optimize business continuity on your VMware virtual platforms. It means controlling proper boot and shutdown of the virtual machines hosted on a same physical machine, assuring data integrity on each virtual machine.

Intelligent Power Protector is a solution to automate various data security functions. IPP provides following features:

- Continuously waits for information from the Management Proxy or Management Card connected to the EATON UPS.
- Warns administrators and users if AC power fails
- Proceeds system shutdown before the end of battery backup power is reached.
- Restarts machines when AC power restarts.

VMware® ESXi does not have administrative console and hence we cannot install Intelligent Power Protector (IPP) on that machine. However we can install IPP on VMware Infrastructure Management Assistant VIMA 1.0 or on vSphere Management Assistant (vMA 4.0). Using that we can manage and shutdown the VMware ESXi in case of UPS and power anomalies. We can also configure ESXi to safely suspend or shutdown guest operating system. This way we can have only one IPP shutdown agent on only one guest operating system (VIMA, vMA).

There are various benefits to install IPP client on the VIMA, vMA instead of each Virtual Machine:

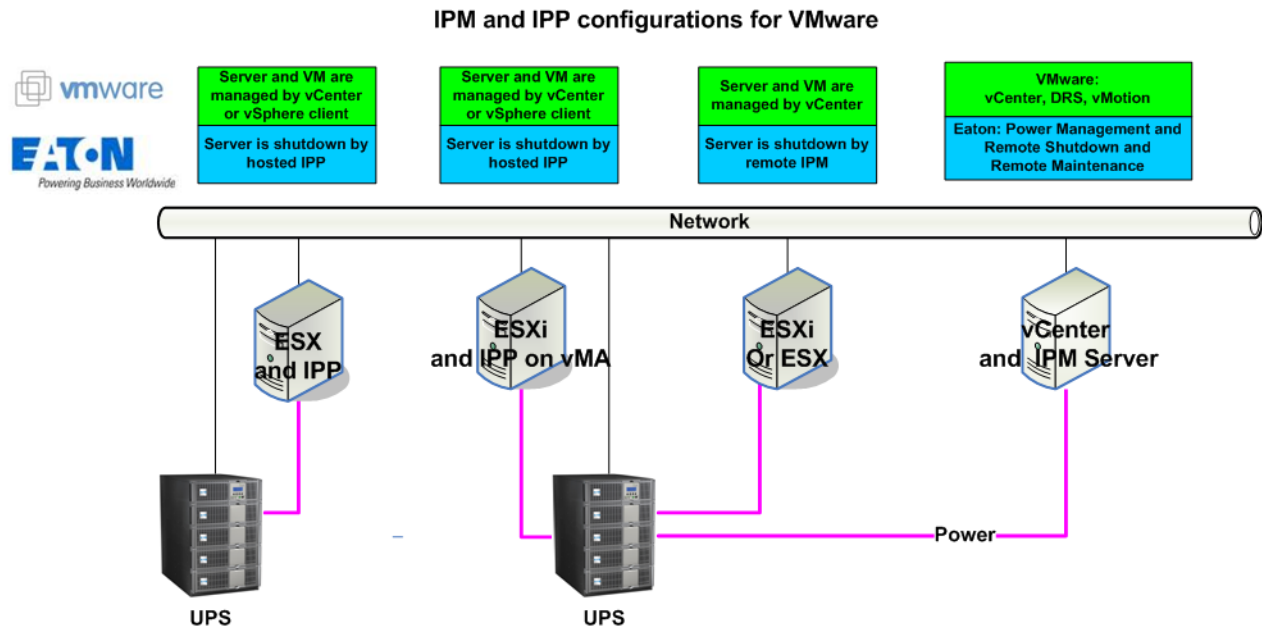
- Only one binary of IPP client on the VIMA/ vMA to manage all Virtual Machines.
- Dynamic management of virtual machines configuration with a personalized script.

This guide will help to install and configure IPP client on VIMA, vMA.

IPP client is tested on VMware virtualization server with two guest operating systems (Windows Server 2003 R2 & Red Hat 5.4) for electrical power events, shutdown, low battery and reboot.

EATON tested virtualization security in a standalone power supply configuration, for system shutdown, electrical shutdown, and reboot.

