Power Management with Windows® Server 2003

Leaflet for System Administrators

The utilisation of Power Management in servers offers you three major advantages:
① Less heat will be produced in the server area; it may be possible to do without air conditioning.
② The server is immune to power losses at night and during the weekend.
③ You save 50% of your electricity costs.

Electricity Program

Energy consumption of a server

Depending on its loading, a server of the entry level class, with one processor and three fixed disks, requires 120 to 160 W of electrical power (without a screen) (Fig. 1).

A server with ACPI[1] functionality automatically goes into a state with reduced power consumption after a longer period of inactivity (Fig. 1):

Standby: Parts of the server run at reduced levels or are switched off (e.g. reduced clock frequency, fixed disks switched off), thereby resulting in lower power consumption.

Hibernate: The data that is currently being used is written to the fixed disk, and all components that are not needed to reawaken the system are switched off. The server is then in the operating state with the lowest possible power consumption. Switching back to the normal mode takes longer than for the *Standby* mode.

Advantages of active power management

The *Standby* and *Hibernate modes* are managed by the power management of the *Windows*® operating system.

In principle, power management should be activated for all servers that do not provide a permanent service and that, for example, are inactive for some hours during the night. This would include, as examples, locally used *File* and *Database servers* that are only used during certain times.

Thanks to switching to the *Hibernate mode?*
- It may be possible to do without air conditioning
- The server will be immune to power losses at night and during the weekend
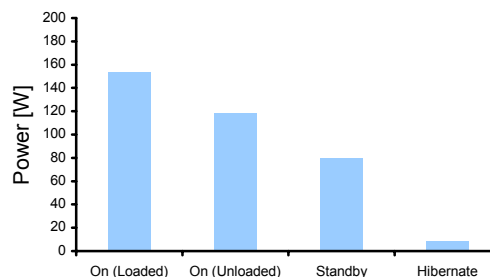- Up to 50% of the current consumption will be saved.

Fig. 1   Power requirement of a server

Valid for new operating systems

The procedure described in the following has been tested with *Windows*® *Server 2003, Standard Edition*.

Power management is not available for *RAS*[2] *servers* and only with limited performance for *DHCP*[3] *servers* (the server must be in the normal operating mode when logging in a client). Use as a *Domain-Controller* is possible.

Procedure for acquisition, installation and operation

Proceed according to the following steps. The recommended set-values can be taken directly from the pictures (Figs. 2, 3, 4).

1. Purchase of ACPI-compatible hardware

Have your supplier confirm that the server in your final configuration will support at least one of the two *ACPI*-modes S3 (*Suspend to RAM*) or S4 (*Suspend to Disk*). Request the electrical power figures in operation and in the *Standby* and/or *Hibernate modes*. Compare the data from different suppliers.

Ensure that the network card makes it possible to activate the server over the network.

2. Installation

Activate all the functions of the *Power Management* in the *BIOS Set-up*. Ensure that the *ACPI*

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[1] ACPI: Advanced Configuration and Power Interface

Windows is a registered trademark of the Microsoft Corporation

[2] RAS: Remote Access Service
[3] DHCP: Dynamic Host Configuration Protocol

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functionality will be integrated during the installation of the operating system.

Install the latest driver versions of all hardware components. In doing this, you increase the chance that the power-saving modes will be supported.

Activate the following two options in the device properties of the network card: *Computer can switch off devices in order to save energy* and *Device can activate the computer from the Standby-Mode* (Fig. 2)

3. Setting up the Power Scheme

With the right mouse button, click on the free area of the desktop and select the item *Properties.* Open the *Power Schemes* tab and select the *Minmal Power Management* scheme. Now enter the times according to Figure 3. With these settings, the server should only go into the *Hibernate mode* after longer periods of inactivity, i.e., in the evening.

4. Setting up the Hibernate Mode

For the *Hibernate Mode*, space must be reserved on the fixed disk. To do this, activate the *Enable Hibernation* field in the *Hibernate* tab (Fig. 4). The required memory space depends on the size of the RAM memory.

