



# Intel® 82541PI Gigabit Ethernet Controller

## High-performance, power-optimized Gigabit connection for mobile and desktop PCI-based designs

### The Intelligent Way to Connect

- Longer battery life through reduced power usage and enhanced power management
- System health monitoring and authenticated remote power control with ASF 2.0
- Design flexibility with Intel® SingleDriver™ technology and footprint-compatibility with Intel® PRO 10/100 and 10/100/1000 Connections

The Intel® 82541PI Gigabit Ethernet Controller provides optimized Gigabit networking for power-sensitive designs, such as mobile PC applications. This highly efficient controller, with enhanced power management, consumes less than 1.0W of power at Gigabit speeds. When no signal is detected on the wire, the controller reduces power consumption by switching to 100 or 10 and powering down the physical-layer circuitry (PHY). When a signal is detected, the controller automatically negotiates the connection to Gigabit, if available. To reduce the battery drain, the controller automatically switches the link to 100Mbps operation when on battery power.

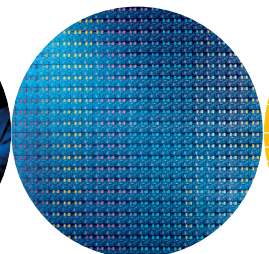
The Intel 82541PI Gigabit Ethernet Controller enhances secure manageability and system health monitoring over the LAN with support for IPMI 1.5, ASF 2.0 and Advanced Pass Through. For IPMI designs, the on-board SMBus port can pass management traffic through the controller to a management device, such as a Baseboard Management Controller (BMC). Alternatively, ASF 2.0 provides manageability without the cost burden of external hardware via standardized interfaces. ASF 2.0 circuitry provides advanced system health and security alerting plus authenticated remote power control capabilities.



The Intel 82541PI combines Intel's fifth-generation Gigabit MAC design with fully integrated PHY to provide a standard IEEE 802.3 Ethernet interface for 1000BASE-T, 100BASE-TX and 10BASE-T applications. In addition, the controller provides a direct Peripheral Component (PCI) Interconnect designed to be compliant with the PCI 2.3 bus up to 66MHz. Packaged in a 15x15mm PBGA, the Intel 82541PI Gigabit Ethernet Controller is footprint-compatible with the Intel® 82551QM Fast Ethernet Controller and Intel® 82562EX and 82562EZ devices. Footprint-compatibility, plus Intel SingleDriver technology allow for a flexible Gigabit Ethernet or Fast Ethernet implementation on the same motherboard layout.

With built-in power management capabilities and enhanced manageability, the Intel 82541PI Gigabit Ethernet Controller can help extend battery life for mobile PC users, giving your designs a competitive edge for tomorrow's mobile PCs.

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## Features

## Benefits

PCI Bus Features	
<ul style="list-style-type: none"> <li>PCI revision 2.3, 32-bit, 33/66MHz</li> <li>CLKRUN# Signal</li> </ul>	<ul style="list-style-type: none"> <li>Application flexibility in LOM or embedded use</li> <li>PCI clock suspension for low-power mobile design</li> </ul>
Gigabit MAC/PHY Advanced Features	
<ul style="list-style-type: none"> <li>64KB configurable RX and TX packet FIFO</li> <li>IEEE 802.3x-compliant flow-control support with software-controllable thresholds</li> <li>Programmable host memory receive buffers (256B to 16KB)</li> <li>IEEE 802.3ab Auto-Negotiation</li> <li>State-of-the-art DSP/analog architecture</li> <li>PHY detects polarity, MDI-X, 2 pair vs. 4 pair cables</li> </ul>	<ul style="list-style-type: none"> <li>FIFO size tunable to the application</li> <li>Reduced frame loss due to receive FIFO overrun</li> <li>Efficient usage of system resources</li> <li>Automatic link configuration including speed, duplex, and flow control</li> <li>Implements digital adaptive equalization, echo, cross-talk and baseline wander cancellation</li> <li>Easier network installation and maintenance</li> </ul>
Host Offloading Features	
<ul style="list-style-type: none"> <li>TCP segmentation (LSO), TCP and UDP checksum off-loading</li> <li>IEEE 802.1Q VLAN support with VLAN tag insertion and stripping and packet filtering for up to 4096 VLAN tags</li> <li>Jumbo frame support up to 16KB</li> <li>Interrupt moderation controls</li> </ul>	<ul style="list-style-type: none"> <li>Increased throughput and lower CPU utilization. Compatible with large send offload on RX and TX feature found in Windows® 2000 and Windows® XP</li> <li>Enables IT staff to easily create multiple virtual LAN segments</li> <li>High throughput for large data transfers on networks supporting jumbo frames</li> <li>Reduces the number of interrupts generated by receive and transmit operations</li> </ul>
Manageability Features	
<ul style="list-style-type: none"> <li>On-chip SMBus 2.0 port</li> <li>ASF 1.0 and 2.0</li> <li>Compliance with PCI Power Management v1.1/ACPI v2.0</li> <li>Wake on LAN* (WoL) support</li> <li>Automatic link speed switching from 1000Mb/s down to 10 or 100Mb/s in standby</li> <li>Smart Power Down mode when no signal is detected on the wire</li> <li>Power Save mode switches link speed from 1000Mb/s down to 10 or 100Mb/s when on battery power</li> </ul>	<ul style="list-style-type: none"> <li>Enables IPMI and ASF implementations</li> <li>Provides advanced alerting and remote-control capabilities with industry-standard interfaces</li> <li>PCI power management capability requirements for PC and embedded applications</li> <li>Packet recognition and wakeup for network adapter and LOM applications without software configuration</li> <li>Supports power-down states without software assistance</li> <li>Low power in standby states</li> <li>Enables very low-power mobile or battery</li> <li>Manages power consumption based on power source</li> <li>Longer battery life for battery-powered implementations</li> </ul>
Additional Device Features	
<ul style="list-style-type: none"> <li>Four programmable LED outputs</li> <li>On-chip power regulator control circuitry</li> <li>BIOS LAN Disable Pin</li> </ul>	<ul style="list-style-type: none"> <li>Customizable indications for link speed, activity, duplex, collisions, and port ID on each port</li> <li>Simplified low-cost power supply design</li> <li>Enables low-power LAN disable for LOM applications</li> </ul>

## Characteristics

Electrical	
<ul style="list-style-type: none"> <li>Typical targeted power dissipation</li> </ul>	<ul style="list-style-type: none"> <li>1.0W at D0 1000Mbps</li> <li>100mW at D3 100Mbps</li> <li>50mW at D3 wakeup disabled</li> </ul>
Environmental	
<ul style="list-style-type: none"> <li>Operating temperature</li> <li>Storage temperature</li> </ul>	<ul style="list-style-type: none"> <li>0°C to 70°C (maximum); does not require a heat sink or forced airflow</li> <li>-65°C to 140°C</li> </ul>
Physical	
<ul style="list-style-type: none"> <li>Package</li> <li>Footprint-compatible with Intel® 82540EM, 82540EP, 82541EI and 82541GI Gigabit Ethernet Controllers</li> <li>Footprint-compatible with Intel® 82551QM, 82562EZ and 82562EX Fast Ethernet Controllers</li> </ul>	<ul style="list-style-type: none"> <li>196-pin PBGA, 1mm ball pitch, 15x15mm (simplifies LOM board designs)</li> <li>Enables easy migration</li> <li>Enables a Gigabit Ethernet or 10/100 LOM implementation on the same board</li> </ul>

## Order Code

- GD82541PI

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