Tivoli. *Power Management*

User's Guide

IBM®

Note: Before using this information and the product it supports, read the information in Notices.

Contents

Part One

Introduction

With the BigFix Power Management solution, IT organizations can enforce conservation policies across the enterprise, while providing granularity that enables application of these policies to a single computer. Specifically, you can monitor, manage, and control the power usage settings on the computers in your network.

This *User's Guide* describes some of the primary features of Power Management and how to optimize its benefits in your deployment. For information about installing and activating Power Management components in your environment, see the Power Management *Setup Guide*.

Power Management supports many features, including:

- Managing computer power settings and policies
- Tracking and reporting on computer power usage including measuring power usage, potential power savings, and more
- Tracking of computer states, which allows you to create power policies that maximize power savings
- Advanced Wake-on-LAN capabilities (that require no network modifications) including Last Man Standing, Wake-on-LAN Medic, scheduled wake-up times, and more
- Support for PC Insomnia detection / prevention
- A client-side dashboard to view power usage

System requirements

- Windows XP, Windows Vista, Windows 2003, Windows 7
- Mac OS 10.4, 10.5 and 10.6

Definitions

This section defines common Power Management terms:

- **Power States** – System Power States define the overall power consumption of a system. BigFix Power Management tracks four main power states – Active, Idle, Standby or Hibernation, and Power Off. For detailed information about power states, see the related Knowledge Base Article from the BigFix support website.

  Note: *On Mac systems, Power State Tracking is limited to Active and Power Off.*

- **Wake-on-LAN** – Wake-on-LAN (WoL) is a standard mechanism for waking computers by sending them a specific network packet (known as the magic packet). Wake-on-LAN is difficult in many network environments because of network restrictions regarding broadcasts from other subnets. BigFix Power Management handles these complexities by sending WoL packets from nearby agents in the same subnet.

- **Wake-from-Standby** - Windows and other operating systems allow applications to wake a computer from standby at pre-defined times. Using Wake-from-Standby, a computer wakes itself without the need for Wake-on-LAN.

- **Price per kWh** - This is the amount you pay for electricity. One kWh is equal to 1,000 watts used for one hour. As a reference point, a standard desktop and monitor runs for approximately six hours on one kWh of electricity. A typical cost for a kWh is $0.10 in many regions of North America. However, electricity costs vary significantly depending on region and power provider, and different computer models vary power usage.

- **CO2 Emissions** - CO_2 is one of the primary greenhouse gases and power generation is one of the largest sources of CO_2 emissions. The amount of CO_2 emitted per kWh generated varies significantly based on how the electricity is generated. For example, hydroelectric and nuclear power plants do not emit CO_2, but coal-fired power plants emit significant CO_2.

Key features

This section defines the purpose and function of key features of BigFix Power Management:

- **PC Insomnia Prevention** – Computers can be set to go into sleep states after configurable amounts of user idle time. The term PC Insomnia is used to describe a situation where applications prevent a computer from sleeping. *PC Insomnia Prevention* is a mechanism that the BigFix agent uses to monitor user idle time and force the computer to sleep at the appropriate times.

- **Wake-on-LAN Forwarder** (WoLF) – Many enterprise networks do not allow broadcasting from different subnets, which makes Wake-on-LAN difficult. To solve this issue, BigFix Agents can be designated as Wake-on-LAN Forwarders (WoLFs), which send the Wake-on-LAN packets to nearby computers in the same subnet. This method allows organizations to use Wake-on-LAN without requiring network changes.

- **Last Man Standing (LMS)** - Wake-on-LAN technology requires at least one computer in a subnet to be active to serve as Wake-on-LAN Forwarder for other computers. A LMS-designated computer ensures that a computer is always active by resisting shutdowns and by automatically being awakened if powered off.

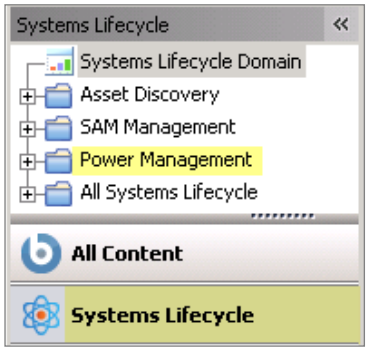
- **Power Management Efficiency** – A measure of how efficiently a computer spends its non-active time, whereby *Idle Time* is considered inefficient and *standby* is efficient. The formula is: Standby Time / (Standby Time + Idle Time).

- **Minimum Power Consumption** – The amount of power used by a computer if it is only on when in active use and powered off at all other times.
- **Full Power Consumption** - The amount of power used if a computer was powered on all day without any power management settings enabled.

Use the BigFix console

BigFix Power Management includes new and upgraded features that provide enhanced visibility into the power settings in your deployment.

The navigation tree in the BigFix Console, which is available for all BigFix products, serves as your central command for all Power Management functionality. The navigation tree gives you easy access to all reports, wizards, Fixlets, analyses and tasks related to managing the power settings in your network.



Components

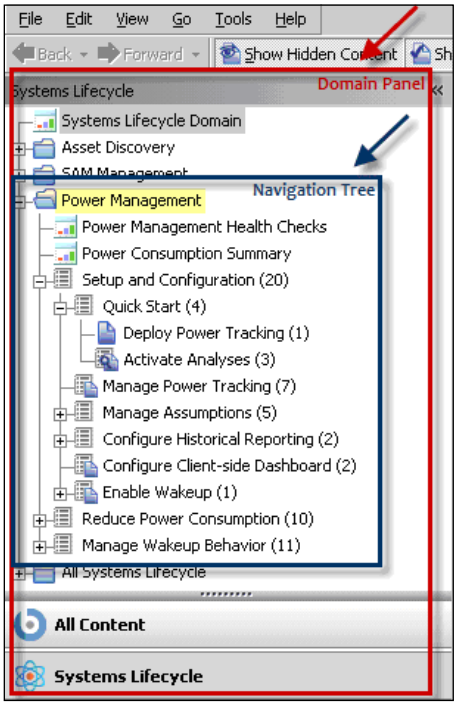
The BigFix Console organizes content into the following parts:

- *Domain Panel – Includes the navigation tree and list of all domains*
- *Navigation Tree – Includes a list of nodes and subnodes containing site content*
- *List Panel – Contains a list of tasks and Fixlets*
- *Work Area – Work window where Fixlets and dialogs display*

In the BigFix Console, products or *sites* are grouped by categories or *domains*. For example, Power Management is one of the sites contained within the *Systems Lifecycle* domain, along with SAM Management and Asset Discovery.

The Domain Panel is the area on the left side of the Console that includes a navigation tree and a list of all domains. The Navigation Tree includes a list of nodes and subnodes containing site content.

In the image below, you see a navigation tree at the top with expandable and collapsible nodes, and a list of domains at the bottom. By clicking the *Systems Lifecycle* domain at the bottom of the domain panel, a list of sites associated with that particular domain displays in the navigation tree.

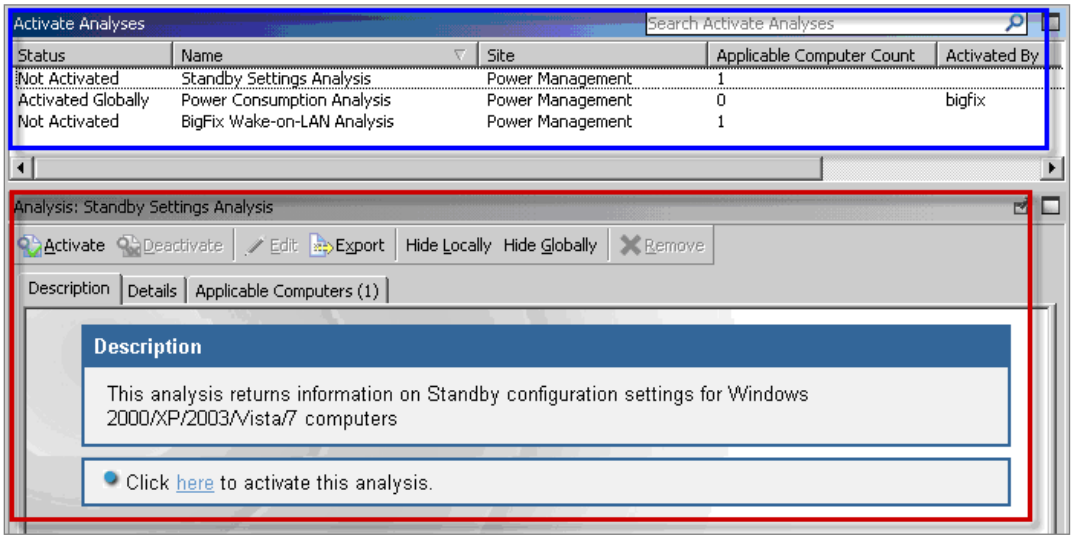


The red-outlined area represents the entire Domain Panel, including the navigation tree and list of domains. The blue box contains the navigation tree for the *Systems Lifecycle* domain.

Power Management tasks are sorted through upper and lower task windows, which are located on the right side of the Console.

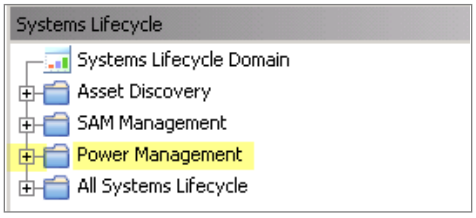
The upper panel, called the *List Panel* (blue), contains columns that sort data according to type, such as Status, Name, Site, and Applicable Computer Count.

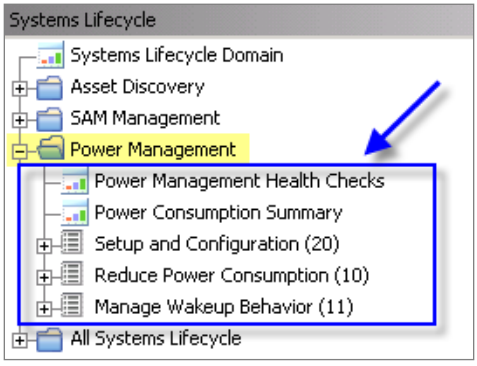
The lower panel or *Work Area* (red) presents the Fixlet, task screen or Wizard from which you take specific actions to customize the content in your deployment.

