

HP Wireless Wakeup

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1 HP Wireless Wakeup

1.1 Purpose

The purpose of this white paper is to describe the HP Wireless Wakeup feature and how to configure it on supported HP notebook systems.

1.2 HP Wireless Wakeup Overview

HP Wireless Wakeup, also commonly known as Wake on Wireless LAN (WoWLAN), is a technology that can be used to remotely wake up computers connected to a wireless network in order to facilitate IT administration and system management. This HP Wireless Wakeup technology is based on the same concept as Wake on LAN that is used in a wired network. An encoded broadcast packet, known as a wakeup magic packet, is sent from a remote system management application in order to wake up the client computer from a system power saving state such as standby (S3) or hibernation (S4). The industry standard wakeup magic packet is a broadcast frame containing 6 bytes of all 255 (FFh) and sixteen repetition of the target client computer's MAC address. It is sent typically as a UDP packet to port 7 or 9.

As the enterprise shifts to an all wireless network environment and the industry trending to eliminate traditional Ethernet adaptor from thin form factor notebook client devices, the key benefit of HP Wireless Wakeup is enabling the management of enterprise clients the same way as in a wired network environment.

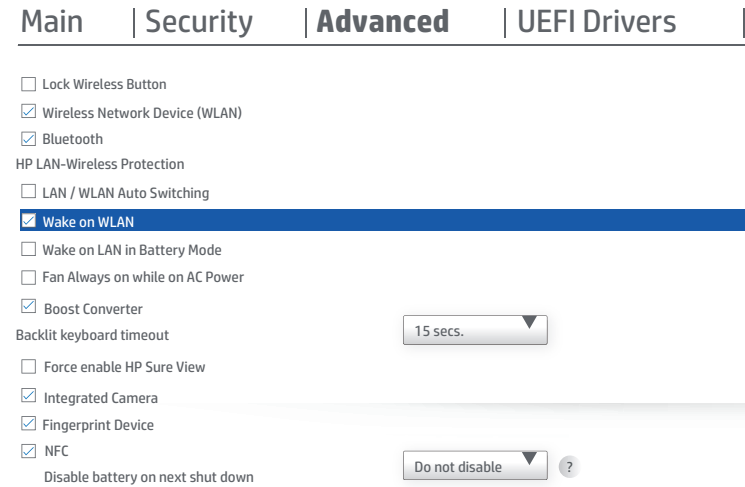
In order to support wake in a wireless environment, there are several dependencies.

- Client devices must be designed to be able to wake from a power saving mode by a wireless network adaptor.
- Client devices must be designed to maintain power to the wireless network adaptor during system power saving states in order to allow the wireless adaptor to keep its association with a wireless access point.
- The wireless network adaptor must support wake function and be able maintain a wireless association with a WLAN access point during supported system power saving states.
- The OS must allow the configuration of the wireless network adaptor to enable WoWLAN function.
- The client device must be associated with a wireless access point prior to entering a system power saving state and the association must be persistent while staying in the system power saving state such that the adaptor can listen for a wakeup packet. If the client device loses its association with the wireless access point for any reason (for example, if the client device is moved out of access point's range) while in a system power saving state then the wake function will no longer be available.
- Network infrastructure must be configured to allow wireless broadcast packets to traverse the network in order for the wake magic packet to reach the client devices.

Typically, after a client system is awakened, a separate management solution is used to perform administrative actions such as system update or patch, inventory, policy update, etc. The configuration and operation of these IT administration and management application suites are beyond the scope of this white paper.

