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Wake on LAN* Header Recommendations

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1.0   Scope

This document provides a reference for implementation of a Wake on LAN (WOL) header. This header is used to connect an add-in Network Interface Card (NIC) that has WOL capability to a system board. It is provided as a guideline only and is not intended to replace or supplement independent designs and validation activities. This document includes information relating to connector types, part numbers, and important signal information.

More information regarding Wake on LAN functionality and specifications can be found at the following URLs:

- IBM Wake on LAN Information Brief

  http://www.pc.ibm.com/us/infobrf/iblan.html

- AMD Magic Packet* explanation and proposed AMD implementation of WOL header (to be updated to correlate with this specification)

  http://www.amd.com/products/npd/overview/20212d.html

- Intel Managed PC website

  http://www.intel.com/managedpc/

- search by part number for connector specs

  http://www.amp.com

2.0   Overview

The *Wake on LAN Header Recommendations* document proposes the adoption of a connector (header) on both the motherboard and an add-in NIC with WOL capability.

The proposed solution is to use identical 3-pin headers on both the motherboard and the NIC.

3.0   System Requirements

The following subsections describe requirements in order to use the proposed WOL connector.

3.1   Motherboards

- 5 V standby input routed to WOL header
- A 3-pin header to interconnect the NIC and the motherboard
- Support for the Magic Packet* wake-up pulse to turn on the system
- BIOS support for boot-from-LAN (BIOS boot specification) if required

3.2   Network Interface Cards

- WOL capability

- 3-pin header to match the motherboard header or a special dongle cable for NICs with 2 headers as illustrated in Figure 4.

Note: Existing NICs (with 2 connectors) could be used with the header defined in this document; however, a custom cable (or dongle) is required between the single motherboard header and the current NIC headers. Figure 1 illustrates this.
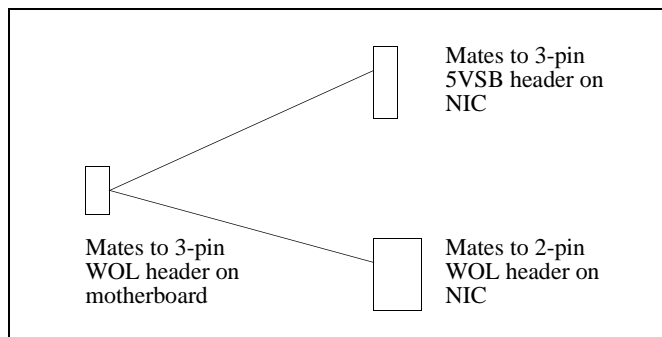
Mates to 3-pin 5VSB header on NIC

Mates to 3-pin WOL header on motherboard

Mates to 2-pin WOL header on NIC

Figure 1.

Note: The addition of a WOL NIC to a system should not be an end-user activity unless the system has been preconfigured to support a WOL NIC by the OEM. This is due to the higher current requirements of the power supply unit (5VSB), wake-up signal support of the motherboard, and possible BIOS enhancements for WOL support (such as an alternate boot sequence).

3.3   Power Supply Unit

A 5 V segmented power supply with a minimum rating of 600 mA is required for WOL implementations

4.0   Problem Definition

4.1   Background

Wake on LAN is a key manageability feature for corporate systems and is defined as the ability of a management application to remotely power-up a system that is powered-off. (A description of the Wake on LAN functionality can be found on the IBM website: www.pc.ibm.com/us/infobrf/iblan.html.)

4.2   Problem

To support the WOL feature, a computer system must have the ability to detect a Magic Packet via the LAN and turn on the computer. The most elegant solution is a LAN On Motherboard (LOM) that includes WOL support. However, many systems will not include LOM or WOL support; thus, it is desired to add that functionality through an add-in NIC that supports WOL. The purpose of this recommendation is to define a method which can be used to interconnect the NIC and the motherboard in such a system.

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5.0 Connectors and Cables
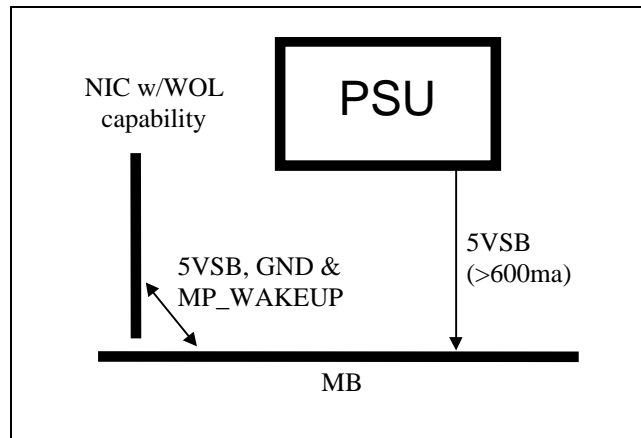
5.1 System Block Diagram

Figure 2.

