Eaton Brightlayer Data Centers suite
Application note

How to prepare for outages with IPM 2

Introduction

Eaton's latest Intelligent Power Manager (IPM) 2 software provides the tools needed to monitor and manage power devices in your physical or virtual environment. Part of Eaton's Brightlayer Data Centers suite, this innovative disaster avoidance solution ensures system uptime and data integrity by allowing you to remotely monitor, manage and control power devices on your network, such as Uninterruptible Power Supply (UPS) devices and rackmount Power Distribution Units (PDU).

Available in three different editions – Monitor, Manage and Optimize, IPM meets varying power management requirements of your organization. The latest edition of IPM features a redesigned user interface, more options to automate critical processes, and enhanced visualization and contextualization options to better understand the status of IT equipment from anywhere and at any time.

Powering Business Worldwide

Monitoring your power devices

The first important requirement that users usually would look for is the ability to monitor their power devices.

The IPM Monitor edition provides users with the capability to monitor their power devices with a dashboard for their IT room. The monitoring capabilities can extend across a single room or multiple rooms. Users can connect various power devices and are able to see and discover their power devices with IPM.

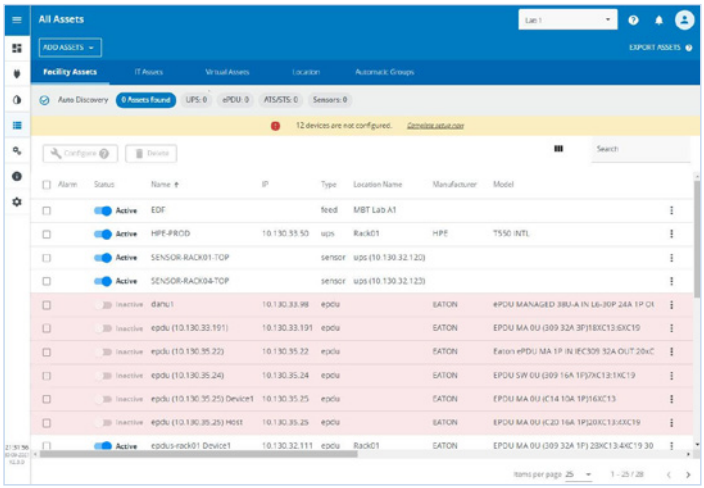


Image 1: IPM dashboard offers ability to see, discover and connect various devices

They can also see the usage of power devices such as UPS devices and rack PDUs, and understand how much power is utilized by each device.

The monitoring capabilities can extend beyond devices to include the contextual environment where the power management devices are located. For instance, if a facility or data center is located in Raleigh, N.C., the user can create a location marked "Raleigh, N.C." with IPM and add rooms to "Raleigh" thereafter. The user can then add racks, rack rows, rack servers, rack UPS devices and rack PDUs. With IPM, the user can have full visibility of racks, rack rows, and even entire rooms.

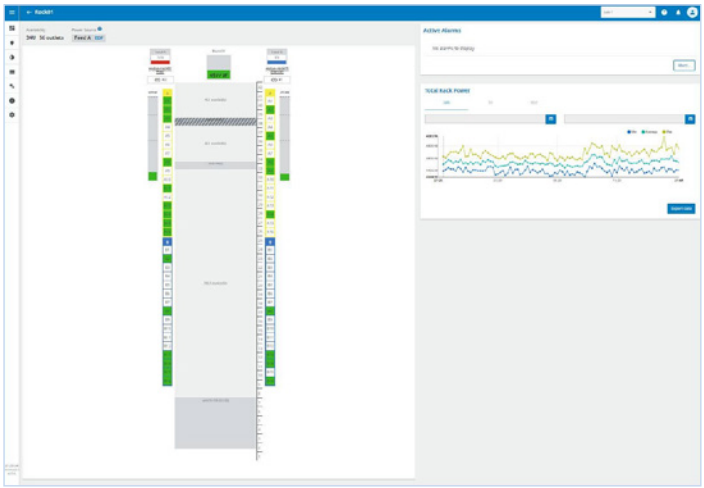
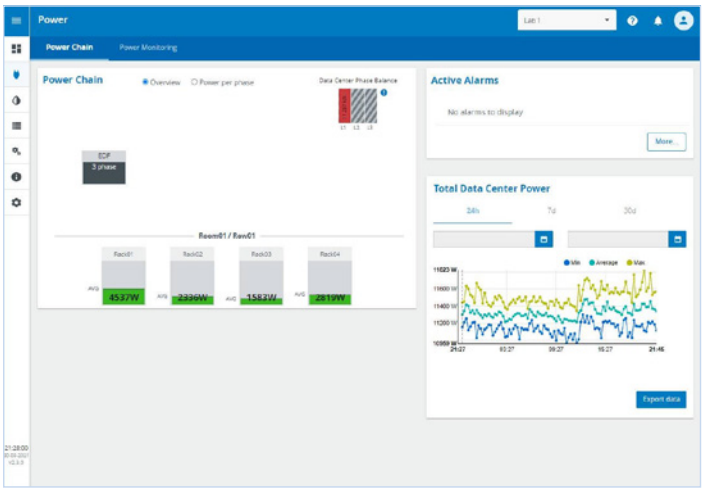


