

Wake On LAN

If a PC has been shutdown to an ACPI state from S1 to S5, it may be possible for it to be remote woken over a network and either resumed (S1 to S4) or booted (S5). For this to be possible it requires both a motherboard and network adapter that supports Wake on LAN and in some cases for that support to be enabled in the BIOS. Thankfully most modern motherboards with built in network adapters support this by default. PCs without on-board network adapters will need a motherboard that supports PCI 2.2 or has on board WoL connector, along with an appropriate network adapter.

When supported by the hardware (and configured if required) the "link" light on your network card should still be on, even when the PC is powered down (s1-s5), if not the card has most likely been powered down by the motherboard and will therefore not be able to look for remote wake up messages.

Most modern network cards support two types of remote wake up: "Magic Packet" and "Wakeup Frame". When the PC is in states S1-S5, it maintains power to any "wake devices" which would normally include any network adapters. The network adapter then listens on the local network for the wakeup message and once the adapter sees the wakeup (and determines that it is the intended recipient) it signals to the motherboard that the motherboard should wake. The motherboard will then either boot (from S5) or resume (S1-S4).

External Hardware

It should be noted that whilst S4 and S5 reinitialise all the hardware, remote wakes from S1-S3 may not issue wake signals to external devices (such as monitors), so while your PC may wake up, your monitor might remain off.

BIOS Passwords

It's also worth noting that wakes from S4 and S5 will reinitialise the BIOS and therefore if you have configured the BIOS to request a password before booting, the PC may not boot past the point until one is supplied.

"Wakeup Frames"

Wakeup Frames are not supported by all network card vendors (and are supported in different ways by different vendors). Where they are supported, they can range from a simple ICMP echo (ping) to the PC or simply any traffic at all directed to that PC. On a network where one PC may check for the presence of another at regular intervals it is inadvisable to use wake up frames as PCs will often repeatedly wake for short periods and then sleep again.

"Magic Packets"

Magic Packets are specially crafted ethernet packets solely used as a wakeup call. They have the advantage over wakeup frames that a PC will only wake when specifically instructed, but do require specialised software to generate them.

As any PC on the LAN is capable of sending a magic packet, some cards support a feature called SecureON which requires an additional password to be encoded into the magic packet, preventing unauthorized users waking the PC.

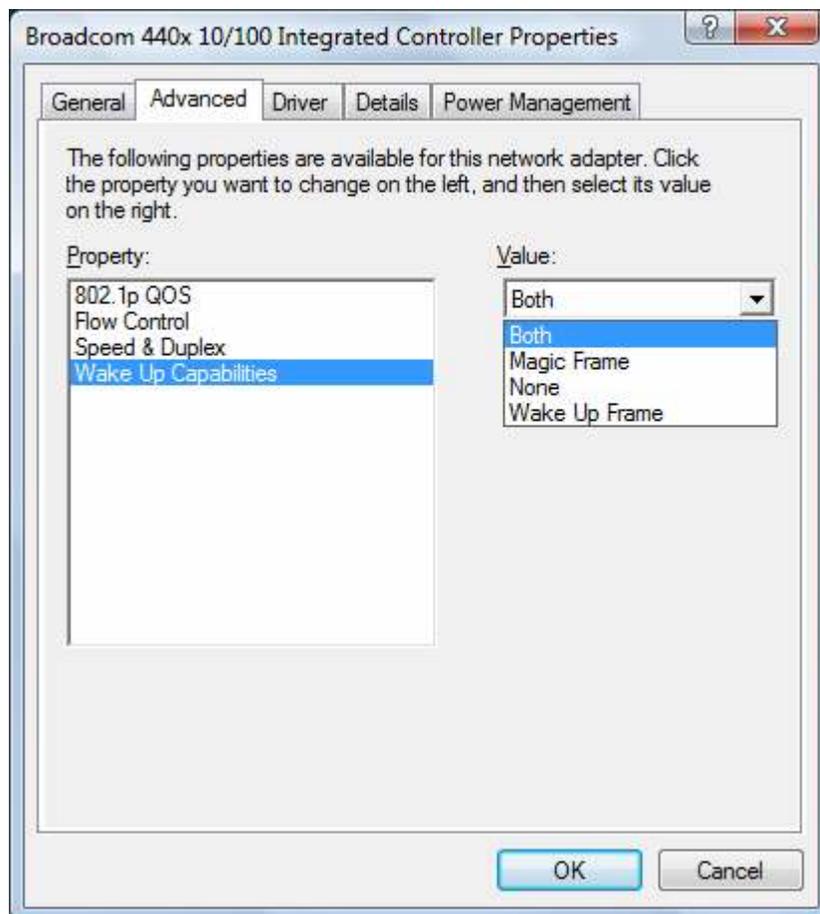
At the time the wake up packet is sent, there is no operating system running to decode the network traffic, it is therefore directed to an individual ethernet address rather than a TCP/IP address. As the PC you wish to wake may not be on the same subnet as the PC you are waking from, the packet must first be encapsulated in a UDP packet, which is then translated into an ethernet broadcast when it reaches the desired subnet. The packet is traditionally sent to port 7, however as the port is not used, it can in fact be sent on any port (which may aid it passing through firewalls).

