PRODUCT BRIEF
Intel® Ethernet Server Adapter I210
Network Connectivity

Intel® Ethernet Server Adapter I210

Single-Port Gigabit Ethernet server adapter designed for entry-level servers and Audio-Video applications.



KEY FEATURES

- Low-halogen[1] single-port PCI-Express* 10/100/1000 Ethernet adapter
- Innovative power management features including Energy Efficient Ethernet (EEE), DMA Coalescing, ultra-compact design, and a unique ventilated bracket for increased efficiency and reduced power consumption
- IEEE 802.1Qav Audio-Video-Bridging (AVB) for tightly controlled media stream synchronization, buffering, and reservation
- High-performing design supporting PCI Express* Gen 2.1 2.5GT/s
- Reliable and proven Gigabit Ethernet technology from Intel Corporation

Overview

The new Intel® Ethernet Server Adapter I210 builds on Intel's history of excellence in Ethernet products. Intel continues its market leadership with this newest generation PCIe* GbE network adapter. Based on the Intel® Ethernet Controller I210, this adapter represents the next step in the Gigabit Ethernet (GbE) networking evolution for the enterprise and data center offering Audio-Video-Bridging (AVB) support, along with power management technologies such as Energy Efficient Ethernet (EEE) and DMA Coalescing (DMAC).

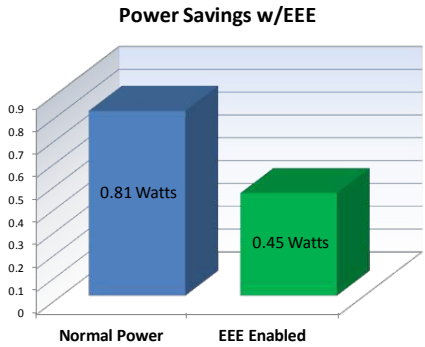
Audio-Video Bridging (AVB)

The Intel® Ethernet Server Adapter I210 supports IEEE 802.1Qav Audio-Video Bridging (AVB) for customers requiring tightly controlled media stream synchronization, buffering, and reservation. The 802.1Qav is part of the AVB specification that provides a way to guarantee bounded latency and latency variation for time sensitive traffic and includes:

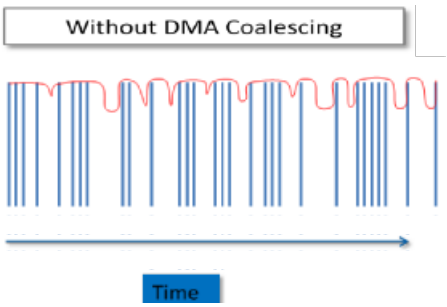
- Timing and Synchronization for time-specific applications (802.1AS) Stream Reservation (SR) protocol to guarantee the resources needed for Audio/Video (AV) streams (802.1Qat)
- Forwarding and queueing enhancements for time sensitive streams (802.1Qav).

Performance Optimization

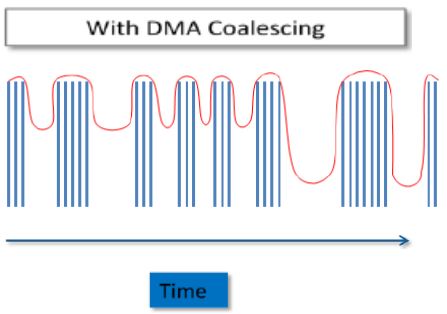
The Intel® Ethernet Server Adapter I210 contains four transmit and four receive queues. These queues offer Error Correcting Memory (ECC) protection for improved data reliability. The adapter efficiently manages packets with minimum latency by combining parallel and pipelined logic architectures optimized for these independent transmit and receive queues. These queues, combined with Receive Side Scaling (RSS) and Message Signal Interrupt Extension (MSI-X) support, optimize the performance on servers with multi-core processors.



Energy Efficient Ethernet Power Savings.



No Coalescing. As shown by the red line, components have less time between DMA calls to reach and stay in lower power.



With Coalescing. With more time between DMA calls, components can reach lower power states and remain in them longer

Power Management Technologies

Today, companies everywhere are looking for ways to decrease energy consumption across the enterprise to reduce costs and environmental impact, while at the same time solving increasingly important power density challenges. That's why Intel has introduced new, advanced Power Management Technologies (PMTs that enable enterprises to configure power options on the adapter and more effectively manage power consumption.