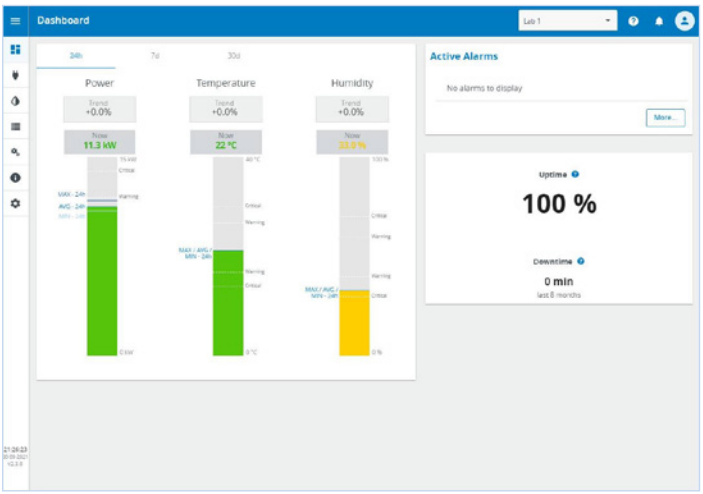
Image 2: IPM rack view

Gain contextual visibility of power metrics and constraints

IPM collects data from all devices of an infrastructure to provide contextual information. This enables users to gain complete visibility of the infrastructure and at room level, and understand the power utilization over a period. For example, users can track their utilization for the last seven days and determine if it has increased, decreased or remained at a constant level.

With IPM, users can have a complete graph of trends indicating the usage, power utilization, temperature and humidity.





Images 3a and 3b: IPM dashboards provide contextual visibility of power metrics and constraints, as well as power usage trend data at the facility and individual racks

IPM provides complete contextual visibility using a dashboard and this feature is provided with the Monitor edition. IPM's Monitor edition gives users the ability to monitor power devices from Eaton, such as UPS devices and PDUs, as well as power devices from third-party vendors that have been certified with the RFC-1628 standard (RFC-1628 standard UPS-MIB interface). In addition to monitoring with IPM, device alerts can be configured to be sent over email.

Simplify management with automation

Eaton enables users to set up simple automation with the **IPM Manage** edition. This ranges from automated email notifications which alert IT managers of specific events, to physical infrastructure management such as the graceful shutdown of servers. Users will simply need to set instructions on the action they wish to activate upon the onset of certain conditions which they specify.

Beyond basic management: Defining advanced business continuity automations with virtual machines and cluster level actions

With the **IPM Optimize** edition, users will get access to the full capabilities of the software. The Optimize edition provides the ability to monitor and manage virtual infrastructures, in addition to physical infrastructures.

IPM Optimize also enables users to create automation policies to manage their virtualization infrastructure. For example, users can conduct live migrations of virtual machines (VMs) from one location to another location. If there is an extended power outage at one of the locations and that location is going to shut down, IPM automatically moves the VMs from the location that is at risk to another location. In addition, IPM Optimize can help with sequential and cluster shutdowns.

