Product Brief

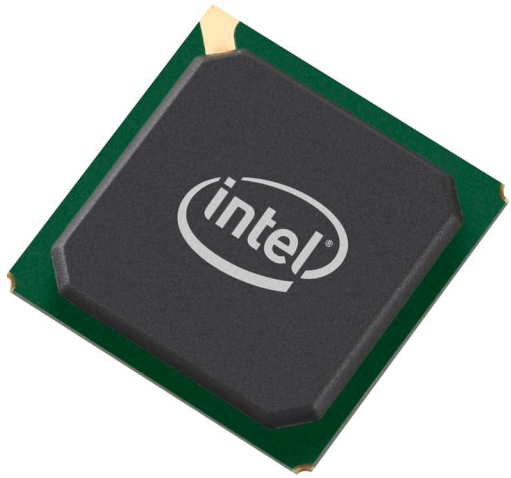
Intel® 82580 Gigabit Ethernet Controller

Network Connectivity

Intel® 82580 Gigabit Ethernet Controller

High Performance, Quad-Port Gigabit Network Connectivity with Advanced Performance Features

- High performing, low power, PCI Express* 2.0 (5.0 GT/s) 10/100/1000 Ethernet Connection
- Compact 17 mm x 17 mm single-chip provides superior port density for server and embedded designs
- Fully integrated Quad GbE MAC (x4/x2/x1) and Quad PHY/SERDES/SGMII in any combination
- IEEE 1588 (pre-standard) / IEEE802.1AS and per packet time stamping
- Supports multiple Tx & Rx Queues, Virtual Machine Data queues (VMDq), and 9.5 KB Jumbo Frames
- Broad OS Support: Linux, Free BSD, Windows, VMware ESX, XEN, Hyper-V
- Lead-Free and Halogen-free package
- Extended lifecycle support protects system investment by providing 7-year availability for customers



Port Density Leadership and Flexible Interfaces for Multi-port Designs

This device uses the PCI Express* 2.0 (5.0 GT/s) [x4/x2/x1] interface. The 82580 is a single-chip low-power device that can provide significant BOM savings by reducing the support components (bridge chips, crystals, and EEPROMS) required when compared with dual-port or multiple single-port GbE designs.

The Intel® 82580 provides fully integrated Gigabit Ethernet Media Access Control (MAC), Physical-Layer (PHY), Serializer-Deserializer (SERDES), and SGMII interface capabilities. The Intel® 82580 supports the MDI (Copper) standard IEEE 802.3 Ethernet interface for 1000BASE-T, 100BASE-TX, 10BASE-T connections (802.3, 802.3u, 802.3ab), the SERDES interface for 1000Base-SX/LX optical fiber connections, the 1000BASE-KX and 1000BASE-BX for backplane connections, and supports the SGMII interface for SFP/external PHY connections.

Performance Benefits for Demanding Applications

The Intel® 82580 Gigabit Ethernet Controller supports Intel® I/O Acceleration Technology (I/OAT) and also contains eight transmit and eight receive queues. The Intel® 82580 efficiently manages packets with minimum latency by

combining parallel and pipelined logic architectures that are optimized for these independent Tx and Rx queues. These queues, combined with Receive Side Scaling (RSS), Direct Cache Access, and Message Signal Interrupt Extension (MSI-X) support, provide performance optimization benefits for multi-core designs. The Intel® 82580 provides advanced interrupt-handling features, and provides intelligent filtering, ordering and directing of packets to specific queues and cores to enable load-balancing of network traffic flows.

Other performance-enhancing features include UDP, TCP and IP Checksum offloads, UDP and TCP Transmit Segmentation Offload (TSO), SCTP receive and transmit checksum offloads, Stateless offloads (header splitting), and 9500-byte jumbo frame support.

For the virtualized environment, the Intel® 82580 supports Intel® Virtualization Technology[1] for Connectivity (VT-c) and Virtual Machine Data queue, (VMDq), which improve I/O performance by reducing the I/O overhead on a virtualized platform. The Intel® 82580 supports up to 8 Virtual Machines per port (a queue is allocated to each VM).

On-Board Side-Band Interfaces for Network Manageability

The Intel® 82580 Gigabit Ethernet Controller contains an SMBus port and DMTF-defined Network Controller Sideband Interface (NC-SI) for manageability. Ethernet traffic is forwarded from the network to the baseboard management controller (BMC) and vice versa using the selected implementation. The Intel® 82580 provides filtering capabilities to determine which traffic is forwarded to the BMC. SMBus provides a legacy low-speed (100KHz) serial bus to pass network traffic and also enables the BMC to configure the Controller's filters and management related capabilities. NC-SI is an Ethernet manageability protocol which is easy to implement and offers a very fast data rate (100Mb/s, full-duplex) interface suitable for all types of management traffic.