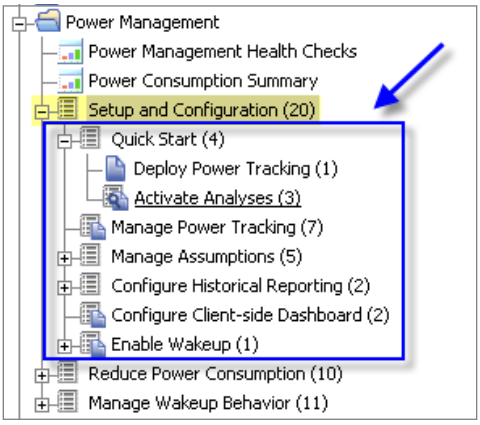


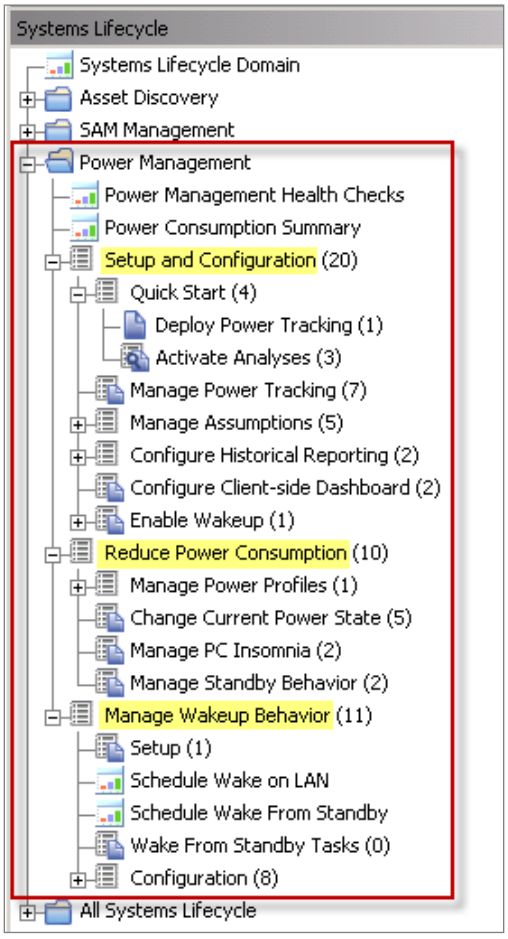
Working with content

You can expand and collapse the nodes in the Power Management navigation tree.

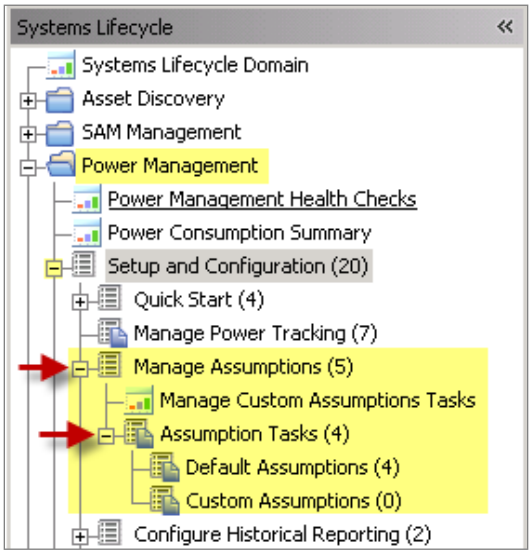








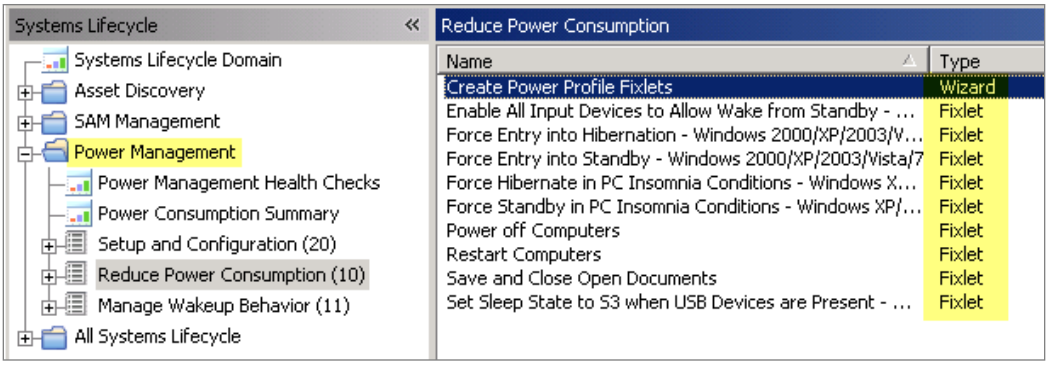
You can see from the image above that BigFix Power Management content is organized into the following nodes - *Setup and Configuration, Reduce Power Consumption,* and *Manage Wakeup Behavior.* Each node expands into sub-nodes that contain additional content. In the image below, you can see how the Manage Assumptions subnode expands to display additional tasks and content:



Composite view

For an overall view of the type of Power Management content, click each node and review the List Panel on the right.

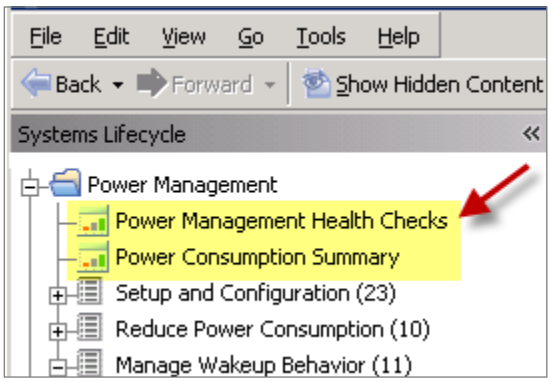
- Analyses
- Dashboards
- Fixlets
- Wizards



This content represents actions that must be addressed to reduce power consumption in your deployment.

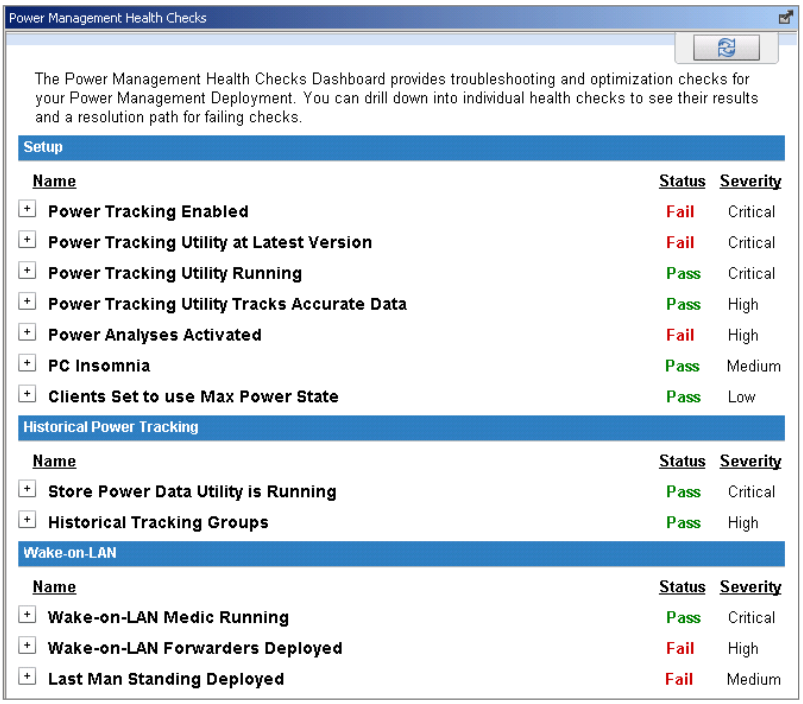
Dashboards overview

BigFix Power Management includes the following dashboards for viewing power settings summaries in your deployment:

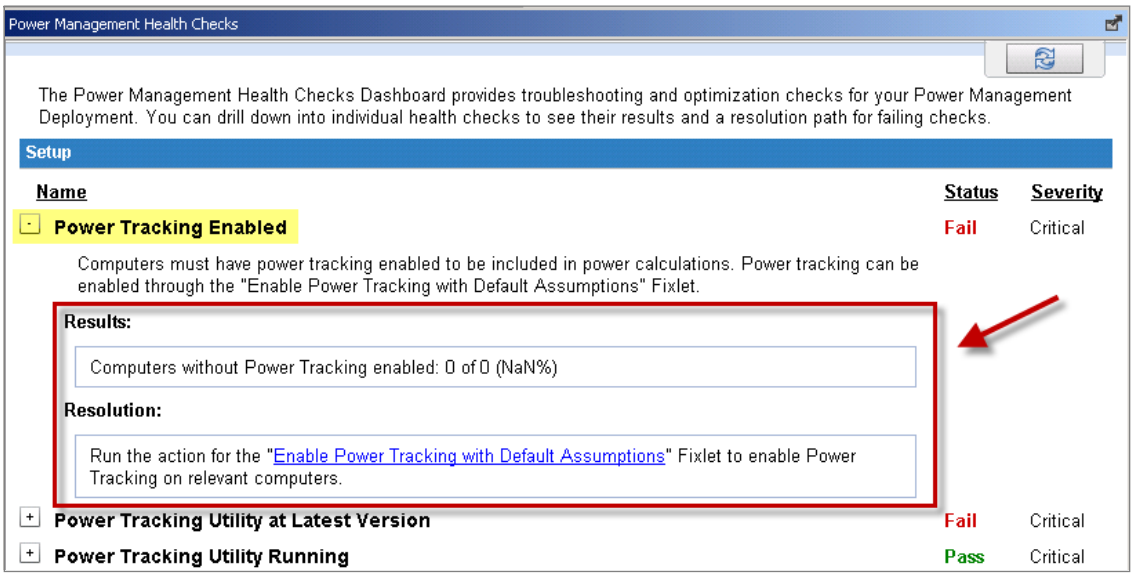


Power Management Health Checks dashboard

The *Power Management Health Checks* dashboard provides troubleshooting and optimization checks for your Power Management Deployment. The dashboard is organized into *Setup, Historical Power Tracking,* and *Wake-on-LAN* sections.



You can drill down into individual health checks to see their results and a resolution path for failing checks. Expand each item to see the detailed results and resolution.

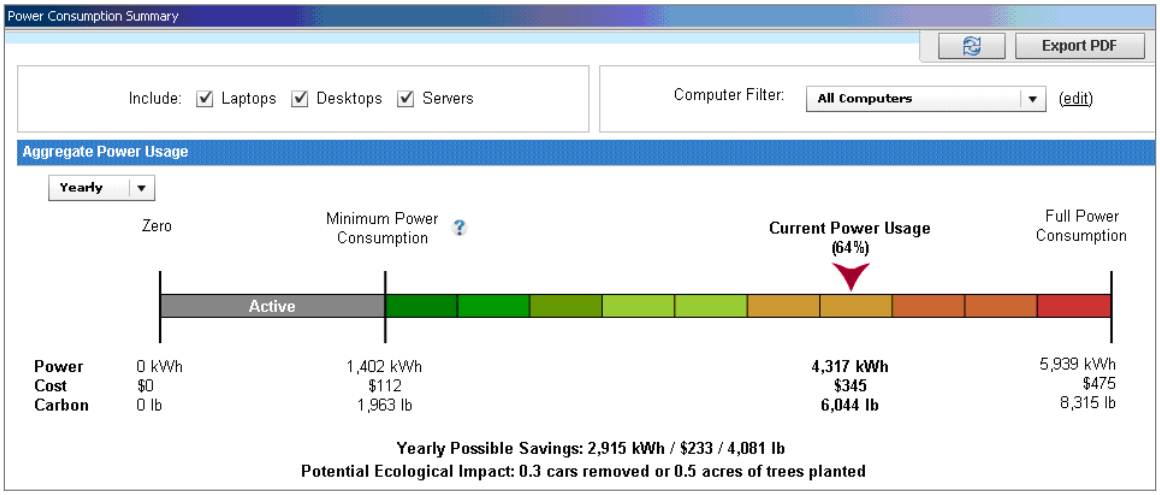


Power Consumption Summary dashboard

The *Power Consumption Summary* dashboard is a composite report that includes separate sections highlighting different aspects of your power usage.

