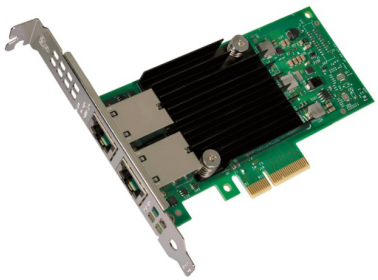
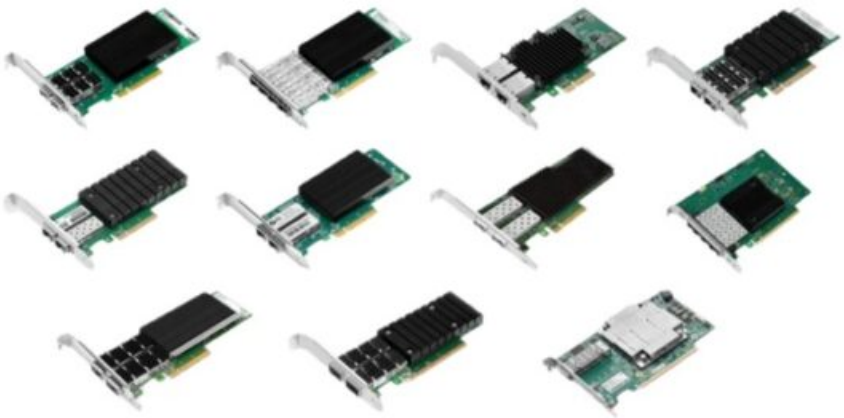


X550AT2 Intel Based Ethernet Adapters User Guide

INTEL®/INTEL BASED ETHERNET ADAPTERS SELECTION GUIDE
Intel®/Intel Based Ethernet Adapters
Intel®/Intel Based Ethernet Adapters are designed for data center, and provide flexible and scalable I/O solutions.



Contents

Overview

FS .COM 10G/25G/40G/100G Intel®/Intel Based Ethernet Adapters with SFP+/SFP28/QSFP+/QSFP28 connectivity are the most flexible and scalable for today's demanding data center environments. Data center networks are being pushed to their limits. The escalating deployments of servers with multi-core processors and demanding applications such as High Performance Computing(HPC), database clusters, and video-on-demand are driving the need for 10/25/40/100 Gigabit connections. The adapters provide flexible and scalable I/O solutions to meet the diverse requirements of running mission-critical applications in virtualized and unified storage environments. With a reliable performance in a flexible LAN and SAN networks, the server adapters can meet the demand of next-generation data centers by providing unmatched features for both server and network virtualization.

Key Features

- Load balancing on multiple CPUs
- iSCSI remote bootsupport
- Fibre Channel over Ethernet(FCoE) Support
- Supportfor most network operating systems with (VMDq) and SR-IOV
- Support VLAN,QOS policy, flow control • Tx TCP segmentation offload (IPv4, IPv6)

Technical Specification

10G Intel®/Intel Based Ethernet Adapters

Attribute	X550AT2-2TP	82599ES-2SP	X710BM2-2SP	XL710BM1-4SP
Ports	Dual	Dual	Dual	Quad
Controller	Intel X550-AT2	Intel 82599ES	Intel X710-BM2	Intel XL710-BM1
Data Rate Per Port	1G/2.5G/5G/10GBase-T	1/10GbE	1/10GbE	1/10GbE
System Interface Type	PCIe 3.0 x 4	PCIe 2.0 x 8	PCIe 3.0 x 8	PCIe 3.0 x 8
Link Rate	8.0 GT/s	5.0 GT/s	8.0 GT/s	8.0 GT/s
Max. Power Consumption	13W	5.8W	5.1W	7.4W
Bracket Height	Full Height and Low Profile	Full Height and Low Profile	Full Height and Low Profile	Full Height and Low Profile
Card PCB Dimensions (WxD)	5.91″x2.68″ (150x68 mm)(without bracket)	13.99″x6.84″ (139.99×68.45mm) (without bracket)	5.91″x2.68″ (150x68 mm) (without bracket)	5.91″x2.68″ (150x68 mm) (without bracket)
Connectivity (VT-c)	Yes	Yes	Yes	Yes
RoCE	No	No	No	No
SR-IOV	Yes	Yes	Yes	Yes
NVGRE	Yes	No	Yes	Yes
GENEVE	No	No	Yes	Yes
VXLAN	Yes	No	Yes	Yes
DPDK	Yes	Yes	Yes	Yes
iWARP	No	No	No	No
OS Support	Windows, Linux, VMware, FreeBSD	Windows, Linux, VMware, FreeBSD	Windows, Linux, VMware, FreeBSD	Windows, Linux, VMware, FreeBSD
Storage Over Ethernet	iSCSI, NFS, FCoE	iSCSI, NFS, FCoE	iSCSI, NFS, FCoE	iSCSI, NFS
Storage Humidity	90% max. non-condensing relative humidity at 35ºC	90% max. non-condensing relative humidity at 35ºC	90% max. noncondensing relative humidity at 35ºC	90% max. noncondensing relative humidity at 35ºC
Operating Humidity	85% max. non-condensing relative humidity	85% max. non-condensing relative humidity	85% max. non-condensing relative humidity	85% max. non-condensing relative humidity
Storage Temperature	-40 °C to 70 °C (-40 °F to 158 °F)	-40 °C to 70 °C (-40 °F to 158 °F)	-40 °C to 70 °C (-40 °F to 158 °F)	-40 °C to 70 °C (-40 °F to 158 °F)
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)	0 °C to 55 °C (32 °F to 131 °F)	0 °C to 55 °C (32 °F to 131 °F)	0 °C to 55 °C (32 °F to 131 °F)

