

Product Brief

Intel® Ethernet Server Adapter I210

Single-port Gigabit Ethernet server adapter designed for entry-level servers and audio-video applications



Key Features

- Low-halogen¹ 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
- The Intel Ethernet I210 Series implements a signed firmware authenticated capability to verify the firmware and critical device settings with built-in detection of corruption
- 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 Intel® Ethernet Server Adapter I210 builds on Intel's history of excellence in Ethernet Products. This adapter represents the next step in the Gigabit Ethernet (GbE) networking evolution for the enterprise and data centers 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 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.

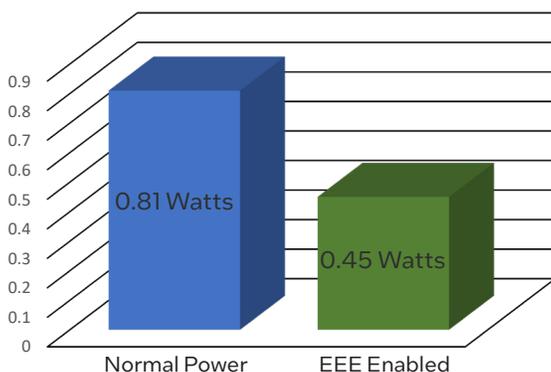
Power Management Technologies

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)

Supports the IEEE802.3az Energy Efficient Ethernet (EEE) standard. 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.

Power Savings with EEE

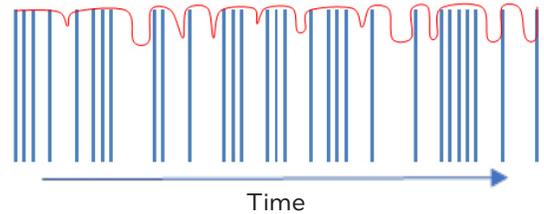


The controller power is reduced by approximately 50 percent of its normal operating power, saving power on the network port and the switch port. When increased network traffic is detected, the controller and the switch quickly come back to full power to handle the increased network traffic. EEE is supported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

DMA Coalescing

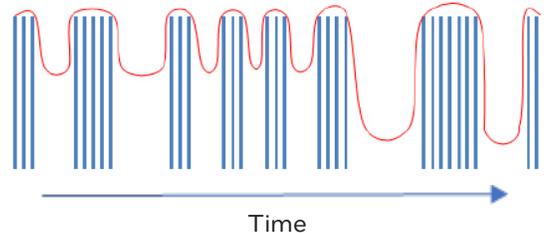
Another power management technology that can reduce power on the server platform is DMA Coalescing (DMAC). Typically, when a packet arrives at the adapter, a DMA request is initiated in order to place the packet into host (or server) memory. This transaction wakes up the processor, memory, and other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

Without DMA Coalescing



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

With DMA Coalescing



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

Based on the configurable DMAC settings, incoming packets are buffered momentarily before any DMA calls are made. This buffering enables the controller to intelligently identify opportunities to batch multiple packets together. When components are wakened from lower power states they can efficiently handle the batched packets at the same time. Platform components are able 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.

Software Tools and Management

Intel Ethernet adapters support Dell's Lifecycle Controller. The Lifecycle Controller is coupled with the Dell DRAC service processor to provide embedded system management. The Lifecycle Controller enables both local and remote access to manage initial setup and configuration of the BIOS settings on the platform, setup and configuration of Intel Ethernet adapters, update of all the platform firmware, and the deployment of the operating systems.

Intel® Advanced Network Services (Intel® ANS) include new teaming technologies and techniques such as Virtual Machine Load-Balancing (VMLB) for Hyper-V environments. Intel ANS also provides a variety of teaming configurations for up to eight ports, and support for teaming mixed vendors' server adapters. Intel ANS includes support for 802.1Q VLANs, making Intel ANS one of the most capable and comprehensive tools for supporting server adapter teaming.

Environmentally Friendly Design

The I210 family is low halogen and lead-free to reduce the potential for environmental impact. Power management technologies, a unique ventilated bracket, and space-saving design make this adapter an ideal solution for compact workstations and entry-level servers.