Packaged in an Environmentally Friendly Design

The Intel® 82580 Gigabit Ethernet Controller is completely lead free and halogen free in silicon and package design to reduce the potential for environmental impact.

Product Codes

Barton Hills (A-1) quad-port	T&R: MM - 905781 Tray: MM - 905782	NH82580EB	-10 to 85 °C Ambient Operating Temperature
Barton Hills (A-1) dual-port	T&R: MM - 905785 Tray: MM - 905786	NH82580DB	-10 to 85 °C Ambient Operating Temperature

1 Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

Features	Benefits
PCIe* Features	
PCIe* x4/x2/x1 interface	▪ High bandwidth density per pin ▪ Less-congested board routing
PCIe* v 2.0 (5.0 GT/s)	▪ PCI-SIG Conformance and Standards Interoperability ▪ Supports 4 GbE at wire speed
PCIe* Advanced Extensions	▪ Extended error reporting, device serial number, and Latency Tolerance Reporting (LTR), which provides messaging support to communicate service latency requirements for Memory Reads and Writes to the Root Complex
Low Power	
<1 W S0-Max (state) 1000Base-T Active 90 °C (mode) and <400mW S0-Typ (state) 100Base-T Active (mode)	▪ Low power consumption
Smart power down at S0 (no link) / Sx (no lin)k	▪ Puts the PHY in a lower power state during no-link conditions.
LAN disable function	▪ Power management
Full wake up support: APM (formerly Wake on LAN), ACPI, and Magic Packet* wake-up enable with unique MAC address	▪ Power management
ACPI register set and power down functionality supporting D0 and D3 states	▪ Power management
Gigabit MAC/PHY Performance Features	
Eight optimized transmit (Tx) and receive (Rx) queues	▪ Efficient packet prioritization ▪ Network packet handling without waiting or buffer overflow
Descriptor ring management hardware for Transmit and Receive	▪ Optimized descriptor fetch and write-back mechanisms for efficient system memory and PCIe bandwidth usage
Legacy and Message Signal Interrupt (MSI) Modes	▪ Interrupt mapping
Message Signal Interrupt Extension (MSI-X)	▪ Advanced interrupt mapping for load balancing across multiple cores ▪ More vectors per function ▪ SW controlled aliasing when fewer vectors are allocated than requested, and ability for each vector to use independent address and data value.
Intelligent interrupt generation	▪ Enhanced software device driver performance
Receive Side Scaling (RSS) for Windows environment and Scalable I/O for Linux environments (IPv4, IPv6, TCP/UDP)	▪ Two receive queues
64-bit address master support for systems using more than 4GB of physical memory	▪ Efficient use of PCIe bus and system memory
Programmable host memory receive buffers (256 bytes to 16KB)	▪ Efficient use of PCIe bus and system memory
Programmable host memory receive buffer per queue (256 Bytes to 16 KBytes) and cache line size (64 Bytes to 128 Bytes)	▪ Efficient use of PCIe bus and system memory
Packet buffer size adjustable; Configurable Rx and Tx data FIFO programmable in 1 KB increments	▪ FIFO size adjustable to the application
Support for transmission and reception of packets up to 9728 Bytes (Jumbo Frames)	▪ Enables higher and better throughput of data
IEEE 802.3* auto-negotiation	▪ Automatic link configuration for speed, duplex, flow control
Compliant with 1Gb/s Ethernet IEEE 802.3, 802.3u, 802.3ab PHY specifications	▪ Robust operation over installed base of Category-5 twisted-pair cabling
Integrated PHY for 10/100/1000 Mb/s for multi-speed, full, and half-duplex operation	▪ Smaller footprint and lower power dissipation compared to multiple discreet MAC and PHY solutions
IEEE 802.3x and 802.3z compliant flow control support with software-controllable Rx thresholds and Tx pause frames	▪ Local control of network congestion levels ▪ Reduce receive buffer overflows ▪ Frame loss reduced from receive overruns