Sequential and cluster shutdown

In an IT environment, the very act of shutting down all devices can be disruptive to businesses – particularly when critical workloads are affected.

Let us take an example of a hyper-converged infrastructure that requires a shutdown due to a possible power outage. Hyper-converged infrastructure typically consists of four major areas – the VMs, the controller VM, the virtual cluster, and the IT infrastructure hardware.

The controller VM not only controls the users' VM, but the entire infrastructure as well. This includes hardware like servers, storage, or networks. There is also the virtual cluster that is managing all the workloads within it.

The critical requirement for any power management software in this type of environment is to be able to sequentially shut down the user's VM, followed by the controller VMs, the cluster and finally the hardware.

During an extended power failure, signals can be sent to the VM controller, VMs, and to the cluster.

With IPM, the user can define processes to shut down the infrastructure in a graceful manner and avoid an abrupt shutdown.

The example below provides an idea of how IT managers can use IPM to conduct a sequential shutdown during power incidences.

Sequential shutdown scenario

An organization has a rack full of servers and one UPS device that is powering these servers. They also have environmental sensors in place to monitor the temperature and humidity.

With IPM Optimize, the IT manager can define various automated policies. When there is a power failure at the location, the software is instructed to shut down the servers. In addition, the IT manager has set up policies to shut down the infrastructure in a sequential manner. After 10 minutes of power failure, the software will shut down some of the VMs, followed by another group of servers 15 minutes later.

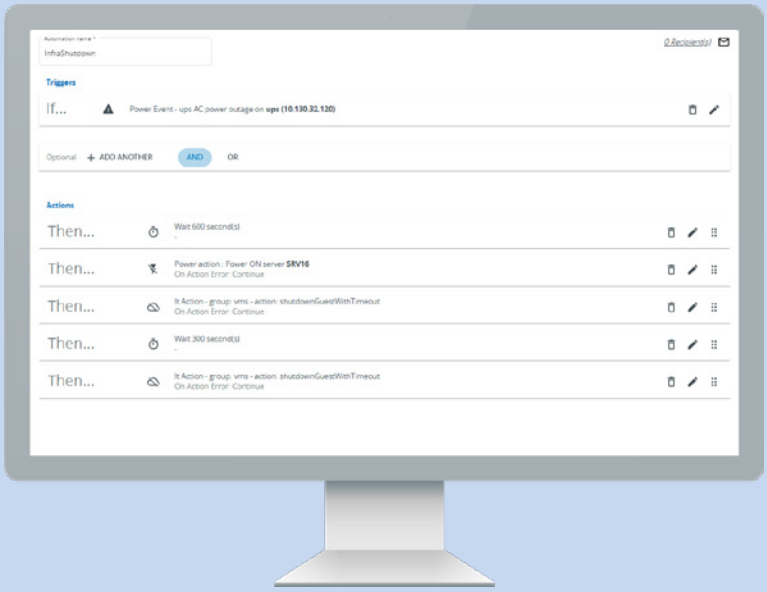
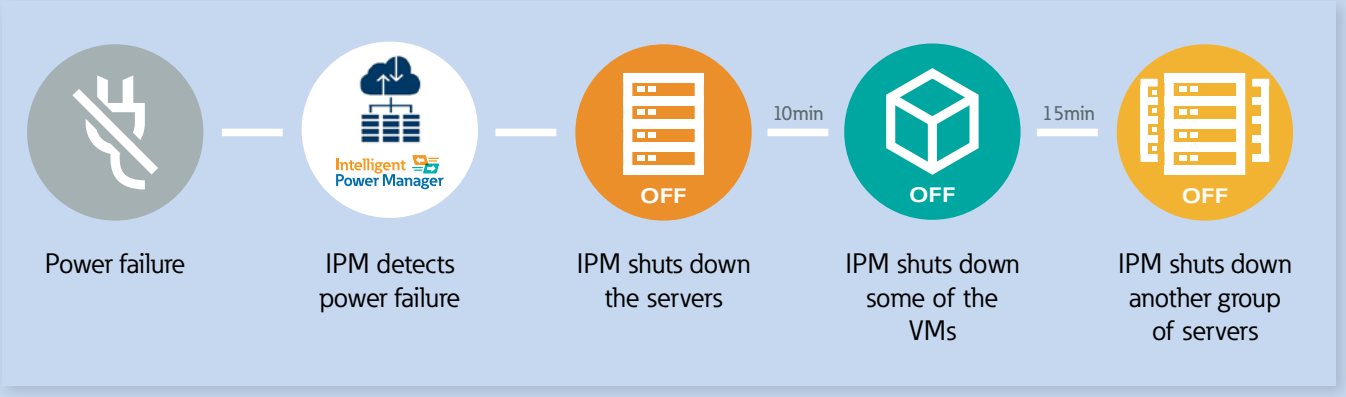