Features	Description
General	
Intel® Ethernet Controller I210 with PCI Express 2.1 Support	<ul style="list-style-type: none">Industry-leading integrated MAC/PHY PCIe 2.0 GbE controller2.5 GT/s support for x1 width (lane)
Low Halogen ¹	<ul style="list-style-type: none">Leadership in an environmentally friendly ecosystem
Low profile single-port copper adapter	<ul style="list-style-type: none">Compact design for high-density servers
Ships with full-height bracket installed; low-profile bracket included in package. Single-screw mount.	<ul style="list-style-type: none">Streamlines installation
Ventilated bracket	<ul style="list-style-type: none">Maximize airflow and cooling
Ethernet	
Audio-Video Bridging (AVB) Support (802.1Qav)	<ul style="list-style-type: none">Dedicated Tx and Rx Queues for AVB trafficSupports forwarding and queuing enhancements for time-sensitive streamsSupports time-based transmission
IEEE 802.3 autonegotiation	<ul style="list-style-type: none">Automatic link configuration for speed duplex and flow control
1 Gb/s Ethernet IEEE 802.3, 802.3u, 802.3ab PHY specifications compliant	<ul style="list-style-type: none">Robust operation over installed base of CAT5 twisted-pair cabling
Integrated PHY for 10/100/1000 Mb/s for multi-speed, full, and half-duplex	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Local control of network congestion levelsFrame loss reduced from receive overruns
Automatic cross-over detection function (MDI/MDI-X)	<ul style="list-style-type: none">The PHY automatically detects which application is being used and configures itself accordingly
IEEE 1588 protocol and 802.1AS implementation	<ul style="list-style-type: none">Time-stamping and synchronization of time sensitive applicationsDistribute common time to media devices

Features	Description
Power Management and Efficiency	
IEEE 802.3az - Energy Efficient Ethernet (EEE)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> PHY powers down circuits and clocks that are not required for detection of link activity
Active State Power Management (ASPM)	<ul style="list-style-type: none"> Optionality Compliance bit enables ASPM or runs ASPM compliance tests to support entry to L0s
LAN disable function	<ul style="list-style-type: none"> 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:	<ul style="list-style-type: none"> Advanced Power Management (APM) Support– [formerly Wake on LAN] <ul style="list-style-type: none"> 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 Advanced Configuration and Power Interface (ACPI) specification v2.0c <ul style="list-style-type: none"> ACPI - PCIe power management based wake-up that can generate system wake-up events from a number of sources Magic Packet wake-up enable with unique MAC address
ACPI register set and power down functionality supporting D0 and D3 states	<ul style="list-style-type: none"> A power-managed link speed control lowers link speed (and power) when highest link performance is not required
MAC Power Management controls	<ul style="list-style-type: none"> Power management controls in the MAC /PHY enable the device to enter a low-power state
Low Power Link Up - Link Speed Control	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Avoid spurious wake-up events and reduce system power consumption when the device is in D3 low power state and system in S3 or S4 low power states

Stateless Offloads and Performance

TCP/UDP, IPv4 checksum offloads (Rx/ Tx/Large- send); Extended Tx descriptors)	<ul style="list-style-type: none"> More offload capabilities and improved CPU usage Checksum and segmentation capability extended to new standard packet type
IPv6 supports for IP/TCP and IP/UDP receives Checksum offload	<ul style="list-style-type: none"> Improved CPU usage
Transmit Segmentation Offloading (TSO) (IPv4, IPv6)	<ul style="list-style-type: none"> Increased throughput and lower processor usage
Interrupt throttling control	<ul style="list-style-type: none"> Limits maximum interrupt rate and improves CPU usage
Legacy and Message Signal Interrupt (MSI)	<ul style="list-style-type: none"> Interrupt mapping
Message Signal Interrupt Extension (MSI-X)	<ul style="list-style-type: none"> Dynamic allocation of up to 5 vectors per port
Intelligent interrupt generation	<ul style="list-style-type: none"> Enhanced software device driver performance
Receive Side Scaling (RSS) for Windows	<ul style="list-style-type: none"> Up to four queues per port
Scalable I/O for Linux environments (IPv4, IPv6, TCP/UDP)	<ul style="list-style-type: none"> Improves the system performance related to handling of network data on multiprocessor systems
Support for packets up to 9.5 KB (Jumbo Frames)	<ul style="list-style-type: none"> Enables faster and more accurate throughput of data
Low Latency Interrupts	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Helps the driver to focus on the relevant part of the packet without the need to parse it
PCIe 2.1 TLP Processing Hint Requester	<ul style="list-style-type: none"> Provides hints on a per transaction basis to facilitate optimized processing
Descriptor ring management hardware for Transmit and Receive	<ul style="list-style-type: none"> Optimized descriptor fetch and write-back for efficient system memory and PCIe bandwidth usage