Energy Efficient Ethernet (EEE)

The Intel Ethernet Server Adapter I210 family supports the IEEE802.3az Energy Efficient Ethernet (EEE) standard so that, during periods of low network activity, EEE reduces the power consumption of an Ethernet connection by negotiating with a compliant EEE switch port to transition to a low power idle (LPI) state.

This reduces the controller power to approximately 50% of its normal operating power, saving power on the network port and the switch port. When increased network traffic is detected, the controller and the switch quickly come back to full power to handle the increased network traffic. EEE is supported for both 1000BASE-T and 100BASE-TX.

DMA Coalescing

Another power management technology that can reduce power on the server platform is DMA Coalescing (DMAC). Typically, when a packet arrives at the adapter, a DMA request is initiated in order to place the packet into host (or server) memory. This transaction wakes up the processor, memory, and other system components from a lower power state in order to perform the tasks required to handle the incoming packet.

Based on the configurable DMAC settings, incoming packets are buffered momentarily before any DMA calls are made. This enables the controller to intelligently identify opportunities to batch multiple packets together so that when components are wakened from lower power states they can efficiently handle the batched packets at the same time. This enables platform components to remain in lower power states longer, which can dramatically reduce platform energy consumption. DMAC synchronizes DMA calls across all controller ports to ensure maximum power savings.

Environmentally Friendly Design

The Intel® Ethernet Server Adapter I210 Family is low halogen[1] and completely lead-free to reduce the potential for environmental impact. This, in combination with power management technologies, a unique ventilated bracket, and space-saving design make this adapter an ideal solution for compact workstations and entry-level servers.

General Features

Features	Benefits
Intel® Ethernet Controller I210 With PCI Express* v2.1 Support	▪ Industry-leading integrated MAC/PHY PCIe Gen2 GbE controller ▪ 2.5 GT/s support for x1 width (Lane)
Low Halogen[1]	▪ Leadership in an environmentally friendly ecosystem
Low profile single-port copper adapter	▪ Compact design for high-density servers
Ships with full-height bracket installed; low-profile bracket included in package. Single-screw mount.	▪ Streamlines installation
Ventilated bracket	▪ Maximize airflow and cooling

Ethernet Features

Features	Benefits
Audio-Video Bridging (AVB) Support (802.1Qav)	▪ Dedicated Tx and Rx Queues for AVB traffic ▪ Supports Forwarding and Queuing Enhancements for Time-Sensitive Streams ▪ Supports Time-based transmission
IEEE* 802.3* auto-negotiaton	▪ Automatic link configuration for speed duplex and flow control
1 Gb/s Ethernet IEEE 802.3, 802.3u, 802.3ab PHY specifications compliant	▪ Robust operation over installed base of Cat 5 twisted-pair cabling
Integrated PHY for 10/100/1000 Mb/s for multi-speed, full, and half-duplex	▪ Smaller footprint and lower power dissipation compared to multiple discrete MAC and PHYs
IEEE 802.3x and IEEE 802.3z compliant flow control support with software-controllable Rx thresholds and Tx pause frames	▪ Local control of network congestion levels ▪ Frame loss reduced from receive overruns
Automatic cross-over detection function (MDI/MDI-X)	▪ The PHY automatically detects which application is being used and configures itself accordingly
IEEE 1588 protocol and 802.1AS implementation	▪ Time-stamping and synchronization of time sensitive applications ▪ Distribute common time to media devices