Image 4: IPM automation set-up for a sequential shutdown



Apart from sequential shutdowns, users can also automate a graceful shutdown of a cluster with IPM Optimize. The following example illustrates the steps involved to automate a sequential shutdown during power failures and a subsequent startup upon restoration of power with IPM.

Cluster shutdown scenario

The IT manager considers the area to implement the automated shutdown during a power failure.

The organization has various servers with virtualization software as well as some VMs. They have storage devices and have installed IPM on top of that. They also have UPS devices and rack PDUs. In a case of power failure, the IT manager can define specific business continuity automation as part of the organization's disaster avoidance measures.

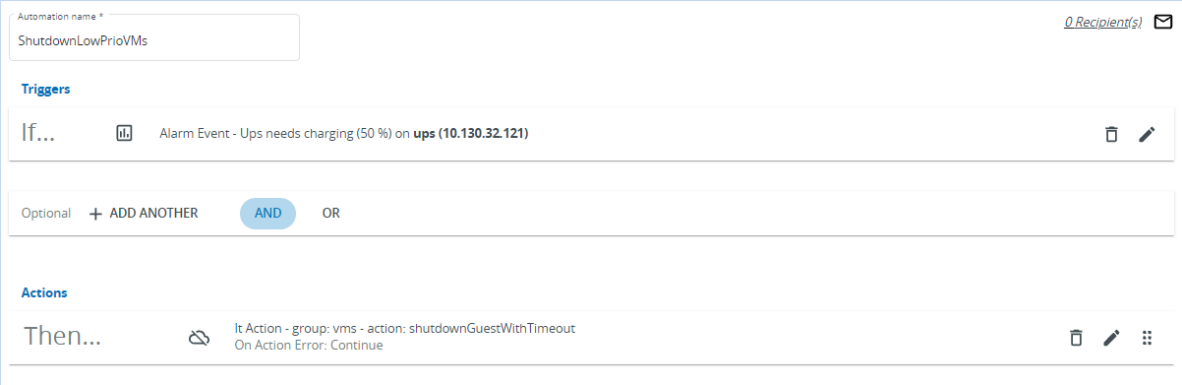


Image 5: IPM automation set-up for cluster shutdown – shutdown of low priority VMs when UPS battery capacity falls below 50%

Starting with a scenario where the battery capacity falls below 50%, the IT manager instructs the software to shut down some of the low priority VMs.

As these devices are not crucial, a shutdown of these VMs will not hamper business operations. This also enables the organization to secure more runtime for high priority VMs, such as DNS servers or email servers, which are critical to keep the infrastructure running.