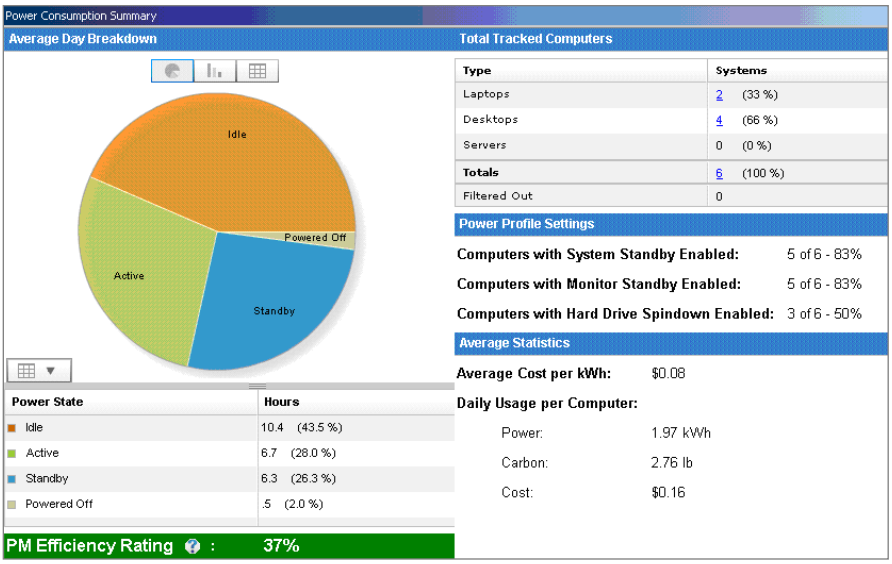
The Aggregate Power Usage section displays the overall power used by your deployment and compares it with your estimated Minimum Power Consumption. *Minimum Power Consumption* is the amount of power used if your computers are only turned on when actively in use, as opposed to idle, standby or hibernate modes, and turned off all other times.

The following image shows the Aggregate Power Usage section:



The next part of this dashboard includes the following sections.

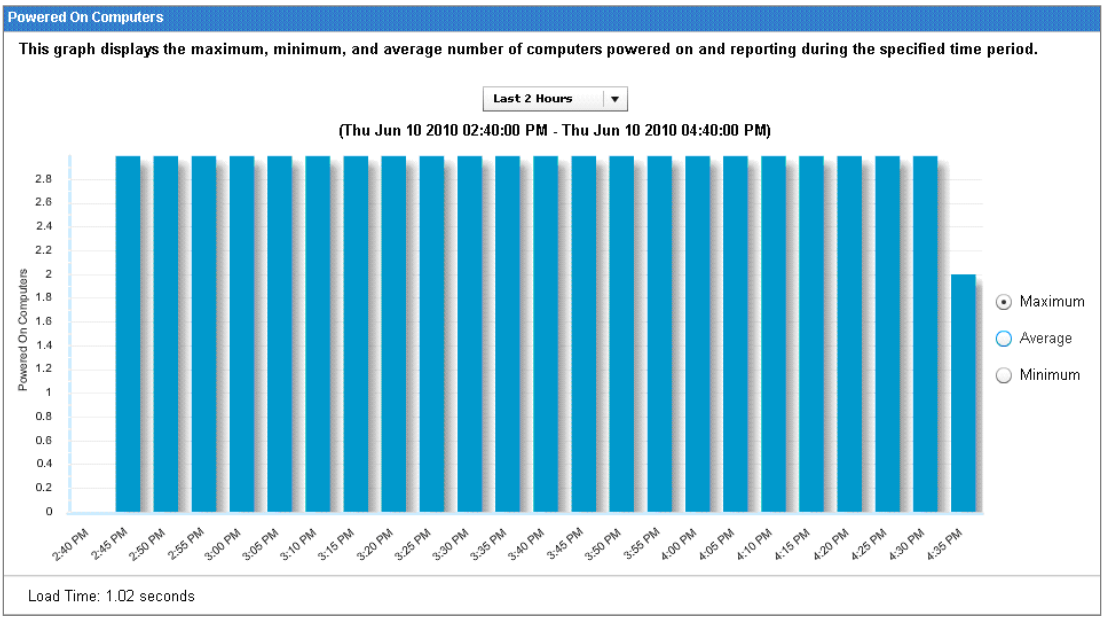
- *Average Day Breakdown* - Amount of time the average computer spends in various power states in an average day.
- *Total Tracked Computers* - Distribution of computer types in the deployment, and computers excluded from power calculations due to errors.
- *Power Profile Settings* - Distribution of power management settings in your deployment.
- *Average Statistics* - Daily power consumption of an average computer in your deployment.



The *Powered on Computers* sections display the number of computers that were powered on during various periods. It displays the following settings:

- Minimum shows computers that were on continuously through the whole interval.
- Maximum shows computers that reported on at least once during the interval.
- Average shows computers that were on more often than off during the interval.

The *Powered on Computers* graph displays trends of when users turn off their computers throughout different intervals: hour, day, week, or month.



Note: *The Powered On Computers graph cannot be filtered.*

Part Two

Use Power Management

Power Management provides a suite of Fixlets and wizards to help control computer power states and minimize waste caused by computers running while not in use. You can manage sleep, hibernation, and standby states on your running computers in the *Reduce Power Consumption* node in the navigation tree.

Power savings strategies

BigFix Power Management includes a number of strategies for saving power. The following list includes some common power saving strategies, though it is not comprehensive.

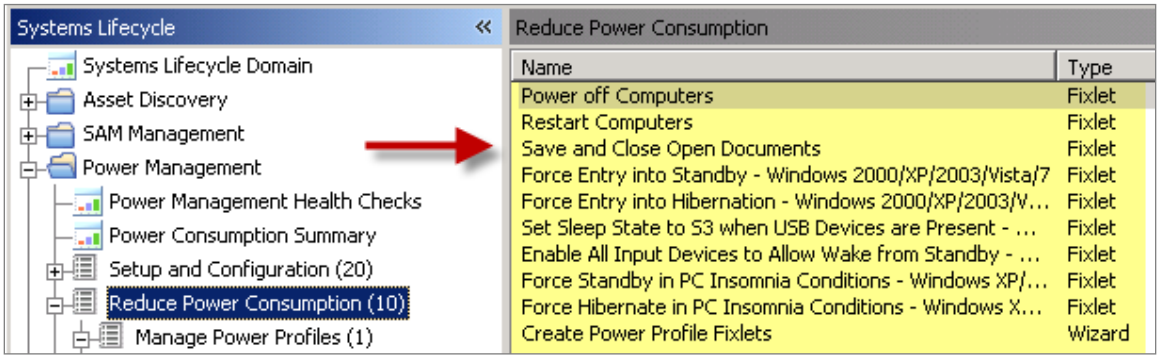
- **Enable Monitor Standby** – Monitors represent a significant portion of power usage for desktops and laptops. Enabling Monitor Standby has minimal end-user impact because most monitors recover quickly from low power mode. Monitor Standby can be easily combined with the System Standby or Power-off strategies below. Use the Power Profile Wizard to change monitor standby policies.

- **Enable System Standby** – As computers use very low power in standby mode, System Standby is considered the best approach to power management. Users must wake computers with a mouse click or keyboard strike before using them, but most computers wake from standby within 10 seconds.

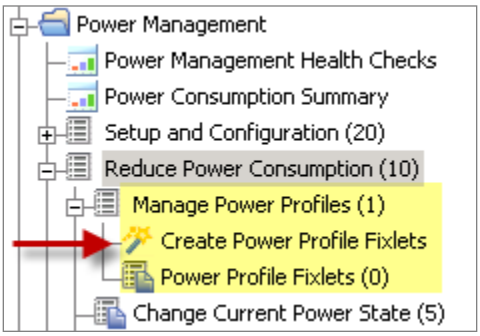
- **Power-off Computers** – You can power off computers at predefined times to save electricity. Powering off computers has the most end user impact, as this method can potentially cause work to be lost.

Reduce Power Consumption

The Reduce Power Consumption section gives tools to implement the power savings strategies described above.



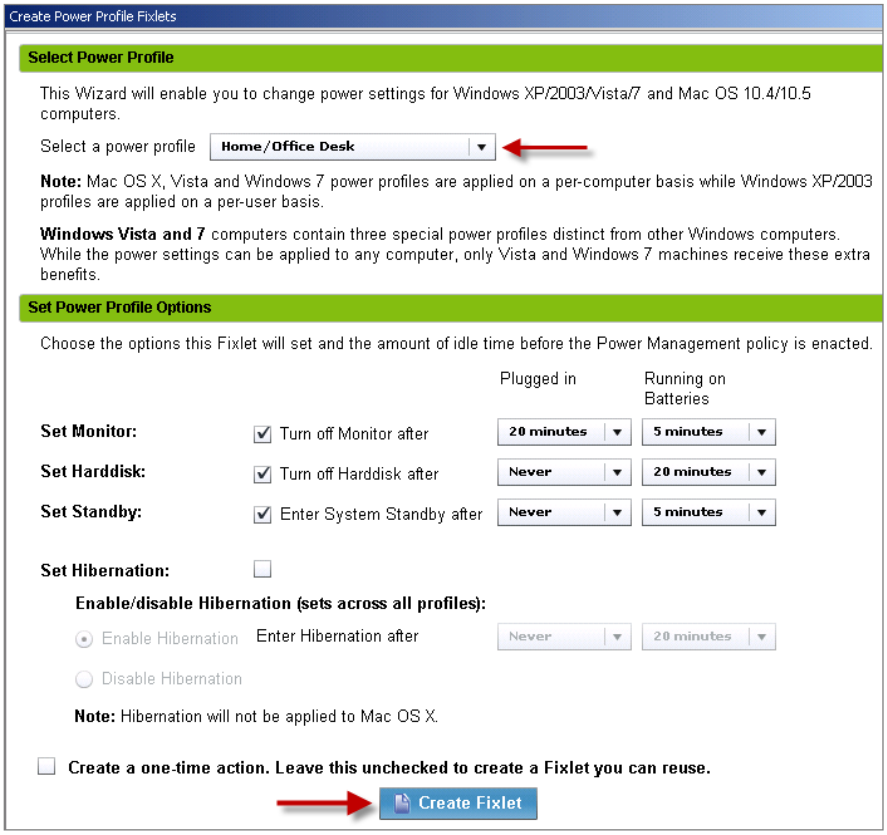
In the *Reduce Power Consumption* node, you see a *Manage Power Profiles* subnode that includes a Wizard for creating power profile Fixlets and a listing of the Fixlets already created.