## 2. Eaton offering for VMware



Eaton provides 3 solutions for VMware that are illustrated on the previous architecture diagram:

- **the first** one provides ESX server graceful shutdown. IPP is installed on each ESX operating system.  
 This solution is the best one when:  
 => vCenter Server is not available for management of hosts  
 => Number of ESX is Limited  
 (Refer to the IPP Appendix document: User manual extension for VMware ESX 4.0).
- **the second** one provides ESXi \* server graceful shutdown. IPP is installed on a VIMA/vMA (one instance of IPP per ESXi).  
 This solution is the best one when  
 => vCenter Server is not available for management of hosts  
 => Number of ESXi is Limited  
 (\*) paid ESXi version only. Free version cannot be shutdown because of VMware restrictions.  
 (Refer to this document).
- **the third** one is for multiple ESX and ESXi servers (pay version only).  
 It provides following features  
 => Remote graceful Shutdown of multiple ESX/ESXi servers and hosted VMs.  
 => ESX/ESXi Remote maintenance (vMotion)  
 => an IPM Plug-in is created in vCenter  
 => UPS events are accessible through vCenter  
 This solution is ideal for biggest infrastructures working through vCenter server  
 This solution is described in the IPM user manual.

## 3. Installation

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This guide provides information about installing and configuring IPP on VIMA or vMA. These recommendations guide you through the installation process of IPP as a shutdown agent for VMware ESXi architecture to allow electric continuity.

### 3.1. Prerequisites

Here is the list of prerequisites:

1. VMware ESXi Server Machine up and running
2. Only ESXi **pay version** is supported by this integration process
3. VMware Infrastructure Management Assistant VIMA 1.0 or vSphere Management Assistant (vMA 4.0 or 5.0) installed as guest.
4. vSphere Client installed on different machine to VMware ESXi Server configuration.
5. IPP Package
6. SSH client for installation and configuration
7. SCP Client to upload packages to VIMA/vMA.
8. VMware tools installed on each virtual machines

#### Note:

- Through Network connection, the Eaton UPSs are compatible with IPP on ESXi
- Through RS232 /USB connection VIMA/vMA don't provide the compatibility with IPP

#### 3.1.1. VIMA/vMA installation

Please visit <http://www.vmware.com/support/developer/vima/> for more information about download and installation of VIMA or vMA on ESXi host machines.

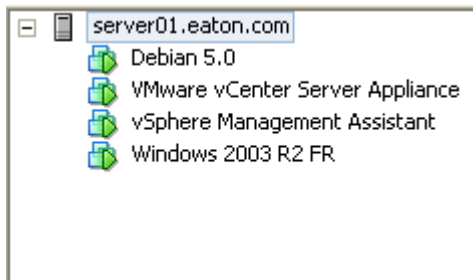
#### 3.1.2. VMware ESXi configuration

- For the automatic OS boot on startup: you must configure the physical machine to allow automatic OS boot on startup. This setting is present in your machine's BIOS. For further information, see specific technical hardware documentation.
- To allow interactions between physical and virtual machines, VMware tools have to be installed on each virtual machine. For further information, see VMware ESXi Server documentation.
- You can configure the automatic startup and shutdown properties of guest operating systems as per requirement. **But to work IPP properly, VIMA/vMA needs to be configured as**
  - Automatic Shutdown of VIMA/vMA when ESXi host is going down and
  - Automatic Startup of VIMA/vMA when ESXi host is starting

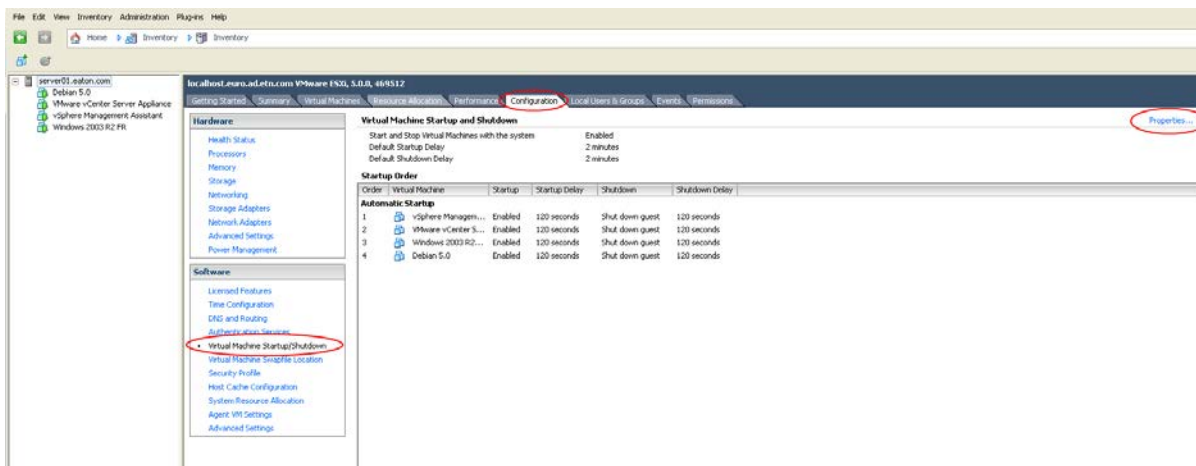
**Following procedure will explain about configuration of VIMA/vMA shutdown and startup properties**