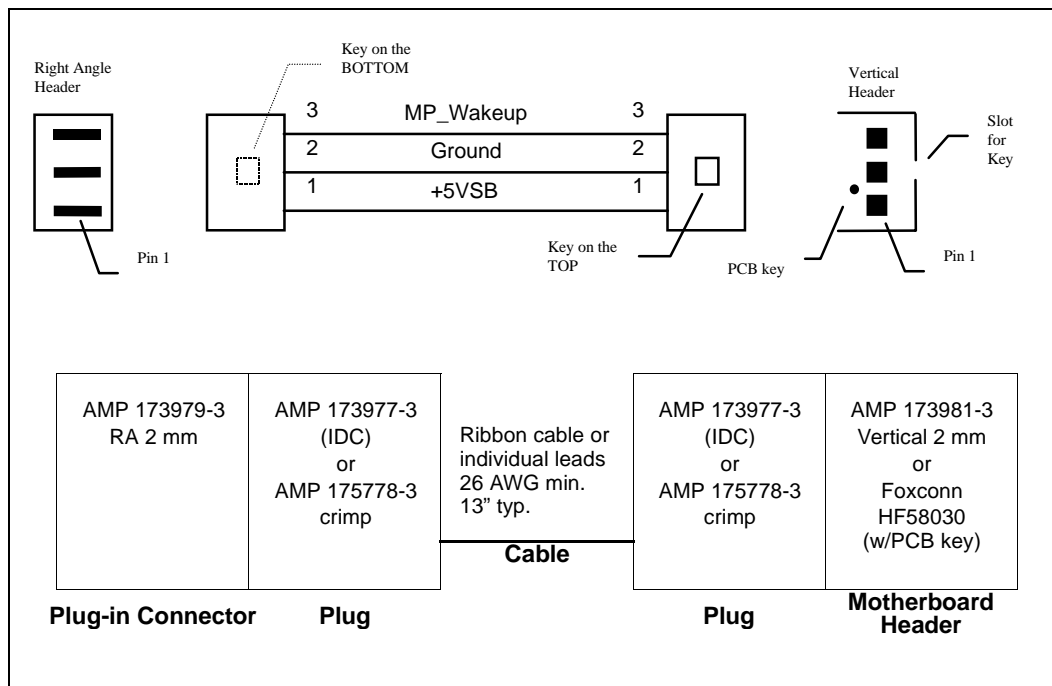## 5.2 Interconnect Cable and Components

Figure 3.

The motherboard or NIC can use either a vertical or a 90° header as desired. Interconnect cable can be oriented in either direction. Headers are friction-locking and shrouded (in other words, the connectors are keyed).

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Note: Always refer to manufacturer's WOL cabling documentation for specific cabling requirements.

6.0   Electrical Characteristics

The WOL input signal from an external or internal source may be from one of several different devices including Ethernet, Token Ring, etc. This signal may come from various logic families or transistor types. This specification delineates the acceptable parameters for this device as well as the input characteristics required (such as V_{IH} and V_{IL} for the host motherboard) to define bias resistors, impedances, and current load maximum values.

AC Electrical Characteristics for Devices Driving the WOL Signals

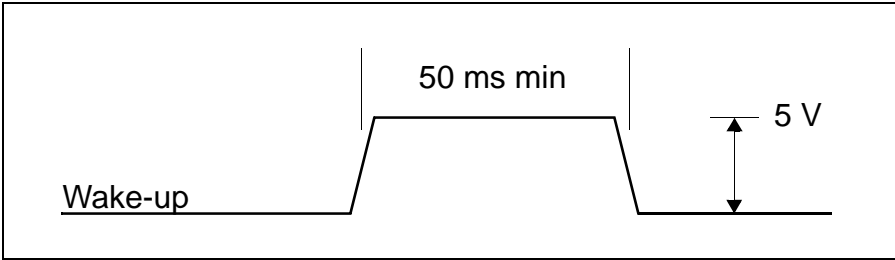| Symbol	Parameter	Min	Max
V_{OL}	Low level output voltage		0.8 V
V_{OH}	High level output voltage	2.6 V (at 0.5 mA)	V_{CC}
t_{TLH} / t_{THL}	Output transition time	0 ns	50 ns
	Pulse width	50 ms	

Figure 4.

Note: The wake-up signal is defined for a 5 V tolerant environment.

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Appendix A: Detailed Header and Cabling Harness Illustrations

Male (right angle) Header on NIC

Female Cable Connector

Female Cable Connector

Male (vertical) Motherboard Header

Female Cable Connector

3 Wire Cable

Pin 1

Pin 1

Pin 1

Pin 1

Pin 1

PCB key

Pin 1 = 5 V Standby (red)
Pin 2 = Ground (black)
Pin 3 = Wake-up (yellow)

Key on Bottom

(end view)

Pin 1 (female)
AMP #173977-3 **or**
#175778-3

Yellow

(end view)

(top view)

(top view)

Red

Black

13 inches Typical

Pin 1 (female)
AMP #173977-3
or #175778-3

Individual Wires **or**
Ribbon Cable
26 AGW Minimum