Manage power profiles

Power Profiles allow computers to go into a low power state when the user is idle for a predetermined amount of time. You can manage the power profiles for your deployment by using the *Create Power Profile Fixlets* Wizard. Click the wizard from the *Manage Power Profiles* node in the navigation tree.

The Wizard for creating Power Profile Fixlets is organized into parts: selecting a power profile, and setting power profile options.



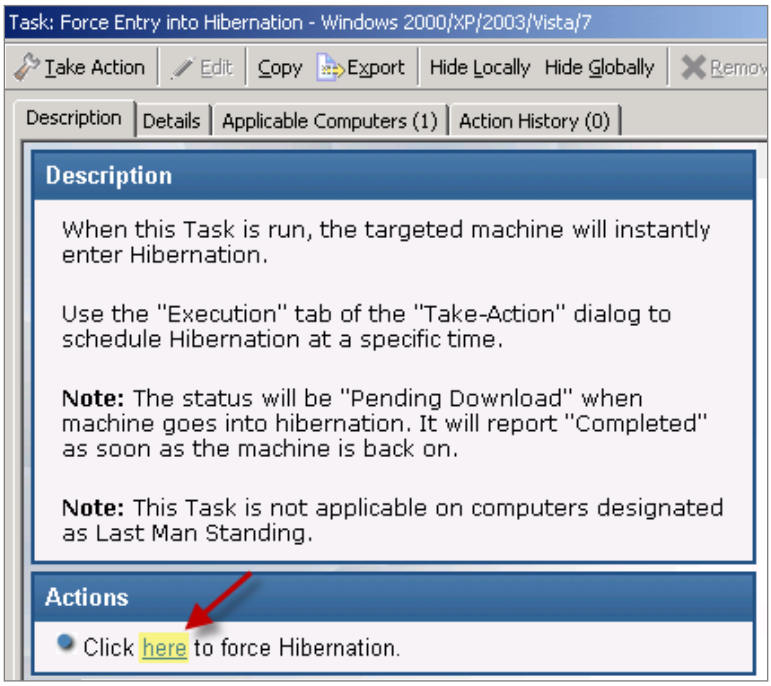
You can create a one-time action or create a Fixlet that can later be reused. Select a power profile from the pull-down list.

Set power profile options. Click *Create Fixlet*. In the Fixlet window, click in the Actions box to initiate deployment. Click *OK* when complete.

Change current power state

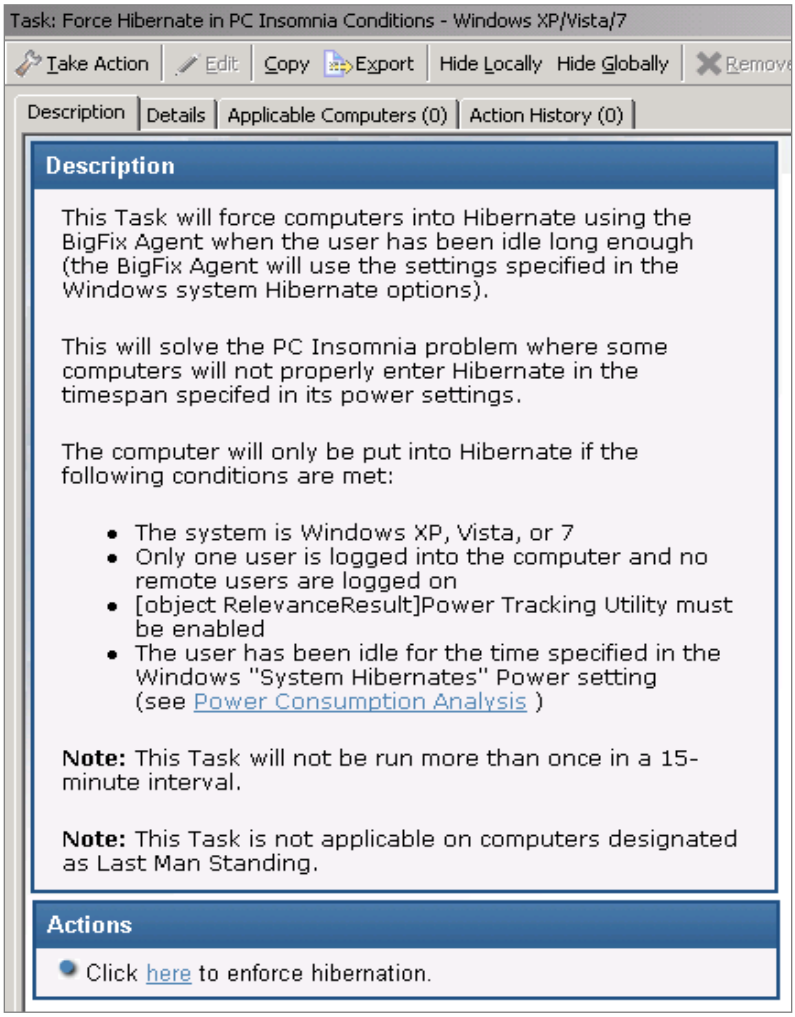
You can force your computer into a low power mode, such as standby or hibernation. The tasks to do this can be used to immediately force systems into low power mode or schedule low power modes regardless of the power profile or user activity on that particular computer.

Note: *There is also a Force Entry into Standby version of this Task.*



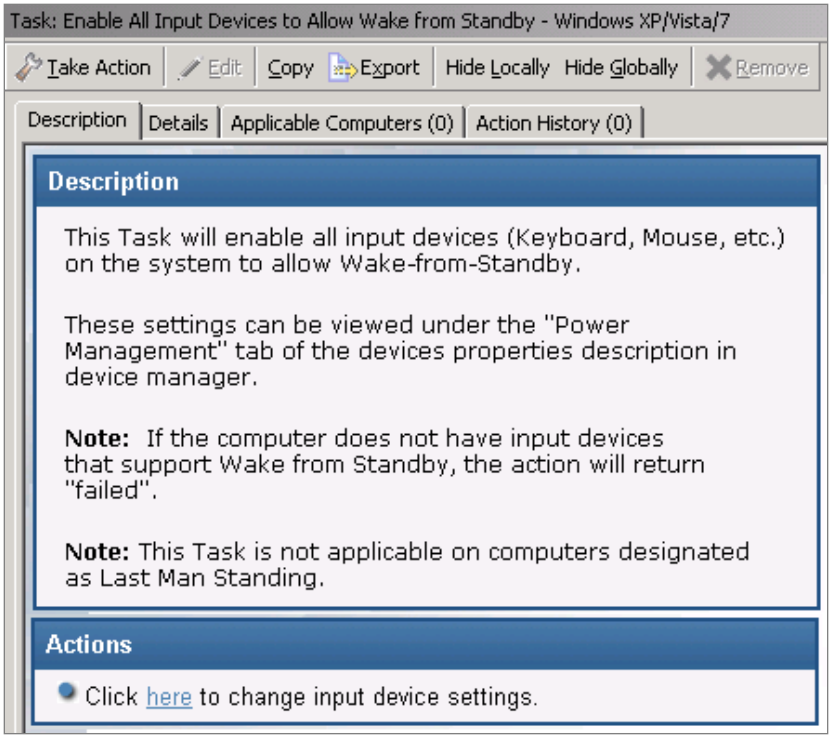
Manage PC Insomnia

Some Windows computers fail to enter hibernate or standby mode after the appropriate amount of user idle time, due to PC Insomnia. The Manage PC Insomnia Fixlets force a computer to enter standby or hibernate once the amount of user idle time specified in the power profile has elapsed. Forcing a computer into Standby will allow for faster wake times. Forcing a computer into hibernation causes longer wake-up times, but allows for slightly greater power savings.



Manage standby behavior

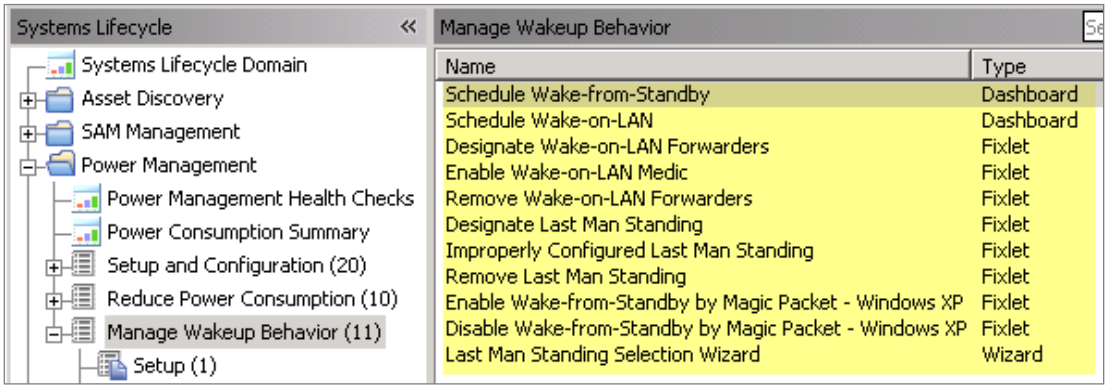
Only certain input devices are capable of waking a computer from standby by user interaction, and only if the correct Windows settings are enabled. This task finds all wake capable input devices and enables them to allow Wake-from-Standby.



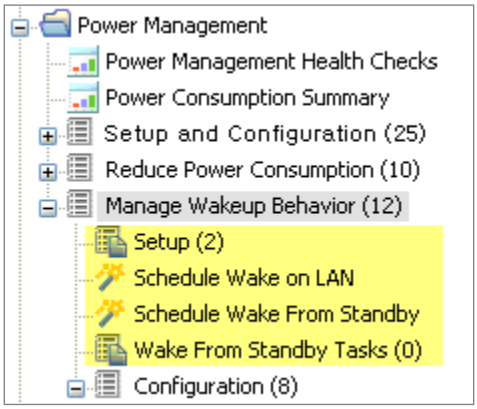
Manage wakeup behavior

Power Management provides Fixlets and Wizards to bring a computer online and take actions and manage the computer at specific times.

You can control the wakeup settings of a computer in the *Manage Wakeup Behavior* node using dashboards, Fixlets, and wizards.



