Intel® Ethernet Network Adapter XXV710-DA2T

25/10/1Gb Ethernet with hardware-enhanced IEEE 1588 Precision Time Protocol (PTP) for high clock phase accuracy synchronization across networks.

Key Features
- PCI Express (PCIe) v3.0, x8
- Onboard high-precision oscillator for greater phase accuracy
- Dual SMA connectors for connecting to external timing sources
- Network Virtualization offloads including VXLAN, GENEVE, NVGRE, MPLS, and VXLAN-GPE with Network Service Headers (NSH)
- Intel® Ethernet Flow Director for hardware based application traffic steering
- Dynamic Device Personalization (DDP) enables increased packet processing efficiency for NFV and Cloud deployments
- Data Plane Development Kit (DPDK) optimized for efficient packet processing
- Excellent small packet performance for network appliances and Network Functions Virtualization (NFV)
- Intelligent offloads to enable high performance on servers with Intel® Xeon® processors

Overview
Increasing growth in 5G and Edge deployments is driving demand for high-precision timing synchronization across the network. Most of these deployments will use 1588 Precision Time Protocol (PTP) to ensure the required phase accuracy across the network. The Intel® Ethernet Network Adapter XXV710-DA2T with Hardware-Enhanced IEEE 1588 PTP meets these requirements in a standards-based PCI Express Ethernet adapter that provides greater flexibility and lower total cost of ownership than today’s single-purpose PTP appliances.

The Intel® Ethernet Network Adapter XXV710-DA2T is part of the Intel® Ethernet 700 Series Network Adapters. These adapters are the foundation for server and appliance connectivity, providing broad interoperability, critical performance optimizations, and increased agility for Communications, Cloud, and Enterprise IT network solutions.

- **Interoperability** - Multiple speeds and media types for broad compatibility backed by extensive testing and validation.
- **Optimization** - Intelligent offloads and accelerators to unlock network performance in servers with Intel® Xeon® processors.
- **Agility** - Both Kernel and Data Plane Development Kit (DPDK) drivers for scalable packet processing.
Hardware-Enhanced Precision Time Protocol Support

The Intel® Ethernet Network Adapter XXV710-DA2T increases IEEE 1588 PTP phase accuracy through a combination of hardware enhancements and software optimizations.

Onboard high-precision oscillator with up to 5,000¹ times tighter accuracy: Provides greater phase accuracy than a standard Ethernet adapter and better holdover during clock interruption.

Dual SubMiniature version A (SMA) coaxial connectors: Allow connection to external timing sources, such as GPS signaling devices and to timing recipients, allowing the NIC to act as a Grandmaster and as a timing source for other equipment. The output capability provides a way to audit the phase accuracy of each node.

Software-defined pins (SDPs): User-configurable I/O pins drive the SMAs and provide built-in timing coordination between ports.

Standard Linux support: Linux PTP utility provides support for multiple PTP profiles and use of SDPs for sync via 1 pulse per second (1pps) input and output signals.

All Intel® Ethernet 700 Series Network Adapters include these feature-rich technologies:

Flexible and Scalable I/O for Virtualized Infrastructures

Intel® Virtualization Technology (Intel® VT), delivers outstanding I/O performance in virtualized server environments.

I/O bottlenecks are reduced through intelligent offloads such as Virtual Machine Device Queues (VMDq) and Flexible Port Partitioning, using SR-IOV with a common Virtual Function driver for networking traffic per Virtual Machine (VM), enabling near-native performance and VM scalability. Host-based features supported include:

VMDq for Emulated Path: VMDq, enables a hypervisor to represent a single network port as multiple network ports that can be assigned to the individual VMs. Traffic handling is offloaded to the network controller, delivering the benefits of port partitioning with little to no administrative overhead by the IT staff.

SR-IOV for Direct Assignment: Adapter-based isolation and switching for various virtual station instances enables optimal CPU usage in virtualized environments.