Power Management and Efficiency Features

Features	Benefits
IEEE 802.3az - Energy Efficient Ethernet (EEE)	▪ Power consumption by the PHY is reduced by approximately 50%; link transitions to low power Idle (LPI) state as defined in the IEEE 802.3az (EEE) standard
DMA Coalescing	▪ Reduces platform power consumption by coalescing, aligning, and synchronizing DMA ▪ Enables synchronizing port activity and power management of memory, CPU and RC internal circuitry
Smart Power Down (SPD) at S0 no link/Sx no link	▪ PHY powers down circuits and clocks that are not required for detection of link activity
Active State Power Management (ASPM)	▪ Optionality Compliance bit enables ASPM or runs ASPM compliance tests to support entry to L0s
LAN disable function	▪ Option to disable the LAN Port and/or PCIe Function. Disabling just the PCIe function but keeping the LAN port that resides on it fully active (for manageability purposes and BMC pass-through traffic).
Full wake up support:: ▪ Advanced Power Management (APM) Support–[formerly Wake on LAN] ▪ Advanced Configuration and Power Interface (ACPI) specification v2.0c ▪ Magic Packet* wake-up enable with unique MAC address	▪ APM - Designed to receive a broadcast or unicast packet with an explicit data pattern (Magic Packet) and assert a signal to wake up the system ▪ ACPI - PCIe power management based wake-up that can generate system wake-up events from a number of sources
ACPI register set and power down functionality supporting D0 and D3 states	▪ A power-managed link speed control lowers link speed (and power) when highest link performance is not requireds
MAC Power Management controls	▪ Power management controls in the MAC /PHY enable the device to enter a low-power state
Low Power Link Up - Link Speed Control	▪ Enables a link to come up at the lowest possible speed in cases where power is more important than performance
Power Management Protocol Offload (Proxying)	▪ Avoid spurious wake up events and reduce system power consumption when the device is in D3 low power state and system in in S3 or S4 low power states

Stateless Offloads and Performance Features

Features	Benefits
TCP/UDP, IPv4 checksum offloads (Rx/ Tx/Large-send); Extended Tx descriptors)	▪ More offload capabilities and improved CPU usage ▪ Checksum and segmentation capability extended to new standard packet type
IPv6 support for IP/TCP and IP/UDP receive checksum offload	▪ Improved CPU usage
Transmit Segmentation Offloading (TSO) (IPv4, IPv6)	▪ Increased throughput and lower processor usage
Interrupt throttling control	▪ Limits maximum interrupt rate and improves CPU usage
Legacy and Message Signal Interrupt (MSI)	▪ Interrupt mapping.
Message Signal Interrupt Extension (MSI-X)	▪ Dynamic allocation of up to 5 vectors per port
Intelligent interrupt generation	▪ Enhanced software device driver performance
Receive Side Scaling (RSS) for Windows*	▪ Up to four queues per port
Scalable I/O for Linux environments (IPv4, IPv6, TCP/UDP)	▪ Improves the system performance related to handling of network data on multiprocessor systems
Support for packets up to 9.5 KB (Jumbo Frames)	▪ Enables faster and more accurate throughput of data
Low Latency Interrupts	▪ Based on the sensitivity of the incoming data, the controller can bypass the automatic moderation of time intervals between the interrupts
Header/packet data split in receive	▪ Helps the driver to focus on the relevant part of the packet without the need to parse it
PCIe v2.1 TLP Processing Hint Requester	▪ Provides hints on a per transaction basis to facilitate optimized processing of
Descriptor ring management hardware for Transmit and Receive	▪ Optimized descriptor fetch and write-back for efficient system memory and PCIe bandwidth usage

Remote Boot Option Features

Features	Benefits
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
Intel® iSCSI Remote Boot for Windows, Linux, and VMware	▪ Enables system boot up via iSCSI ▪ Provides additional network management capability
Intel Boot Agent software--Linux* boot via PXE or BOOTP, Windows* Deployment Services, or UEFI	▪ Enables networked computer to boot using a program code image supplied by a remote server▪ Complies with the Pre-boot eXecution Environment (PXE) Version 2.1 Specification
Descriptor ring management hardware for Transmit and Receive	▪ Optimized descriptor fetch and write-back for efficient system memory and PCIe bandwidth usage

Manageability Features

Features	Benefits
DMTF Network Controller Sideband Interface (NC-SI) Pass-through	▪ Supports pass through traffic between BMC and Controller's LAN functions ▪ Meets RMII Spec, Rev. 1.2 as a PHY-side devi
Intel® System Management Bus (SMBus) Pass-through	▪ Enables BMC to configure the Controller's filters and management related capabilities.
Management Component Transport Protocol (MCTP) over SMBus and PCIe	▪ Used for baseboard management controller (BMC) communication between add-in devices
OS2BMC Traffic support	▪ Transmission and reception of traffic internally to communicate between the OS and local BMC
Private OS2BMC Traffic Flow	▪ BMC may have its own private connection to the network controller and network flows are blocked
Firmware Based Thermal Management	▪ Can be programmed via the BMC to initiate Thermal actions and report thermal occurrences
IEEE 802.3 MII 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, link status, duplex indication, and MAC Dx power state
Watchdog timer	▪ Defined by the FLASHT register to minimize Flash updates
Extended error reporting	▪ Messaging support to communicate multiple types/severity of errors
Controller Memory Protection	▪ Main internal memories are protected by error correcting code (ECC) or parity bits
Vital Product Data (VPD) Support	▪ Support for VPD memory area