Remote Boot Options

Preboot Execution Environment (PXE) flash interface support)	<ul style="list-style-type: none"> Enables system boot via the EFI (32-bit and 64-bit) Flash interface for PXE 2.1 option ROM
Intel Boot Agent software--Linux boot via PXE or BOOTP, Windows Deployment Services, or UEFI	<ul style="list-style-type: none"> Enables networked computer to boot using a program code image supplied by a remote server Complies with the Preboot Execution Environment (PXE) Version 2.1 Specification
Descriptor ring management hardware for Transmit and Receive	<ul style="list-style-type: none"> Optimized descriptor fetch and write-back for efficient system memory and PCIe bandwidth usage

Manageability

DMTF Network Controller Sideband Interface (NC-SI) Pass-through	<ul style="list-style-type: none">Supports pass through traffic between BMC and Controller's LAN functionsMeets RMII Spec, Revision 1.2 as a PHY-side device
Intel® System Management Bus (SMBus) Pass-through	<ul style="list-style-type: none">Enables BMC to configure the Controller's filters and management related capabilities
Management Component Transport Protocol (MCTP) over SMBus and PCIe	<ul style="list-style-type: none">Used for baseboard management controller (BMC) communication between add-in devices
OS2BMC Traffic support	<ul style="list-style-type: none">Transmission and reception of traffic internally to communicate between the OS and local BMC
Private OS2BMC Traffic Flow	<ul style="list-style-type: none">BMC may have its own private connection to the network controller and network flows are blocked
Firmware Based Thermal Management	<ul style="list-style-type: none">Can be programmed via the BMC to initiate Thermal actions and report thermal occurrences
IEEE 802.3 MII Management Interface	<ul style="list-style-type: none">Enables the MAC and software to monitor and control the state of the PHY
MAC/PHY Control and Status	<ul style="list-style-type: none">Enhanced control capabilities through PHY reset, link status, duplex indication, and MAC Dx power state
Watchdog timer	<ul style="list-style-type: none">Defined by the FLASH register to minimize Flash updates
Extended error reporting	<ul style="list-style-type: none">Messaging support to communicate multiple types/severity of errors
Controller Memory Protection	<ul style="list-style-type: none">Main internal memories are protected by error-correcting code (ECC) or parity bits
Vital Product Data (VPD) Support	<ul style="list-style-type: none">Support for VPD memory area

Specifications

Connector	RJ45
IEEE standard/ network topology	EEE 802.3 (10BASE-T, 100BASE-TX, 1000BASE-T)
Cabling	CAT3 or higher for 10BASE-T operation CAT5 or higher for 100BASE-TX operation CAT5e or higher for 1000BASE-T operation
Data rate supported per port	10/100/1000 Mbps copper
Bus Type	PCIe 2.1 (2.5GT/s)
Bus Width	1-lane PCIe; 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	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 = 1Gb/s

Physical Dimensions

Length	6.7 cm (2.64 inches)
(Bracket) Width	1.8 cm (0.71 inches)
Full-height end bracket	12.07 cm (4.76 inches)
Low-profile end bracket	8 cm (3.15 inches)

Supported Operating Systems

For a complete list of supported network operating systems for Intel® Ethernet Network Adapters visit:
intel.com/support/EthernetOS

Product Order Codes for PowerEdge

Description	SKU	Dell Tech	Intel MM#
I210-T1 (Full Height)	Factory installed: 540-BBIK Customer kit: 540-BBJD	VRRH1	933845
I210-T1 (Low Profile)	Factory installed: 540-BCSG Customer kit: 540-BBMO	FHNX8	938613

To see the full line of Intel Ethernet Network Adapters visit www.dell.com or contact your Dell Technologies sales representative.

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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