From the Virtual Infrastructure Client interface select top-most item ESXi host server from left hand side tree hierarchy, go in the

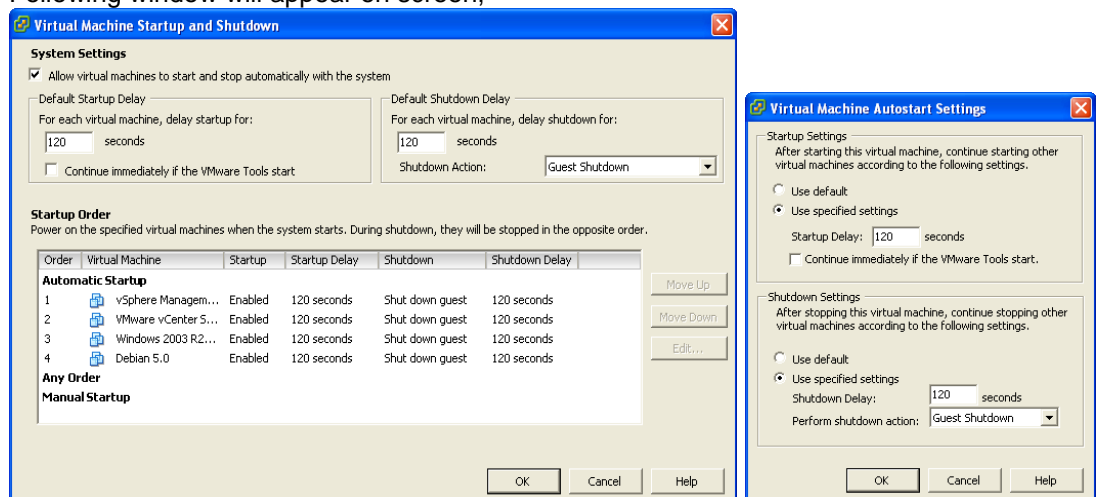
1. Select "Configuration" tab



2. Select “Virtual machine startup / shutdown” menu -> Click “Properties” present in right hand corner



Following window will appear on screen,



Select VIMA/vMA guest machine and click on edit button and configure as shown above

Startup Settings  
 Click Use specified settings  
 Startup delay – 120 Seconds

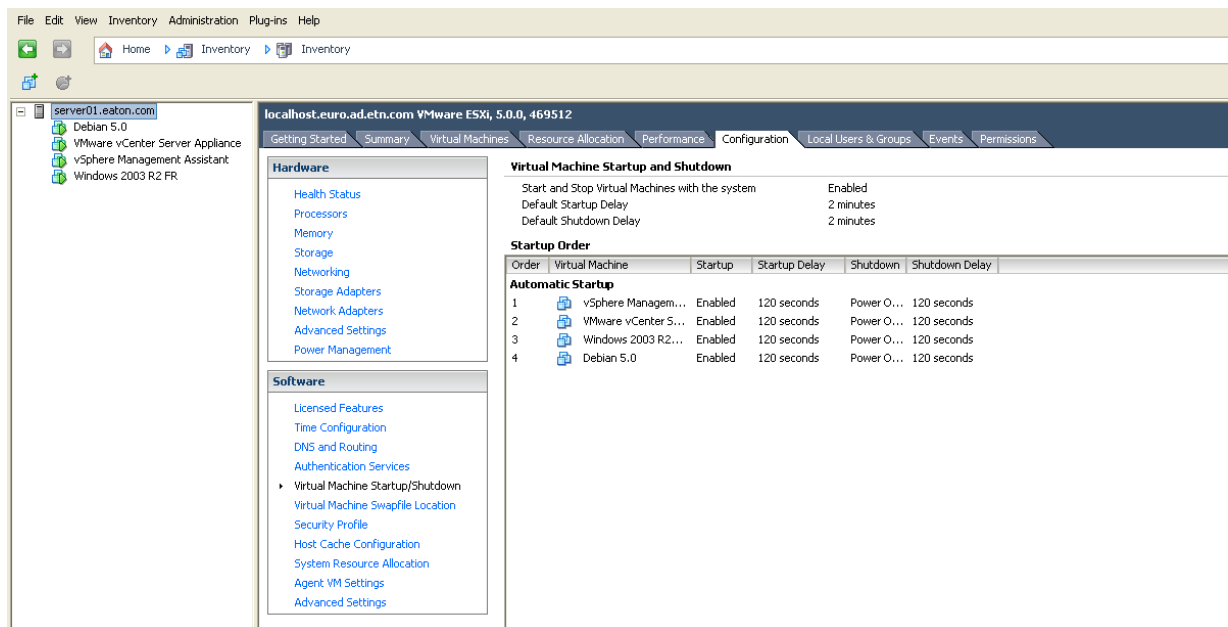
Shutdown Settings  
 Click Use specified settings  
 Shutdown delay – 120 seconds