The server is not completely separated from the mains supply in the *Hibernate mode*. A complete switch-off via an external device (for example a UPS system or an intelligent multiple socket outlet, www.emt.ch) offers additional advantages:

- Increase of reliability through the daily rebooting of the system
- Prevention of access by third persons
- Protection against mains failures

For detailed information see the leaflet "Switching of IT Servers" mentioned below.

5. Operation

The server will only switch into the *Hibernate Mode* if no client is still using files on the server. You should therefore close all programs on the connected client computers in the evening, and then switch the computers off.
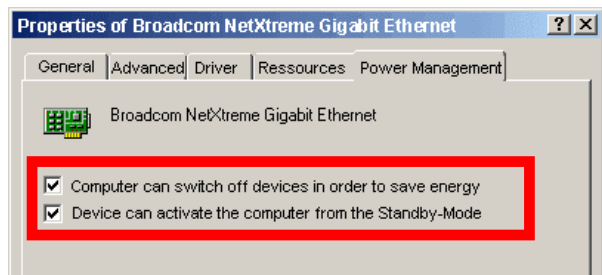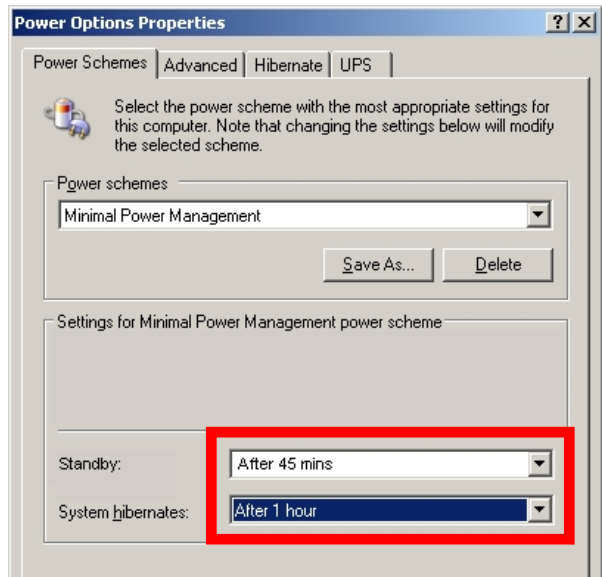
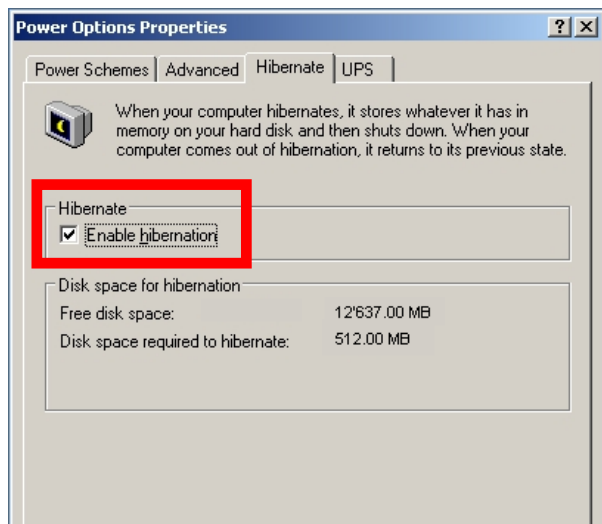Fig. 2   Network card settings

Fig. 3   Power Scheme settings

Fig. 4   Hibernate Mode settings

To find out more ...

- The corresponding Help themes in Windows: *Overview of Energy Options, Overview of ACPI*
- Findings relating to the use of ACPI in Windows servers, 2004
  Download: www.electricity-research.ch

- Leaflet *Energy Efficiency in the Invitations to Tender for IT units*, 2004
  Download: www.electricity-research.ch
- Leaflet *Switching of IT Servers*, 2004
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