1.3 HP Notebook Support and BIOS Configuration

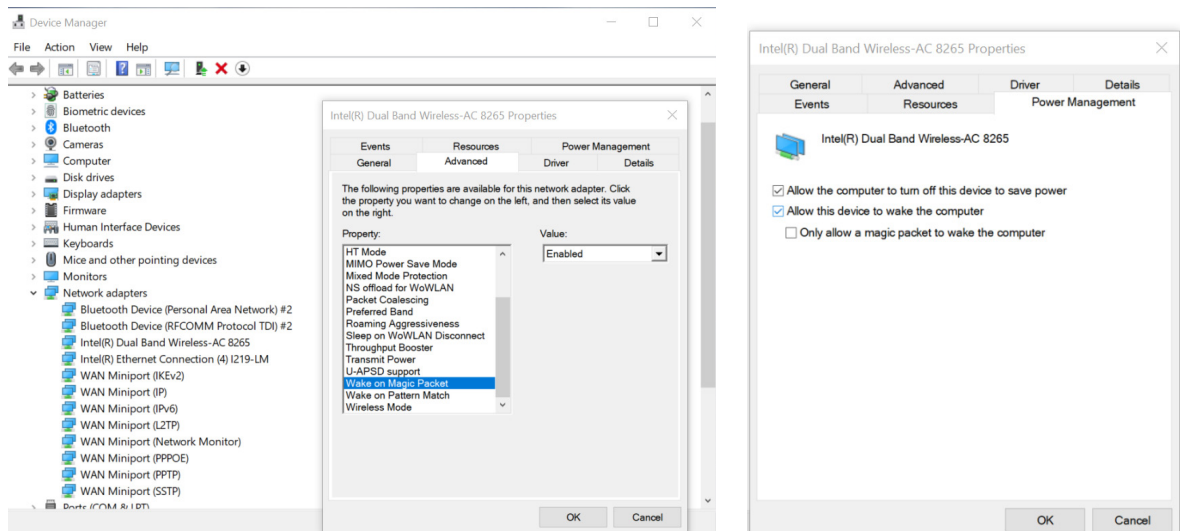
In order for the wireless network adaptor to control the power state of the system, the wireless adaptor must be integrated with the motherboard power connector design of a notebook system. Therefore, external wireless adaptors cannot be supported. HP notebook systems designed to support HP Wireless Wakeup will include a configuration option in F10 BIOS Setup under the Advanced Built-In Device Options menu:



The HP Wireless Wakeup feature is disabled by default. To enable it, check the Wake on WLAN box, save and exit BIOS Setup.

1.4 Wireless Network Adaptor Support and OS Configuration

After the notebook BIOS is configured for HP Wireless Wakeup, the wireless network adaptor must then be configured to enable the wake function. A wireless network adaptor that supports wake will expose the feature configuration and power management options to the Windows OS. From the wireless adaptor properties dialog in Windows device manager, the feature configuration must be set to enabled and the “Allow the device to wake the computer” option must be checked under Power Management option.



Microsoft introduced a new system power mode, Modern Standby, with Windows 10. A system that supports Modern Standby Connected/Disconnected does not expose the power management option of the network adaptor to the end user and therefore it cannot be configured to support wake using magic packets.

1.5 Network Support and Configuration

When a notebook client is in a power saving state, the OS IP network stack is no longer active and therefore it may not be able to respond to any Address Resolution Protocols (ARPs) from a router. Hence, a wakeup magic packet must be transmitted as a local subnet broadcast packet addressed with a client's wireless adaptor's MAC address. The network administrator must configure network devices and firewalls to not block the wakeup magic packet.

A system in a broadcast domain (subnet) can be assigned as a wake server to generate the broadcast wakeup packet. Generally, there is no issue if the targeted client computer to be awakened is in the same subnet as the server. If the wake server does not reside in the same broadcast domain, then the network must be configured to enable and forward directed broadcasts to allow wakeup magic packets to traverse across broadcast domains.

Modern enterprise WLAN networks often block broadcast traffics to prevent denial of service attacks. Directed broadcast capability is typically disabled by default. The configurations of various network environment and equipment are beyond the scope of this white paper. It is advisable to contact the wireless network infrastructure provider to assist in the configuration for a specific network design to enable WoWLAN and to limit the direct broadcast traffic to only specific sources, such as the wake server's IP address.

An example of network configuration:

<https://www.cisco.com/c/en/us/support/docs/switches/catalyst-3750-series-switches/91672-cat13-wol-vlans.html>

1.6 Feature Limitations

	HP 2016 KBL Commercial Notebooks	HP 2017 KBL-R Commercial Notebooks
Support HP Notebooks	All commercial notebooks* except 400 series	All commercial notebooks*
Supported CPU	Intel® CPU only	Both Intel® and AMD CPU are supported
Supported Wireless Network Adaptors	Only Intel® wireless network adaptors are supported	Intel® and Realtek wireless network adaptors are supported
Supported Wake from System Power Saving Mode	Standby (S3)	Standby (S3)
	Hibernate (S4)	Hibernate (S4)
Supported System Power Source	AC and DC	AC and DC

*The following notebook platforms cannot support HP Wireless Wakeup when configured as Modern Standby systems: HP Pro x2 612 G2, HP Elite x2 1012 G2, HP EliteBook x360 1020 G2.

For Intel® wireless network adaptor, when WoWLAN is enabled, if a notebook client leaves the AP coverage while in a power saving mode, the client system may be awakened. If this is not the desired behavior, a registry key setting can be configured to override the wake when connection with AP is lost:

`\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Class\{4d36e972-e325-11ce-bfc1-08002be10318}\000?`
(folder of Wi-Fi adaptor)

- Registry key: WoWLANWakeUpConfig
- Disable 'Wake when connection with AP is lost' – 0x7C

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