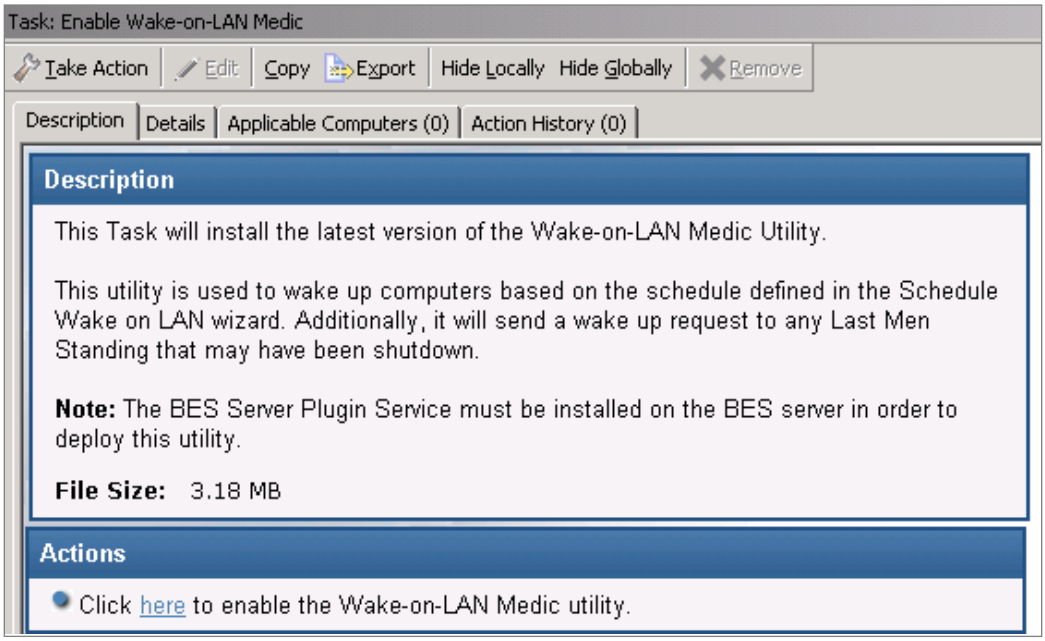
In the *Manage Wakeup Behavior* node, you see *Setup* and *Wake-from-Standby* tasks, along with wizards for scheduling Wake-on-LAN and Wake-from-Standby.



Setup

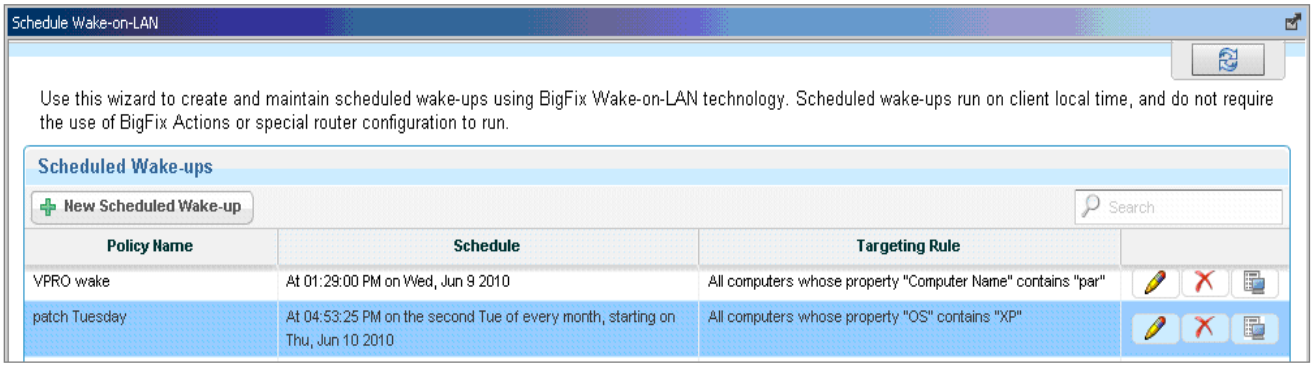
The Wake-on-LAN Medic utility is a process that runs on the BigFix Server. This utility manages Wake-on-LAN scheduling and keeps Last Man Standing computers awake. You must enable the Wake-on-LAN Medic so that Wake-on-LAN features work correctly.

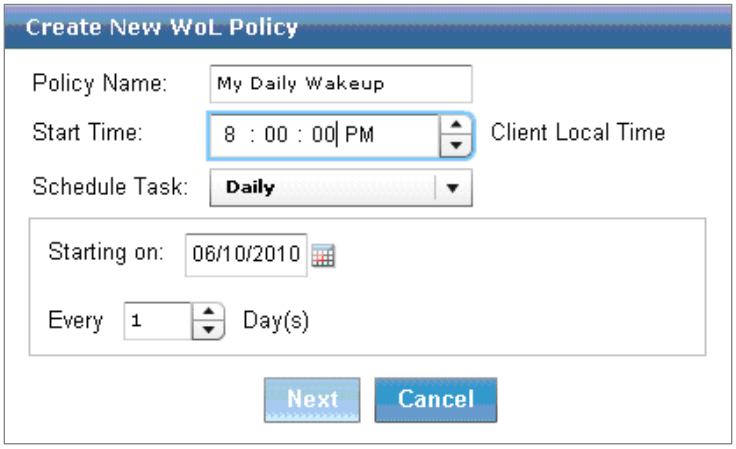
Use the Setup task to install the latest version of the Wake-on-LAN Medic utility. Click this task from the navigation tree. When the Task window opens, review the description and click in the Actions box to initiate the utility.

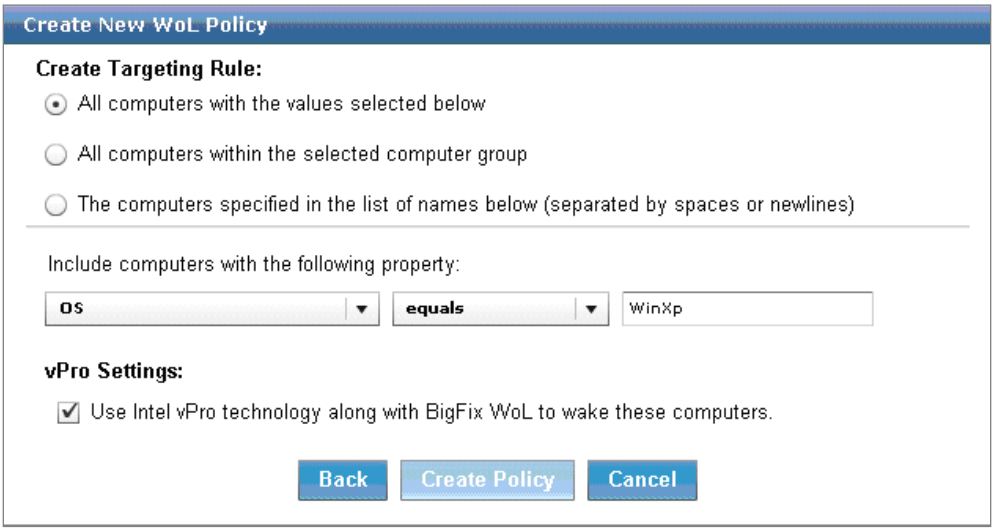


Schedule Wake-on-LAN

You can create and maintain scheduled wake-ups using the *Schedule Wake-on-LAN Wizard*. Scheduled wake-ups run on client local time and do not require the use of BigFix Actions or special router configurations to run.





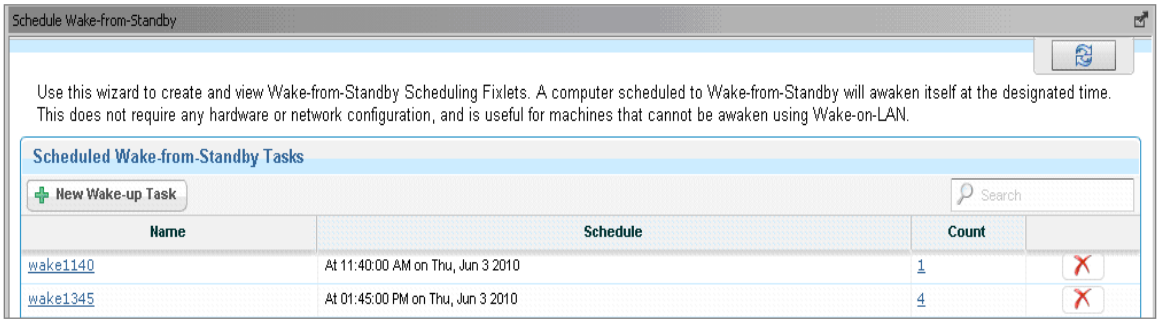


Note: *The vPro Settings option is only enabled if you are subscribed to the Client Manager for Intel vPro site.*

After you schedule a WoL policy, the WoL Medic component is set to wake the systems. By default, the WoL Medic checks every five minutes to see if it is time to run scheduled WoL policies.

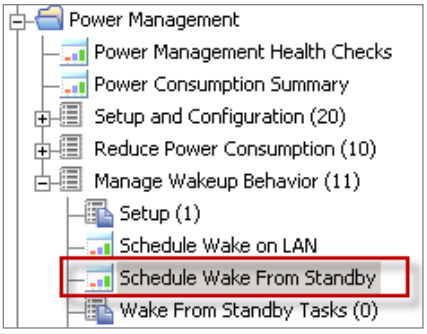
Schedule Wake-from-Standby

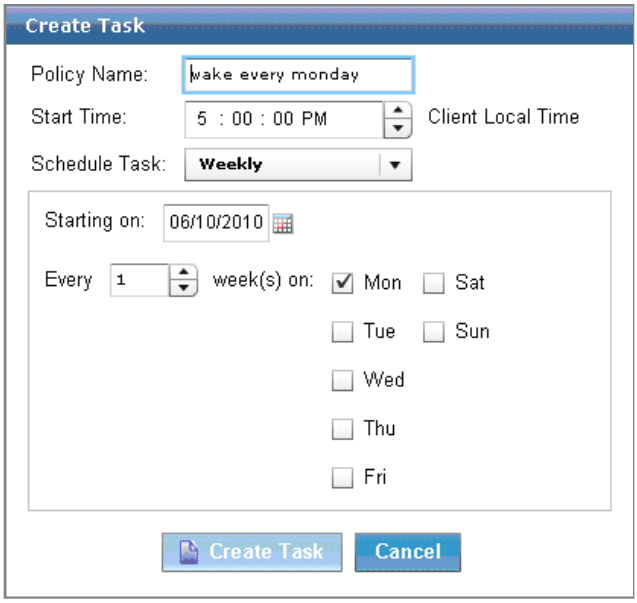
You can create and view Wake-from-Standby Scheduling Fixlets using the Schedule Wake-from-Standby Wizard. A computer scheduled to Wake-from-Standby awakens itself at the designated time. This does not require any hardware or network configuration, and is useful for computers that cannot be awakened using WoL.



Wake-from-Standby tasks

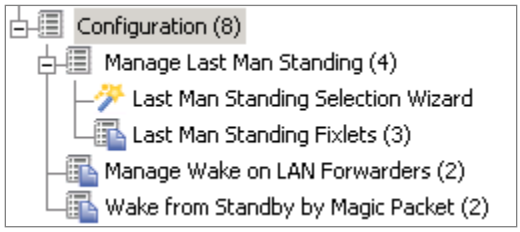
To schedule a Wake-from-Standby task, click the *Schedule Wake-from-Standby* wizard in the navigation tree. From here, you can create new Wake-from-Standby tasks that populate in the *Wake-from-Standby Tasks* part of the navigation tree.