- For the automatic virtual machine boot of other guest machines on VMware ESXi start-up:  
 From the Virtual Infrastructure Client interface, go in the  
 “Virtual machine startup / shutdown” menu → “Configuration” → “Properties” → “Start and stop  
 VMs with the system”, and tick “enable.”

**Note:** In the « Properties... » page, you also have the possibility to define the Startup Order of your virtual Machines.

Start and Stop VMs with the system : **Enabled**  
 Default Startup Delay : x Seconds  
 Default Shutdown Delay : x Seconds  
 Startup Order : Automatic Startup

This configuration is illustrated on the following screenshot:



### 3.1.3. EATON hardware architecture

The prerequisites for Intelligent Power Protector installation are described in the "Intelligent Power Protector – User Manual" chapter: “Installation Prerequisites”. (<http://pqsoftware.eaton.com>)  
 For UPS systems compatibility, please refer to the chapter “Appendix -> Compatibility List”

### 3.1.4. Network architecture

All hardware elements must have an operational network configuration that allows them to dialog freely with each other.

**Note:** vMA 5 (Suse OS) does not need any firewall setting, please go to section 3.2

**Make sure in particular that vMA firewall authorises:**

- connections on tcp port **4679** and **4680** to enable a remote access for supervision and configuration through Web Browser. These ports are reserved at IANA (<http://www.iana.org>).
- Connections through TCP port **80**. It must be opened as a destination port (for output) on the machine hosting Intelligent Power Protector.
- To enable communication between Intelligent Power Protector and Network Management Card (This step is not needed on vMA 5 (Suse OS)) :
- ```
sudo iptables -I OUTPUT -p tcp --dport 80 -j ACCEPT
sudo iptables -I OUTPUT -p tcp --dport 5000 -j ACCEPT
sudo iptables -I INPUT -p tcp --dport 4679 -j ACCEPT
sudo iptables -I INPUT -p tcp --dport 4680 -j ACCEPT
sudo iptables -I INPUT -p udp --dport 4679 -j ACCEPT
sudo iptables -I INPUT -p udp --dport 4680 -j ACCEPT
```

To enable communication between Intelligent Power Protector and Connect UPS BD/XSlot/PXGX2000.

Nota: in this command we propose the `-I` (insert) option but `-A` (append) is possible to use as well. It isn't not exactly the same. Please refer to firewall documentation for the best command for you. (This step is not needed on vMA 5 (Suse OS))

- ```
sudo iptables -I INPUT -p udp --dport 161 -j ACCEPT
sudo iptables -I INPUT -p udp --dport 200 -j ACCEPT
sudo iptables -I INPUT -p udp --dport 2844 -j ACCEPT
sudo iptables -I INPUT -p udp --dport 2845 -j ACCEPT
sudo iptables -I OUTPUT -p udp --dport 161 -j ACCEPT
sudo iptables -I OUTPUT -p udp --dport 200 -j ACCEPT
sudo iptables -I OUTPUT -p udp --dport 2844 -j ACCEPT
sudo iptables -I OUTPUT -p udp --dport 2845 -j ACCEPT
```
- Save firewall settings using following command (This step is not needed on vMA 5 (Suse OS))  

```
service iptables save
```

To configure your **VMware ESXi Server** for the network, please refer to the user manual.