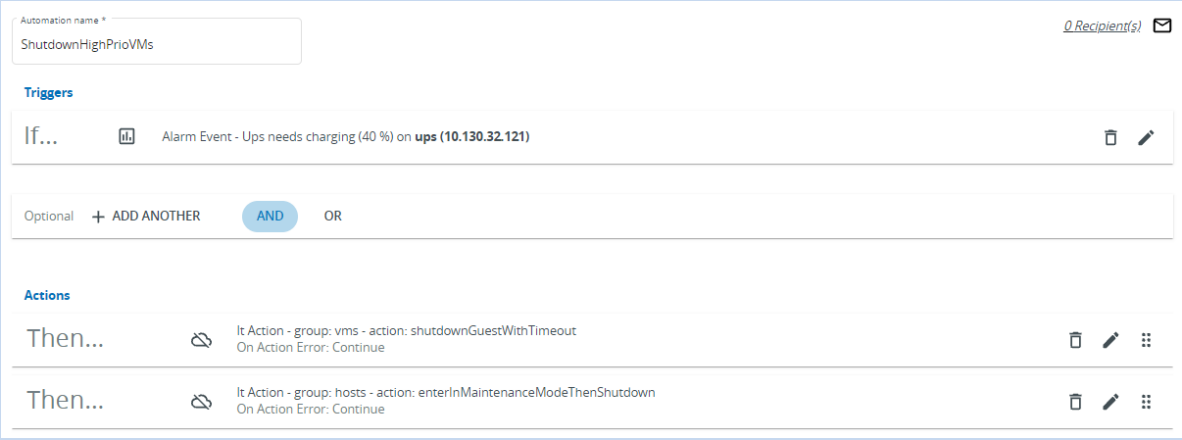


Image 6: IPM automation set-up for cluster shutdown – shutdown of high priority VMs, followed by ESXi servers when UPS battery capacity falls below 40%

Next, the IT manager sets up an instruction for IPM to shut down the high priority servers and VMs when the battery capacity drops below 40%. If the power failure continues, the software is instructed to shut down the storage, and ultimately the ESXi server.

The IT manager is also able to set up automated policies based on server priorities, upon the restoration of power. For example, whenever power is restored, the IT manager can instruct IPM to start some of the switches connected to Eaton rack PDUs by switching on rack PDU outlets.

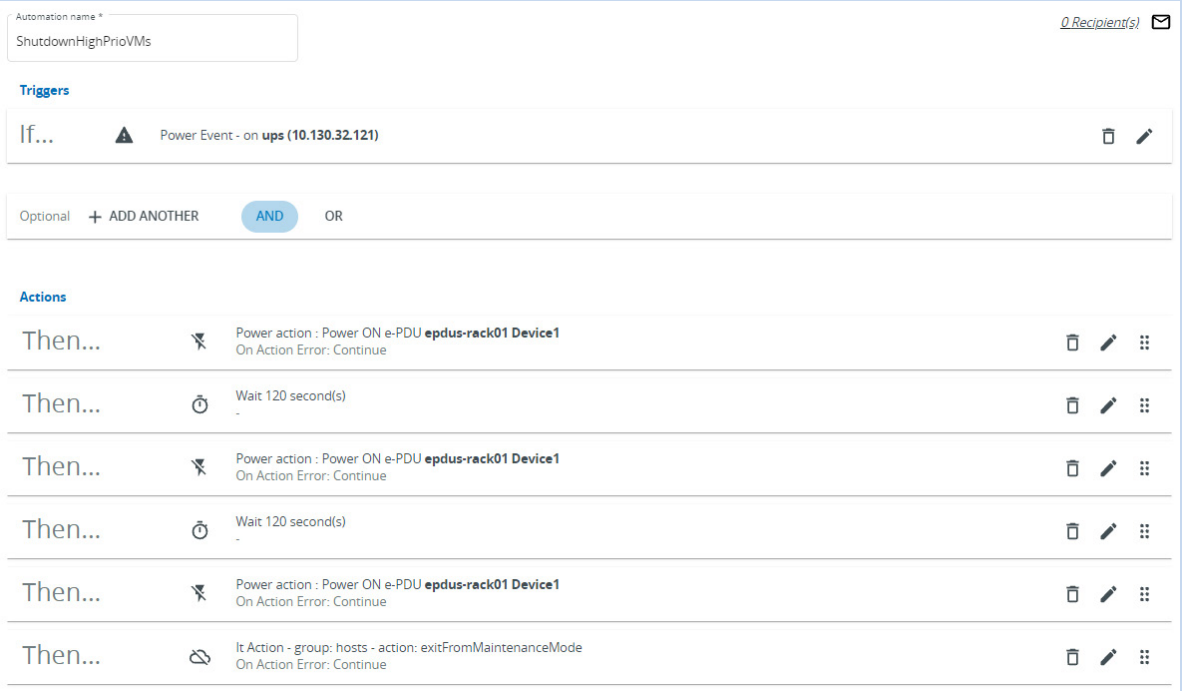


Image 7: IPM automation set-up for power restoration

With IPM, IT managers can configure the sequence in which backup servers are to be started, by switching on the rack PDU outlets that are connected to those servers. To enable the servers to startup, the IT manager needs to effect at the hardware BIOS settings to enable auto startup features so that servers to start automatically when power is restored.