Intel® Ethernet Adaptive Virtual Function (Intel® Ethernet AVF): A virtual function driver that eases SR-IOV hardware upgrades or changes, and preserves base mode functionality in hardware and software. Customers deploying mass-scale VMs or containers for their network infrastructure now have a common Virtual Function (VF) driver. This driver supports a Base Mode and advanced set of features on the Intel® Ethernet 700 Series.

Enhanced Network Virtualization Overlays (NVO)

Network virtualization has changed the way networking is done in the data center, delivering accelerations across a wide range of tunneling methods.

VXLAN, GENEVE, NVGRE, MPLS, and VXLAN-GPE with NSH Offloads: These stateless offloads preserve application performance for overlay networks, and the network traffic can be distributed across CPU cores, increasing network throughput.

Flexible Port Partitioning (FPP)

FPP leverages the PCI-SIG SR-IOV specification. Virtual controllers can be used by the Linux host directly and/or assigned to virtual machines.

• Assign up to 63 Linux host processes or virtual machines per port to virtual functions.

• Control the partitioning of per port bandwidth across multiple dedicated network resources, ensuring balanced QoS by giving each assigned virtual controller equal access to the ports bandwidth.

Network administrators can also rate limit each of these services to control how much of the pipe is available to each process.
**Greater Intelligence and Performance for NFV and Cloud deployments**

Dynamic Device Personalization (DDP) customizable packet filtering, along with enhanced Data Plane Development Kit (DPDK), support advanced packet forwarding and highly-efficient packet processing for both Cloud and Network Functions Virtualization (NFV) workloads.

- DDP enables workload-specific optimizations, using the programmable packet-processing pipeline. Additional protocols can be added to the default set to improve packet processing efficiency that results in higher throughput and reduced latency. With the 700 Series, new protocols can be added or modified on-demand, and applied at run-time using Software Defined Firmware or APIs, eliminating the need to reset or reboot the server. This not only keeps the server and VMs up, running, and computing, it also increases performance for VNFs that process network traffic that is not included in the default firmware.

**Download DDP Profiles**

**Advanced Traffic Steering**

Intel® Ethernet Flow Director (Intel® Ethernet FD) is an advanced traffic steering capability built into the adapter. It consists of a large number of flow affinity filters that direct receive packets by their flows to queues for classification, load balancing, and matching between flows and CPU cores.

Steering traffic into specific queues can eliminate context switching required within the CPU. As a result, Intel® Ethernet FD significantly increases the number of transactions per second and reduces latency for cloud applications like memcached.

**FEATURES**

**GENERAL**

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<tr>
<th>FEATURES</th>
<th>DESCRIPTION</th>
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<tr>
<td>SFP28 Connectivity</td>
<td>The Intel Ethernet Network Adapter XXV710-DA2T includes two SFP28 connections.</td>
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<tr>
<td>Load balancing on multiple CPUs</td>
<td>Increases performance on multi-processor systems by efficiently balancing network loads across CPU core when used with Receive-Side Scaling (RSS) from Microsoft or scalable I/O on Linux.</td>
</tr>
<tr>
<td>Support for most network operating systems</td>
<td>Enables broad deployment for different applications.</td>
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<tr>
<td>Hardware-enhanced IEEE 1588 PTP</td>
<td>Onboard high-precision oscillator enables tighter phase accuracy and greater holdover better holdover between clock interruption.</td>
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**I/O FEATURES FOR MULTI-CORE PROCESSOR SERVERS**