### 3.2. Installation of IPP in VMware ESXi Server

Download on EATON's website the latest version of Intelligent Power Protector Console version. It will automatically detect ESXi Server, and will generate shutdown command script (available in the appendix). This shutdownESXi perl script will be installed at <installation folder>/bin/, by default /usr/local/Eaton/IntelligentPowerProtector/bin/

- Download the latest version of Intelligent Power Protector, available on EATON's website, in downloads section "EATON Power Management Software Suite":  
<http://powerquality.eaton.com/Support/Software-Drivers/default.asp>

Then:

- > select "Network solution".
- > select VMware as Operating System
- > download Linux version for ESXi, known as: « Intelligent Power Protector Linux x86 Console «Intelligent Power Protector Linux x86\_64 Console», named « ipp-linux-x.x.xxx.x86\_64.rpm».

- Upload the package on your VIMA/vMA environment, with a SCP Client



- Connect with SSH to the vMA. You must have corresponding rights to execute and install programs on VIMA/vMA. Refer to VMware Documentation for further information.

**Note:** If you are not the root user when you start the installer you will be have an error:  
*error: can't create transaction lock*

Solution: Enter "sudo -s" to get a root console and run the installer again.

- Install Intelligent Power Protector by typing:

```
[vma ~]$ rpm -i ipp-linux-x.xx.xxx-x.x86_64.rpm
```

To configure a personalized package, please refer to Intelligent Power Protector manual.

- At the end, connect to Intelligent Power Protector using your web browser by typing :  
http://<@IP-or-name-of-vMA>:4679/ (for a HTTP access)  
https://<@ IP-or-name-of-vMA>:4680/ (For a HTTPS access)
- You are now in front of Intelligent Power Protector interface.

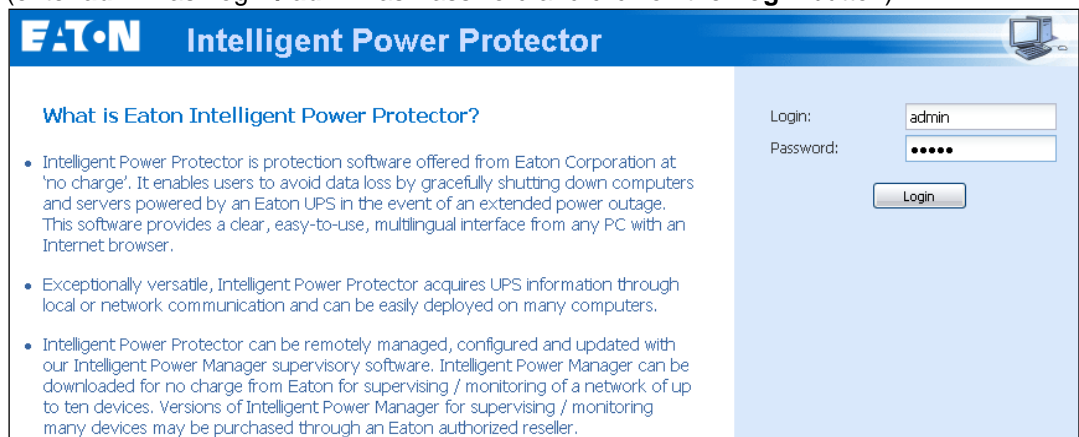
### 3.3. Using IPP with VMware ESXi

After IPP installation, follow these 3 steps to use IPP or refer to the IPP User Manual

#### 3.3.1. Step 1 (Access)

##### Remote access (for VMware ESXi )

- From a remote machine, you can type the following URL in a Web browser  
**https://<name or IP address of vMA hosting IPP>:4680/**  
or  
**http://<name or IP address of vMA hosting IPP>:4679/**
- In SSL mode, accept the certificate (by clicking on Yes)
- (enter **admin** as Login / **admin** as Password and click on the **Login** button)




#### 3.3.2. Step 2 (Configuration)

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

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

**=> Networked UPSs** through broadcast within a few seconds (Network Management Cards 66102)

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 and nodes that are not compatible with the "Quick scan" feature.*

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"

Edit the shutdown configuration and use the shutdown type (Script), in the field “Shutdown script” write the line below:

- for IPP 1.10:  
**bin/shutdownESXi.pl --server @ServerIP/Name --username Server\_username --password Server\_Password**
- for IPP 1.20:  
**perl bin/virt\_tools/shutdownESXi.pl --server @ServerIP/Name --username Server\_username --password Server\_Password**