Simple wizard-based automation configuration

With the latest release of IPM, Eaton provides a new unique way to create simple yet powerful automations.

Users can define a series of automated steps using a wizard and set up multiple user-defined triggers and subsequent actions on IPM.

This capability allows users to implement complex automations based on a series of triggers. For example, users can define a specific action to take place only 10 minutes after a temperature rise following a power failure. This ability to select and define multiple triggers for automation was not possible with earlier versions of IPM.

In addition to defining triggers in the event of a power failure, users can also select triggers to initiate specific actions with a restoration of power. For instance, a user can instruct IPM to send an email alert as the first course of action in the event the battery capacity falls beyond 70% and the temperature rises following a power failure. Then, IT can then instruct IPM to move the VMs from the affected servers to a safe server as the next action.

This is how users can create multiple triggers that results in multiple actions with IPM. Once everything is completed, users can see a summary of actions taken.

Users are also able to perform a dry run of these triggers to ensure that they work before implementation. Upon successful testing, they can move the automation process to the production stage. This will help organizations better prepare for possible outages.

Live migration or load shedding

IPM 2's automation feature can also be deployed to trigger load shedding when demand for electricity exceeds supply. This may be due to unforeseen power outages. In such instances, it is crucial to promptly reduce non-critical load in order to prevent overload and ensure continuous operations.

To illustrate this application, take the example of an organization which has 3 servers. The IT manager labels these as Server 1, Server 2 and Server 3. Each server has at least 2 to 4 VMs.

Using IPM, the IT manager creates an automation policy to effect load shedding and applies the policy to a group of critical VMs. The IT Manager can define the steps when encountering a power failure. IPM can switch all the critical VMs to one single server. With this action, all the critical VMs will be migrated to one single host.

The IT manager can define the next step, which is to shut down the non-critical VMs. This action will result in more runtime with the existing battery for the critical host and the critical VMs. Such an automation policy enables a longer duration of the workloads running on these critical systems during a power failure.

This example shows how live migration or load shedding with IPM works.

Conclusion

With the help of Eaton's IPM, users can focus on delivering essential IT services to their customers without worrying about power and the integrity of their devices.

To recap, IPM meets the varying power management requirements of each organization by:

- Providing contextual visibility of entire infrastructures, down to the device level, alongside trend data and simple asset management
- Ensuring the high availability and uptime of critical IT workloads in on-premises data centers or IT rooms
- Protecting IT equipment with Eaton power devices that can safely and remotely shut down systems if an outage occurs during off hours
- Providing better control over virtual infrastructures with load shedding and live migration when faced with power and environment issues
- Ensuring a safe, orderly shutdown of both host and servers in the event of a prolonged outage

For more information on the IPM 2, please visit Eaton.com/IPM.

Compare IPM licenses

Features	IPM Monitor	IPM Manage	IPM Optimize
Contextual visibility of power metrics and constraints	✓	✓	✓
Monitor Eaton and third-party power devices	✓	✓	✓
Manage and update Eaton power devices		✓	✓
Define basic business continuity automations with host level actions		✓	✓
Simple wizard-based automation configuration		✓	✓
Define advanced business continuity automations with VM and cluster level actions			✓

About Eaton

Eaton is an intelligent power management company dedicated to improving the quality of life and protecting the environment for people everywhere. We are guided by our commitment to do business right, to operate sustainably and to help our customers manage power —today and well into the future. By capitalizing on the global growth trends of electrification and digitalization, we're accelerating the planet's transition to renewable energy, helping to solve the world's most urgent power management challenges, and doing what's best for our stakeholders and all of society.

Founded in 1911, Eaton has been listed on the NYSE for nearly a century. We reported revenues of $19.6 billion in 2021 and serve customers in more than 170 countries. For more information, visit Eaton.com.

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