Note: *You must run the action before the scheduled wakeup time. Scheduled wakeup actions require that Windows Task Scheduler Service is active.*

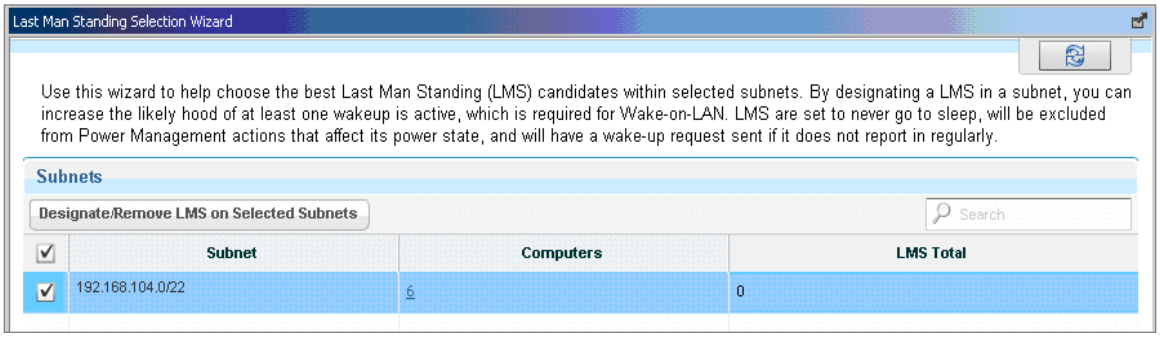
Configuration



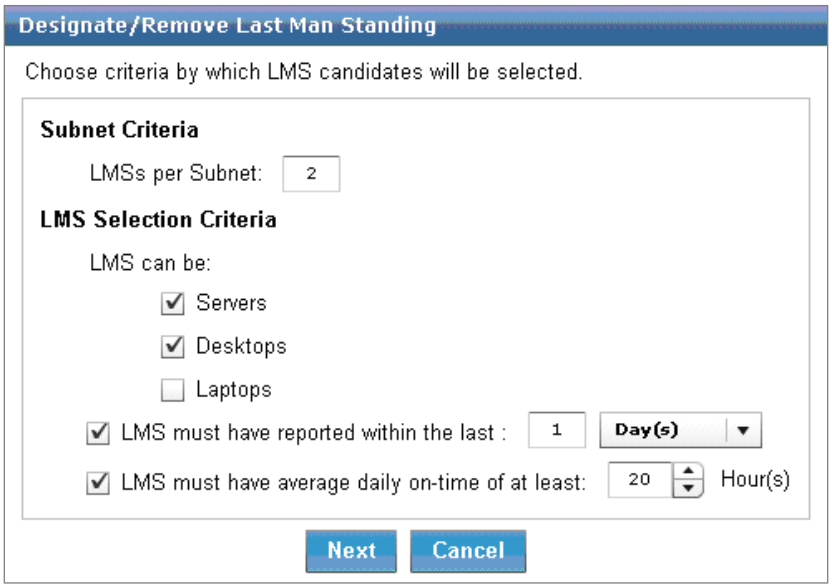
Manage Last Man Standing

Last Man Standing (LMS) ensures that computers in a subnet can be awakened using the Wake-on-LAN feature. However, LMS computers must be running all the time, so you must select only one or two computers in a subnet for this designation. When choosing which computers to designate as LMS, select a type of computer that is likely to be running all the time, such as servers.

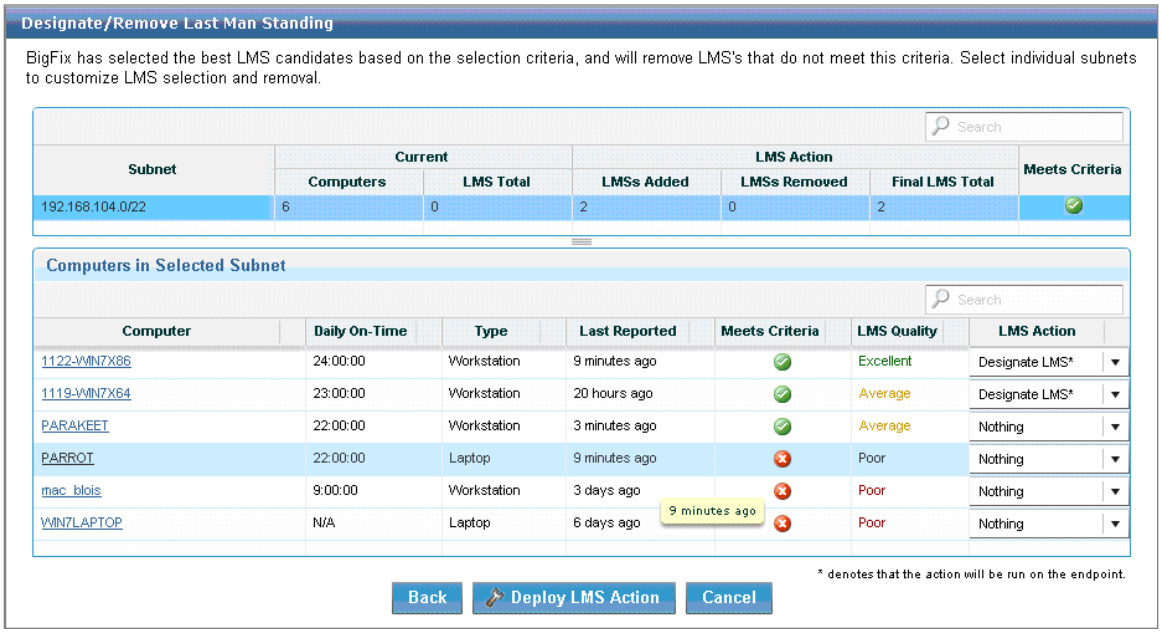
The LMS Selection Wizard automates the selection of LMS computers *per subnet*, where you can define your own custom set of LMS computers.



The LMS wizard finds computers that match the entered criteria and submits them as potential LMS candidates.



You can review all proposed LMS candidates and select from that list before issuing the action in this section.



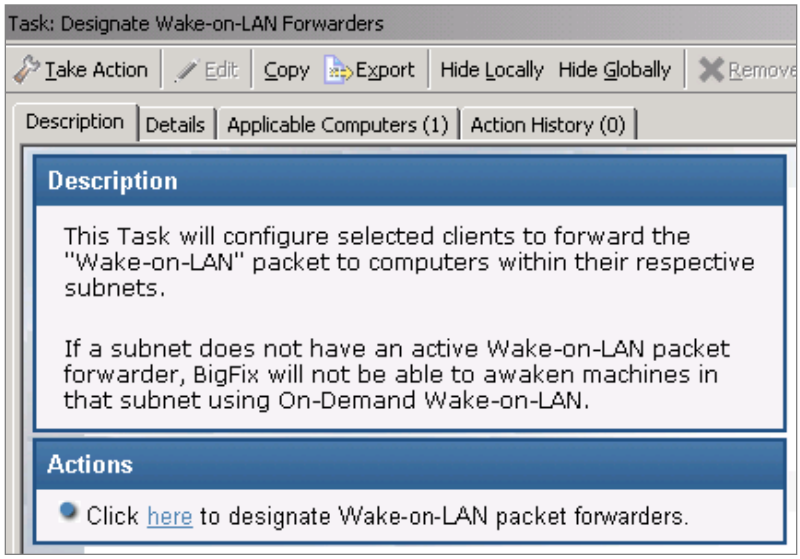
Manage Wake-on-LAN Forwarders

Wake-on-LAN Forwarders (WoLFs) are BigFix Agent computers that forward Wake-on-LAN packets to other computers in the same subnet. There must be at least one powered-on WoLF in a subnet to wake other computers in the subnet.

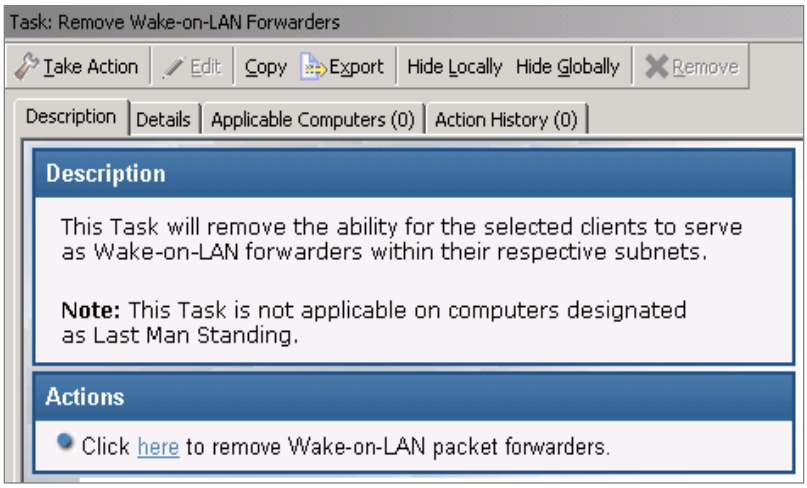
All BigFix agents are set as WoLFs when Power Tracking is enabled. BigFix includes heuristics to keep network traffic to a minimum, so all agents can be made Wake-on-LAN Forwarders. Designating all clients as WoLFs provides for wake redundancy by increasing the likelihood that at least one forwarder in each subnet is powered-on and can be used to wake targeted computers.

Power Management includes tasks for designating and removing WoL forwarders. Access these tasks by clicking on *Manage Wake-on-LAN Forwarders* in the navigation tree and selecting the appropriate task in the List Panel.

The *Designate Wake-on-LAN Forwarders* task configures selected clients to forward the Wake-on-LAN packet to computers in their respective subnets. To designate Wake-on-LAN forwarders, click in the Actions box.



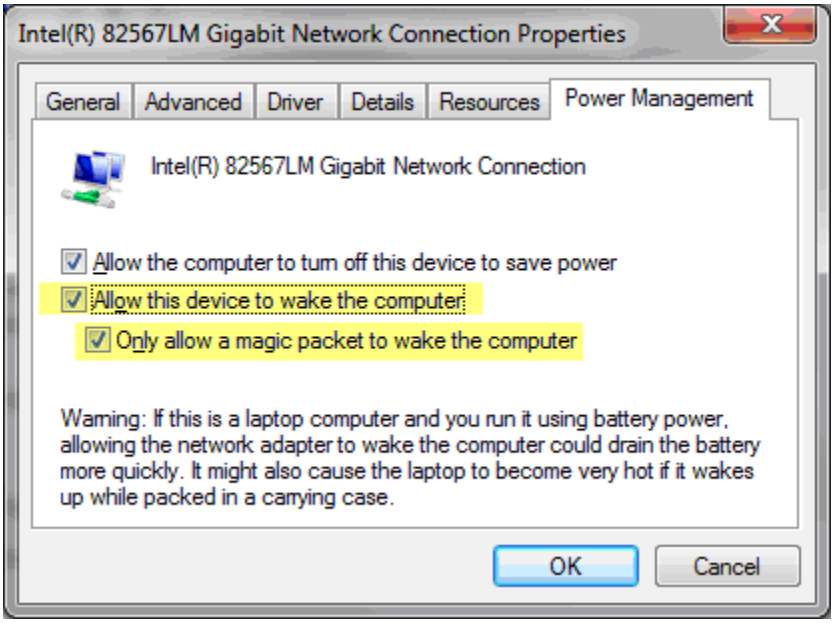
To remove Wake-on-LAN packet forwarders, click the *Remove Wake-on-LAN Forwarders* task in the List Panel, and click in the Actions box to initiate the action.