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<tr>
<td>Intel® Ethernet Flow Director (Intel® Ethernet FD)</td>
<td>An advanced traffic steering capability increases the number of transactions per second and reduces latency for cloud applications like Memcached.</td>
</tr>
<tr>
<td>MSI-X support</td>
<td>Minimizes the overhead of interrupts. Load-balancing of interrupt handling between multiple cores/CPUs.</td>
</tr>
<tr>
<td>Multiple Queues: 1,536 Tx and Rx queues per device</td>
<td>Network packet handling without waiting for buffer overflow providing efficient packet prioritization. Actual number of queues will vary depending upon software implementation.</td>
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<tr>
<td>Tx/Rx IP, SCTP, TCP, and UDP checksum offloading (IPv4, IPv6) capabilities</td>
<td>Lower processor usage. Checksum and segmentation capability extended to new standard packet type.</td>
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**VIRTUALIZATION FEATURES**

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<td>VMDq</td>
<td>Up to 256 maximum VMDq VMs supported. Offloads the data-sorting based on MAC addresses and VLAN tags, functionality from the Hypervisor to the network silicon, improving data throughput and CPU usage.</td>
</tr>
<tr>
<td>PCI-SIG SR-IOV Implementation (128 per device)</td>
<td>Provides an implementation of the PCI-SIG standard for I/O Virtualization. The physical configuration of each port is divided into multiple virtual ports. Each virtual port is assigned to an individual VM directly by bypassing the virtual switch in the Hypervisor, resulting in near-native performance. Integrated with Intel® VT for Directed I/O (Intel® VT-d) to provide data protection between VMs by assigning separate physical addresses in the memory to each VM. 64 per port for dual port.</td>
</tr>
<tr>
<td>Virtual Machine Load Balancing (VMLB)</td>
<td>VMLB provides traffic load balancing (Tx and Rx) across VMs bound to the team interface, as well as fault tolerance in the event of switch, port, cable, or adapter failure.</td>
</tr>
<tr>
<td>Advanced Packet Filtering</td>
<td>1536 exact matched packets (unicast or multicast). 512 hash entries each for unicast and multicast. Lower processor usage. Promiscuous (unicast and multicast) transfer mode support. Optional filtering of invalid frames.</td>
</tr>
<tr>
<td>VLAN support with VLAN tag insertion, stripping and packet filtering for up to 4096 VLAN tags</td>
<td>Ability to create multiple VLAN segments.</td>
</tr>
<tr>
<td>VXLAN, NVGRE, GENEVE, VXLIN-GPE+NSH, MPLS</td>
<td>Preserves application performance in network virtualized environments.</td>
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### FEATURES

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<th>MANAGEABILITY FEATURES</th>
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| Preboot eXecution Environment (PXE) Support | • Enables system boot up via the LAN (32-bit and 64-bit).  
• Flash interface for PXE image. |
| Unified Extensible Firmware Interface (UEFI) | • Enables new technologies during the pre-OS boot process and addresses legacy BIOS limitations on hardware. |
| Simple Network Management Protocol (SNMP) and Remote Network Monitoring (RMON) Statistic Counters | • Easy system monitoring with industry-standard consoles. |
| iSCSI Boot | • Enables system boot up via iSCSI.  
• Provides additional network management capability. |
| Watchdog Timer | • Gives an indication to the manageability firmware or external devices that the controller or the software device driver is not functioning. |

### SUPPORTED OPERATING SYSTEMS
For a complete list of supported network operating systems for Intel® Ethernet 700 Series Adapters visit: intel.com/support/EthernetOS  
Enhanced PTP features are supported under Linux only.

### INTEL® ETHERNET ACCESSORIES
Intel® Ethernet Optics and Cables are proven, reliable solutions for high-density Ethernet connections. Combine these accessories with Intel® Ethernet 700 Series and 500 Series Network Adapters for dependable interoperability and consistent performance across the network. Learn more at intel.com/ethernetproducts

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**Warranty**
Intel limited lifetime hardware warranty, 90-day money-back guarantee (U.S. and Canada) and worldwide support.

**Customer Support**
For customer support options in North America visit: intel.com/content/www/us/en/support/contact-support.html

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*I 20 ppb TCXO (10°C to 70°C) vs. typical 100 ppm crystal

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