Features	Benefits
Host Offloading Features	
TCP/UDP, IPv4, and IPv6 checksum offloads (Rx/Tx/Large-send); Extended Tx descriptors for more offload capabilities	▪ Improved CPU usage
TCP Segmentation / Transmit Segmentation Offloading (TSO)	▪ Improved CPU usage
TimeSync offload compliant with 802.1as specification	
IEEE 802.1q Virtual Local Area Network (VLAN) support with VLAN tag insertion, stripping and packet filtering for up to 4096 VLAN tags	▪ Adding (for transmits) and ping (for receives) of VLAN tags ▪ Filtering packets belonging to certain VLANs
IEEE 802.1q advanced packet filtering	▪ 16 exact-matched packets (unicast or multicast) ▪ 4096-bit hash filter for multicast frames ▪ Lower processor utilization ▪ Promiscuous (unicast and multicast) transfer mode support ▪ Optional filtering of invalid frames
Header/packet data split in receive	▪ Helps the driver to focus on the relevant part of the packet without the need to parse it
Manageability Features	
DMTF Network Controller Sideband Interface (NC-SI)	▪ Supports pass through traffic between BMC and Controller's LAN functions ▪ Supports configuration traffic between the BMC and the Controller's internal units ▪ Allows fast data rate (up to 100Mb/s full duplex) ▪ Allows for advanced BMC capabilities such as video redirection ▪ Extended filtering capabilities ▪ Meets RMII Spec, Rev. 1.2 as a PHY-side device
SMBus pass through	▪ Enables system-level component connections for manageability purposes ▪ Enables BMC to configure the Controller's filters and management related capabilities. ▪ Data rates up to 400Khz
Preboot eXecution Environment (PXE) flash interface support	▪ Enables system boot up via the EFI (32 bit and 64 bit) ▪ Flash interface for PXE 2.1 option ROM
iSCSI boot	▪ Enables system boot up via iSCSI ▪ Provides additional network management capability
Management Data Input/Output (MDIO) – internal management interface	▪ Enables the MAC and software to monitor and control the state of the PHY
MAC/PHY Control and Status	▪ Enhanced control capabilities through PHY reset, PHY link status, PHY duplex indication, and MAC Dx power state indication
Watchdog timer	▪ Provides controller functionality information to hardware and software
Additional Device Features	▪
IEEE 1588 protocol and 802.1AS implementation	▪ Time-stamping and synchronization of time sensitive applications ▪ Distribute common time to media devices
Three output drivers on the single port to drive external LED circuits	▪ Allows event, state, or activity indication for the port ▪ Configurable for output polarity as well as blinking indicator

Characteristics

Electrical	
Estimated Power (typical, D0, gigabit)	▪ 3.35 W (all four copper ports active)
Environmental	
Operating Temperature	▪ -10 °C to 85 °C (with heat-sink)", -10 °C to 55 °C (without heat-sink)
Storage Temperature	▪ -40 °C to 125 °C
Physical	
Implemented in 90nm LP (low power) complementary metal-oxide semiconductor (CMOS) process	▪ Minimizes power and size while maintaining quality and reliability
Package	▪ 17 mm x 17 mm PBGA.
Intel Backing	
Intel® limited lifetime warranty	▪▪ Backed by an Intel® limited lifetime warranty, 90-day money-back guarantee (U.S. and Canada), and worldwide support

Network Operating Systems (NOS) Software Support

Operating System	IA32	X64	IPF
Windows* Vista* SP2	▪	▪	N/A
Windows Server* 2003 SP2	▪	▪	▪
Windows* Unified Storage Solution 2003	▪	▪	▪
Windows Server 2008 SP2	▪	▪	▪
Windows Server 2008 R2	▪	▪	▪
Windows 7	▪	▪	N/A
Linux* Stable Kernel version 2.6	▪	▪	▪
Linux RHEL 4.8.	▪	▪	N/A
Linux RHEL 5.4	▪	▪	▪
Linux SLES 10 SP3	▪	▪	N/A
Linux SLES 11	▪	▪	N/A
FreeBSD* 8.0	▪	▪	N/A
FreeBSD*7.2	▪	▪	N/A

Customer Support

Intel® Customer Support Services offers a broad selection of programs including phone support and warranty service. For more information, contact us at support.intel.com/support/go/network/adapter/home.htm. Service and availability may vary by country.

For Product Information

To speak to a customer service representative regarding Intel products, please call 1-800-538-3373 (U.S. and Canada) or visit support.intel.com/support/go/network/contact.htm for the telephone number in your area. For additional product information on Intel Networking Connectivity products, visit www.intel.com/go/ethernet.

[1]VMDq requires a virtualization operating system that supports VMDq.

[2]Lead and other materials banned in EU RoHS Directive are either (1) below all applicable substance thresholds or (2) an approved exemption applies.

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