Please modify the parameters with the right information for your environment

**@ServerIP/Name** : IP of the ESXi Server (like 10.1.0.250)

**Server\_username**: Name of an Administrator User of your ESXi Server

**Server\_Password**: Password of the Administrator User write before

**Edit shutdown configuration**

**Source**

Power source: 10.0.1.64

**Outlet**

Load segment: Master output

**Access parameters**

Login:

Password:

**Shutdown**

Shutdown timer (sec): None

Shutdown duration (sec): 120

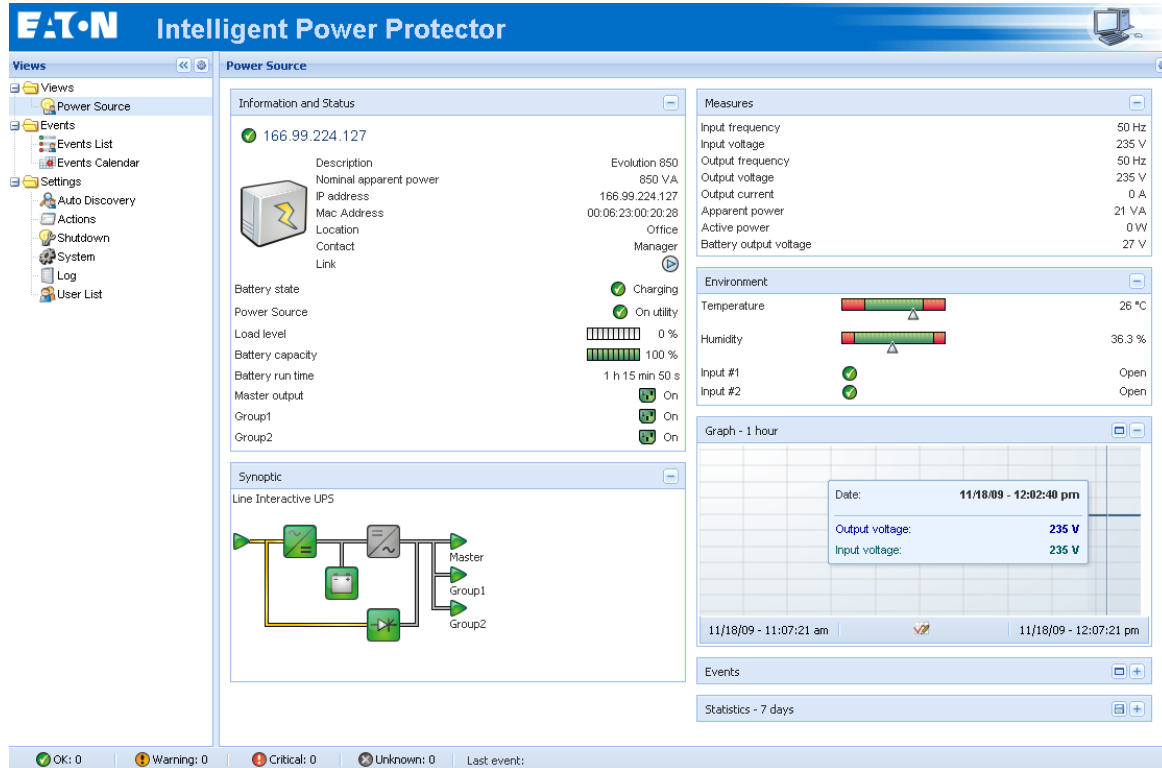
Shutdown type: Script

Shutdown script: bin/virt\_tools/shutdownESXi.pl --server 10.0.1.53 --username john --password secretPass

Save Cancel

### 3.3.3. 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.

## 4. Appendix

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### 4.1. References

- « Intelligent Power Protector user manual » : downloadable from <http://pqsoftware.eaton.com>  
→ « Network solution »
- References documents for VMware ESX Server are available on VMware website :  
[http://www.VMware.com/support/pubs/vi\\_pubs.html](http://www.VMware.com/support/pubs/vi_pubs.html)
- References documents for VMware ESX Server are available on VMware Web site:  
[http://www.VMware.com/support/pubs/vi\\_pubs.html](http://www.VMware.com/support/pubs/vi_pubs.html)
- Please visit <http://www.vmware.com/support/developer/vima/> for more information about download and installation of VIMA or vMA on ESX/ESXi host machines.