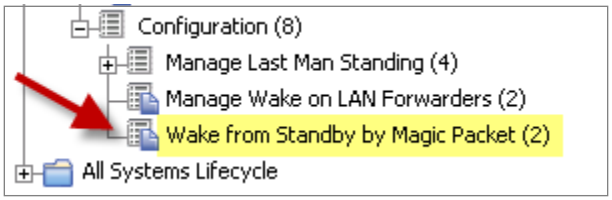
Wake-from-Standby by Magic Packet

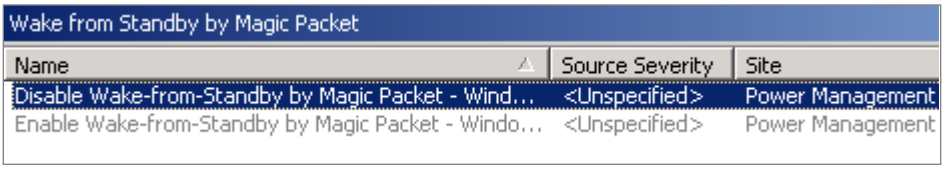
Power Management includes two tasks for disabling and enabling *Wake-from-Standby by Magic Packet*. A *Magic Packet*, also known as the Wake-on-LAN packet, is a broadcast packet that wakes a computer.

These tasks change the Windows network adapter setting from “Allow this device to wake the computer” to “Only allow a magic packet to wake the computer”. These settings are available in the network adapter properties in Windows.



Access these tasks by clicking *Wake-from-Standby by Magic Packet* in the navigation tree and selecting the appropriate task in the List Panel.



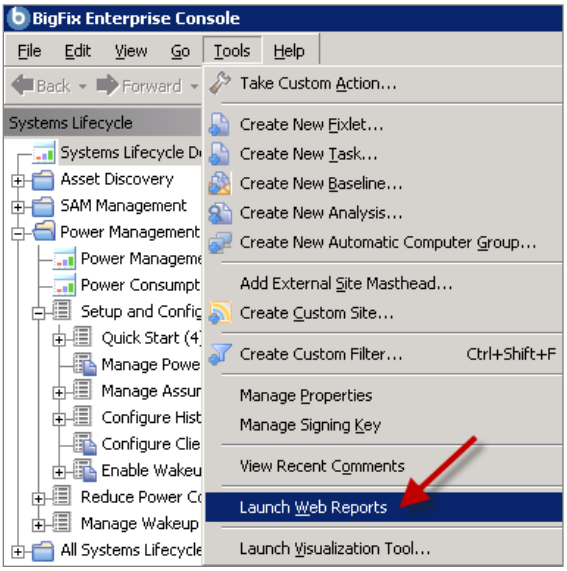


To disable or enable *Wake-from-Standby by Magic Packet*, click the appropriate task and click in the Actions box of the task window to initiate the action.

Web Reports

Power Management Web Reports provides high level summary data for management and decision makers to view and assess power usage in a given deployment.

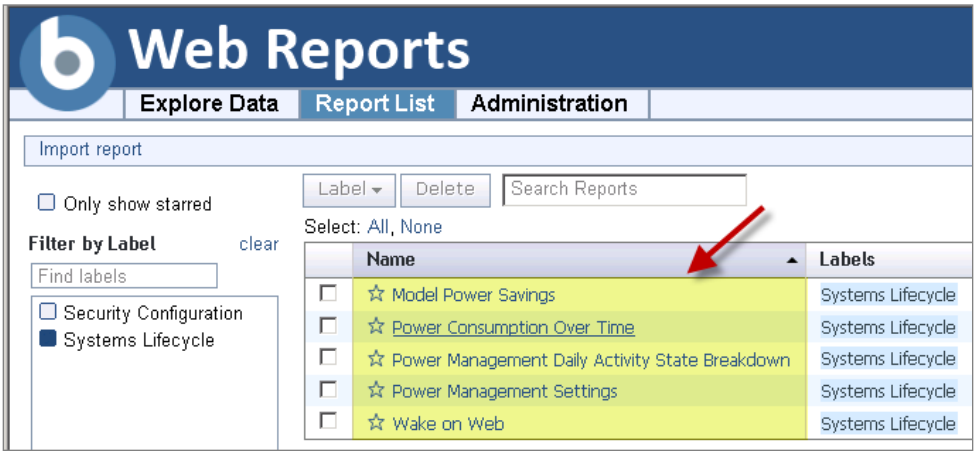
To access Web Reports, click *Tools* and select *Launch Web Reports.*



Enter your Web Reports username and password. I

The main Web Reports page opens in a new browser. To see a list of Power Management reports, select *Systems Lifecycle*.

You see a list of Power Management reports displayed under the *Report List* menu:



The following section describes each Web Report:

- Model Power Savings

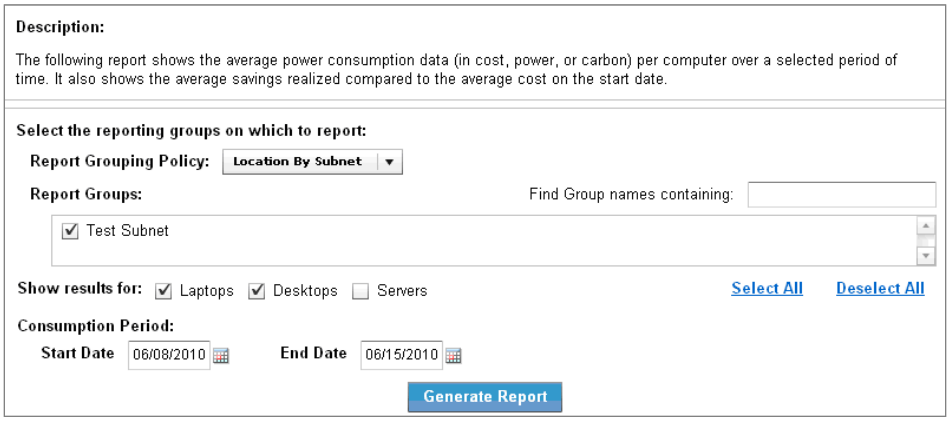
This report calculates how much power you can lose or save if you apply different power profiles across your deployment based on your current usage patterns. You can use this report to formulate what-if scenarios for potential savings by implementing various power policies. By default, the results in this report are based on the actual power state history for each agent for the last two weeks. These results are expected to be an accurate projection of power savings.

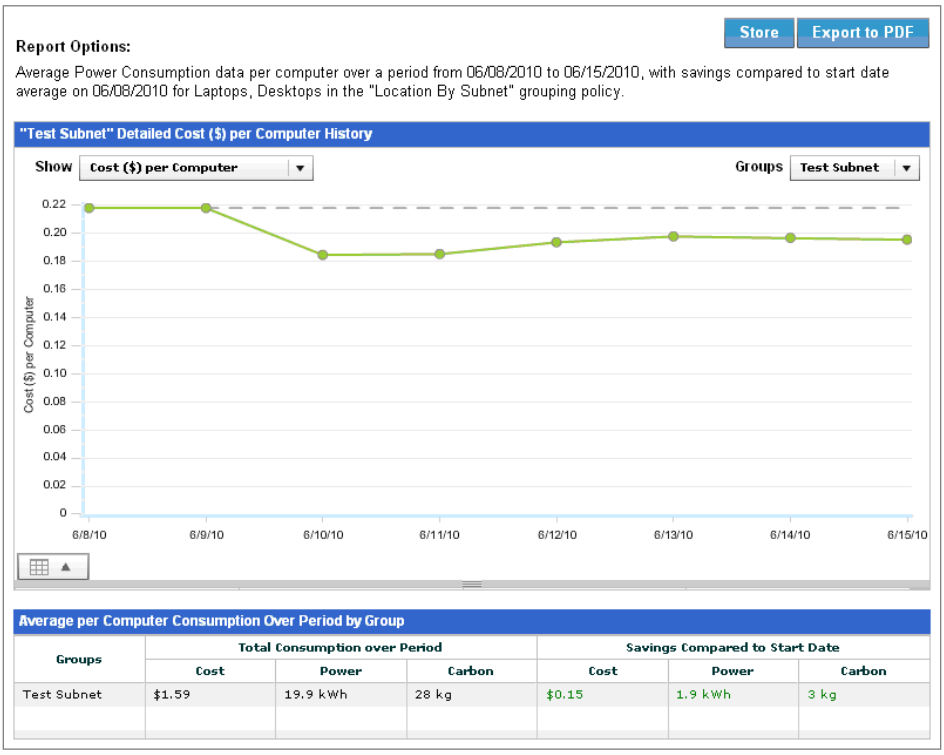
	Potential Standby Settings		Potential Total Savings			Potential Average Savings Per Computer		
Power Profile	System	Monitor	Power	Cost	Carbon	Power	Cost	Carbon
Minimal	Never	60 Min	-787 kWh	$-63	-1,101 lb	-112 kWh	$-9	-157 lb
Moderate	60 Min	30 Min	+1,420 kWh	+$114	+1,988 lb	+203 kWh	+$16	+284 lb
Aggressive	30 Min	10 Min	+1,507 kWh	+$121	+2,110 lb	+215 kWh	+$17	+301 lb

- Power consumption over time

This report charts the average computer power consumption over a specified time period, and displays cost or savings compared to a baseline cost based on the start date. This report can be used to review historical savings and progress of power management policies. You must have *Historical Power Tracking* enabled to use this report.