Specifications

Connector	▪ RJ-45 (Copper)
IEEE standard/network topology	▪ EEE 802.3/10BASE-T, 100BASE-TX, 1000BASE-T
Cabling	▪ Category-3 or higher for 10BASE-T operation ▪ Category-5 or higher for 100BASE-TX operation ▪ Category-5e or higher for 1000BASE-T operation
Data rate supported per port	▪ 10/100/1000 Mbps copper
Bus Type	▪ PCI Express* 2.1 (2.5GT/s)
Bus Width	▪ 1-lane PCI Express; operable in x1 or greater slots
Interrupt levels	▪ INTA, INTB, INTC, INTD, MSI, MSI-X
Hardware certifications	▪ FCC B, UL CE, VCCI, BSMI, CTICK, KCC
Controller - processor	▪ Intel® Ethernet Controller I210
Power consumption (active-typical)	▪ 0.81 W
Operating temperature	▪ 0 °C to 55 °C (32 °F to 131°F)
Storage temperature	▪ -40 °C to 70 °C (-40 °F to 158 °F)
Storage humidity	▪ 90% non-condensing relative humidity at 35 °C
Connect speed LED Indicators	▪ Link/Activity LED: off = No Link; on = Link; Blinking = Activity ▪ Speed LED: Not illuminated = 10Mb/s; green = 100Mb/s; amber = 1 Gb/s

Physical Dimensons

Length	6.7 cm (2.64 inches)
(Bracket) Width	1.8 cm (0.709 inches)
Full-height end bracket	12.07 cm (4.755 inches)
Low-profile end bracket	8 cm (3.15 inches)

Intel Backing

Limited Lifetime Warranty	
90-Day, money-back guarantee (U.S. and Canada)	

Product Codes

Intel® Ethernet Server Adapter I210	
I210T1	Single Pack
I210T1BLK	Bulk Pack – Order 5, Get 5

Operation System/Architecture Support		
Operating System	**IA32**	**X64**
Windows XP Professional x64 Edition SP2		
Windows XP Professional SP3		
Windows Vista SP2		
Windows 7 SP1	•	•
Windows Server 2003 SP2		
Windows Server 2008 SP2	•	•
Windows Server 2008 SP2 Core	•	•
Windows Server 2008 SP2 (w/ Hyper-V role)		•
Hyper-V Server 2008 SP2 (stand-alone version)		•
Windows Server 2008 R2 SP1		•
Windows Server 2008 R2 SP1 Core		•
Windows Server 2008 R2 SP1 (w/ Hyper-V role)		•
Hyper-V Server 2008 R2 SP1 (stand-alone version)		•
WinPE 1.6 (2003 PE)		
WinPE 2.1 (2008 PE)	•	•
WinPE 3.0 (2008 R2 PE)	•	•
Windows CE 6 (based on NDIS5.x)		
Windows CE 7/WEC7 (based on NDIS6.x)	•	
Windows Embedded Standard 7	•	•
Linux Stable Kernel version 2.6/3.x	•	•
Linux RHEL 5.8	•	•
Linux RHEL 6.2	•	•
Linux SLES 10 SP4	•	•
Linux SLES 11 SP2	•	•
FreeBSD 9	•	•
DOS NDIS [1]	•	
DOS ODI		
EFI 1.1		
UEFI 2.1		•
UEFI 2.3		•
VMware ESXi 5.0[2]		•
VMware ESX M/N.next 3 (GA TBD)		•
Xen [3]		

Key: •=affected; Blank=not affected or OS not available on specified architecture
1-Minimal Validation
2-VMware ESX drivers are not included on the SW Release CDs; they are only available from VMware's web site and they are released on a separate sc
3-SR-IOV validation only

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/

(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

For more information on Intel® Ethernet Server Adapter I210, visit www.intel.com/go/ethernet

[1]Low Halogen--Applies only to brominated and chlorinated flame retardants (BFRs/CFRs) and PVC in the final product. Intel components as well as purchased components on the finished assembly meet JS-709A requirements, and the PCB/Substrate meet IEC 61249-2-21 requirements. The replacement of halogenated flame retardants and/or PVC may not be better for the environment.

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