Wide area Networks

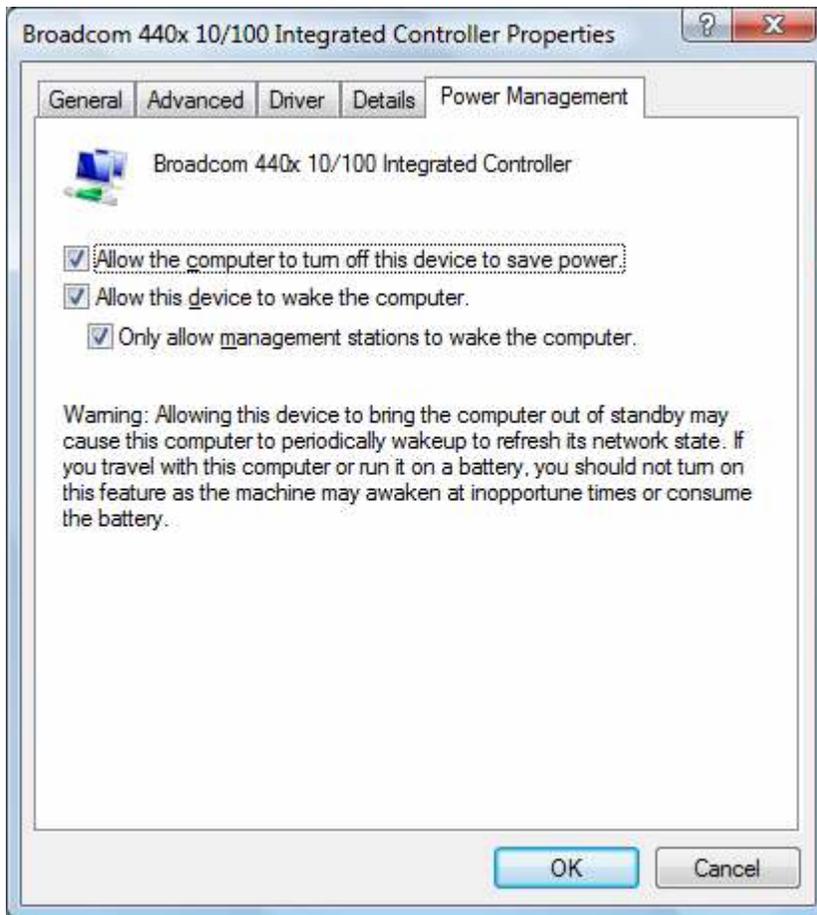
Normally these packets are allowed to pass freely between LAN routers, but WAN > LAN routers (especially consumer grade ones) are known to block IP directed broadcasts, which means that performing WoL from the internet to a PC on a private subnet may require reconfiguration of the router, or may simply not be possible at all. Given that Wake on LAN was only ever intended for LAN use, it seems a reasonable limitation.

Configuring Network adapters

It varies from network adapter to network adapter how to change which type of wake up message it responds to. In Windows you can often do this by editing the advanced settings whilst configuring the network adapter in device manager.



However it is often easier to achieve by using the Power Management tab (only present for adapters that support it).



This tab presents you with three options relevant to Wake on LAN

"Allow the computer to turn off this device to save power."

This has a very misleading description, as it is required for the PC to wake using the device (and therefore obviously won't turn it off in that circumstance). "Allow the computer to control the power state of this device" would be more fitting.

"Allow this device to bring the computer out of standby"

Checking this will turn on both type of wakes for a network adapter (Magic Packet and WakeUp Frame).

"Only allow management stations to bring the computer out of standby"

This also has a misleading description. It actually means PCs will only be woken using the Magic Packet and not by whatever "WakeUp Frame" that network adapter supports.

Once a PC has been configured with the options, any tool capable of sending the appropriate wake up message to the PC, should wake it, assuming your PC hardware and network infrastructure support it.

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PeachWorx are the developers of TaskForceCO2, an easy to use system management tool for both shutting down and remotely resuming Windows PCs. For more information on TaskForceCO2 and PeachWorx please visit <http://www.peachworx.com>