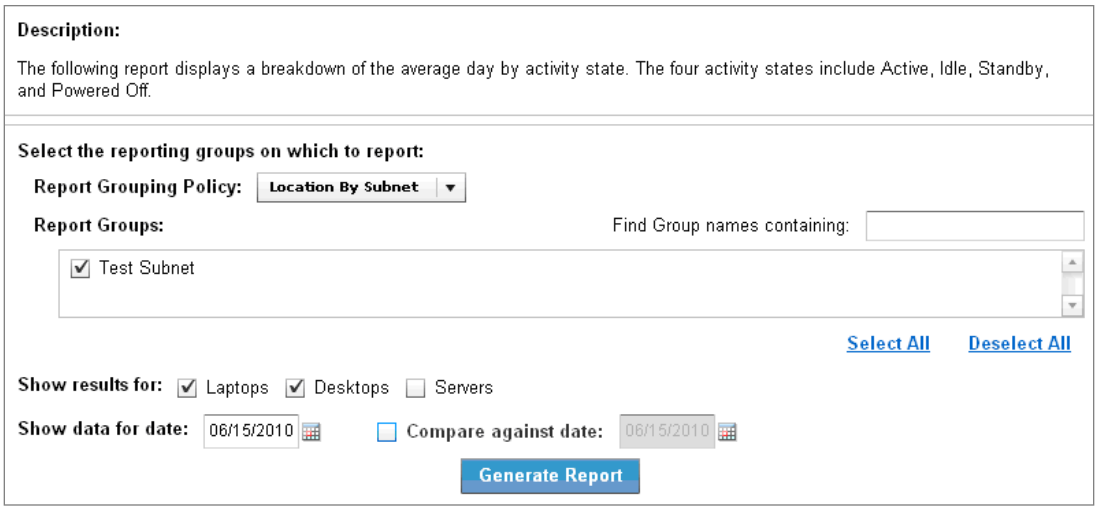
> ***Note:*** *If you select the current date as the End Date, the report might take significantly longer to generate, as previous dates are pre-calculated.*

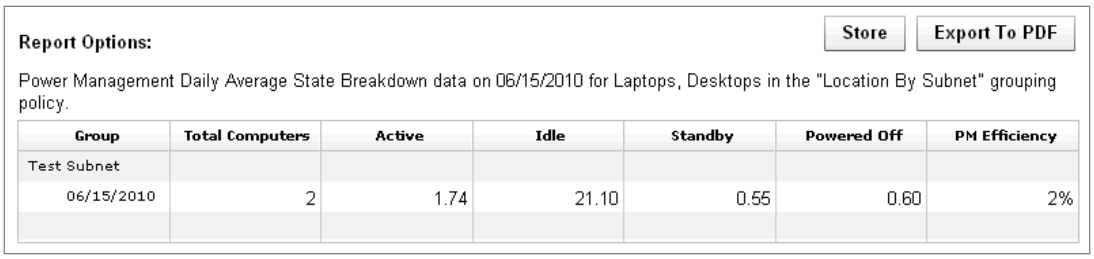




- Power Management Daily Activity State breakdown

This report displays a breakdown of the average day by activity state. The activity states are Active, Idle, Standby, and Powered off. You can use this report to evaluate changes you make to your power policies. For example, if many computers have high idle times, you set a Standby power policy to save significant power. It can also be set to compare improvements between two different days. The comparison function requires that historical power tracking is enabled.





Note: *If you select the current date as the "ompare against date, the report might take significantly longer to generate, as previous dates are pre-calculated.*

- Power Management settings

This report shows the percentage of computers that have power management settings enabled on a specific day. It can also be set to compare the improvements between two different days. The comparison function requires that historical power tracking is enabled.

Description:

The following report shows the penetration percentage of Power Management on selected computers, divided into four categories:

- Monitor Power Management
- Hard Disk Power Management
- System Standby Power Management
- Hibernate Power Management

Select the reporting groups on which to report:

Report Grouping Policy: All Computers

Report Groups: Find Group names containing:

All Computers

Show results for: Laptops Desktops Servers Select All Deselect All

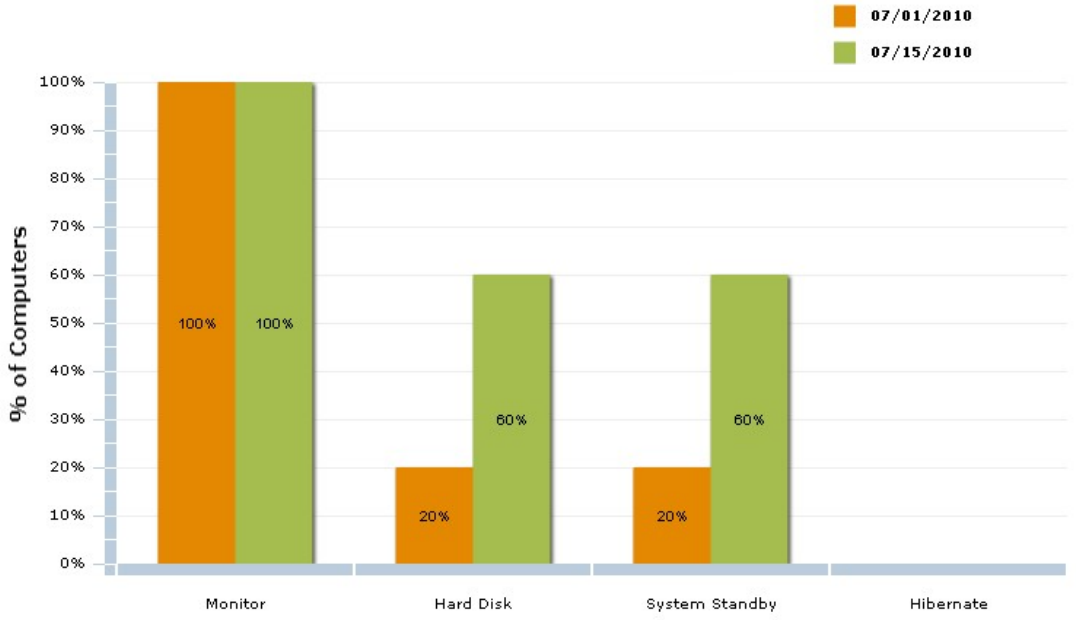
Show data for date: 06/15/2010 **Compare against date:** 06/15/2010

Generate Report

Report Options: Store Export To PDF

Power Management Settings data comparison from 07/01/2010 to 07/15/2010 for Laptops, Desktops in the "All Computers" grouping policy.

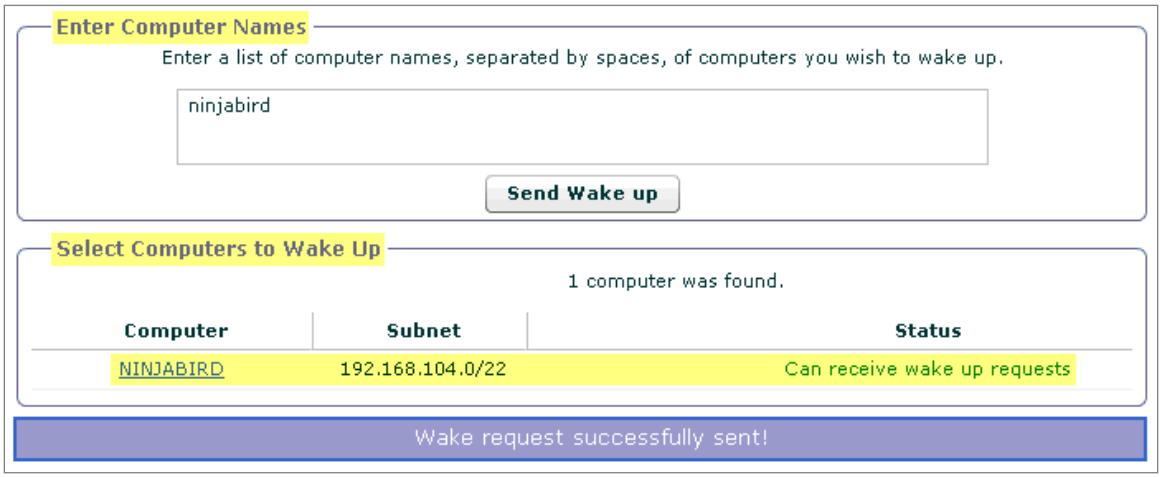
Select Group: All Computers



Note: *If you select the current date as the Compare against date, the report might take significantly longer to generate, as previous dates are pre-calculated.*

- Wake on Web

This report issues a Wake-on-LAN request to a specified list of computers, and displays warnings if the WoL infrastructure is not configured correctly to issue a wakeup.



Part Three

Support

Frequently asked questions

How are power savings calculated?

Power savings are determined by the amount of time your computer is on but not in use. For example, Idle mode is considered wasteful because the computer is using power without being actively used.

Your power savings is equal to *Current Consumption minus Minimum Power Consumption*. Minimum Power Consumption is the amount of time in active state per day times the *Active Power Usage* of the computer, for example, 70 watts. Current Consumption is the amount of time in active and idle modes (Active Power Usage) plus Standby Power Usage, for example, 3 watts.

These basic formulas will vary for each individual deployment. For specific parameters for setting and understanding power calculation formulas, contact your Sales Engineer or technical support.

How realistic are the power savings calculations?

BigFix's power savings calculations are based on tracking different aspects of the computer including: the time spent in each power state, the computer type (server, desktop, laptop), monitor count, and more. The results are used in combination with the electricity costs and power draw values to calculate the amount of power the computer is using.

To ensure the calculations are as accurate as possible, review the Manage Assumptions values and verify that the data, such as the cost you pay for electricity, is appropriate for your organization.

Can I see how my power management efforts are affecting my CO_2 emissions?

Yes. The BigFix Power Management visual power spectrum provides data on the projected CO_2 savings from your power management efforts.

What is the methodology used in calculating carbon savings?

BigFix carbon estimates are based on the results of research studies that determine the average carbon emissions needed to generate a kilowatt-hour of power. For more information, see the DOE Energy Information Administration website.

Are carbon savings findings robust enough to be used for external trading and regulatory reporting uses?

BigFix Power Management uses carbon estimates from the US Department of Energy for the average amount of CO_2 released per kilowatt-hour. Carbon emissions per kilowatt-hour will vary per region and per power source. For more information about power compliance and rules, contact your regulatory agency.

What if power settings are accidentally set on my servers and it causes a problem?

Typically, power settings are set on desktop and laptop computers rather than servers. If power settings are set on a server, the administrator has the ability to correct the issue within a matter of minutes. There are Fixlets that alert you if Standby policies are enabled on your servers.

Can I get a centralized view and control of my power management efforts?

Yes. You can centrally manage up to 250,000 endpoints with a single BigFix Server. You can also view your deployment through the Web Reports feature.

Can I set different power schemes for different groups of computers?

Yes. You can apply different power schemes to a wide variety of groups of computers, including ad hoc schemes, to target specific settings for specific groups such as help desk workstations vs. mobile laptops.

How can I change the default values of cost, power draw, and CO_2?

You can create and manage different cost and power assumptions for each endpoint with the Manage Custom Assumptions wizard.

Is there be a difference between the new and previous power calculations?

The new version of BigFix Power Management is considered to be more accurate than previous versions. The new version improvements include: specifically tracking standby time, more granular calculations on a per-agent level, rather than averaging certain values deployment wide, and a better algorithm for calculating power used based on recent activities.

What is the resource impact of power tracking on my computer?

The calculations and tracking for BigFix Power Management are relatively simple and low-cost for the agent. Enabling power management is not expected to impact users' computers in any noticeable way.

What is the Client Logging Service used for?

BigFix agents version 8.0 and later have a native ability to track standby and idle times. If you do not yet have the BigFix version 8.0 agent installed, you can use the Client Logging service to track these values on the computers with the older agents.

Technical support

BigFix technical support site offers a number of specialized support options to help you learn, understand, and optimize your use of this product:

- BigFix Support Site
- Documentation
- Knowledge Base
- Forums and Communities

Part Four

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