25G Intel®/Intel Based Ethernet Adapters

Attribute	XXV710DA2	E810XXVDA4	E810XXVAM2-2BP	XXV710AM2-2BP
Ports	Dual	Quad	Dual	Dual
Controller	Intel XL-710BM2	Intel E810-CAM1	Intel E810-XXVAM2	Intel XXV710-AM2
Data Rate Per Port	1/10/25GbE	10/25GbE	1/10/25GbE	1/10/25GbE
System Interface Type	PCIe 3.0 x 8	PCIe 4.0 x 16	PCIe 4.0 x 8	PCIe 3.0 x 8
Link Rate	8 GT/s	16 GT/s	16 GT/s	8.0 GT/s
Max. Power Consumption	14.1W	22.9W	20.8W	14.1W
Bracket Height	Full Height and Low Profile	Full Height	Full Height and Low Profile	Full Height and Low Profile
Card PCB Dimensions (WxD)	6.57×2.72″ (167x 69 mm)	6.58x 4.37″ (167x 111mm)	5.91×2.52″ (150x64 mm) (without bracket)	5.91″x2.68″ (150x68mm)(without bracket)
Connectivity (VT-c)	Yes	Yes	Yes	Yes
RoCE	No	Yes	Yes	No
SR-IOV	Yes	Yes	Yes	Yes
NVGRE	Yes	Yes	Yes	Yes
GENEVE	Yes	Yes	Yes	Yes
VXLAN	Yes	Yes	Yes	Yes
DPDK	Yes	Yes	Yes	Yes
iWARP	No	Yes	Yes	No

Attribute	XXV710DA2	E810XXVDA4	E810XXVAM2-2BP	XXV710AM2-2BP
OS Support	Windows, Linux, VMware, FreeBSD	Windows, Linux, VMware, FreeBSD	Windows, Linux, VMware, FreeBSD	Windows, Linux, VMware, FreeBSD
Storage Over Ethernet	iSCSI, NFS	iSCSI, NFS	iSCSI, NFS, FCoE	iSCSI, NFS, FCoE
Storage Humidity	90% max. non-condensing relative humidity at 35ºC	90% max. non-condensing relative humidity at 35ºC	90% max. non-condensing relative humidity at 35ºC	90% max. non-condensing relative humidity at 35ºC
Operating Humidity	85% max. non-condensing relative humidity	85% max. non-condensing relative humidity	85% max. non-condensing relative humidity	85% max. non-condensing relative humidity
Storage Temperature	-40 °C to 70 °C (-40 °F to158 °F)	-40 °C to 70 °C (-40 °F to158 °F)	-40 °C to 70 °C (-40 °F to158 °F)	-40 °C to 70 °C (-40 °F to158 °F)
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)	0 °C to 60 °C (32 °F to 140 °F)	0 °C to 55 °C (32 °F to 131 °F)	0 °C to 55 °C (32 °F to 131 °F)

40G Intel®/Intel Based Ethernet Adapters

Attribute	**XL710BM2-2QP**
Ports	Dual
Controller	Intel XL710-BM2
Data Rate Per Port	1/10/40GbE
System Interface Type	PCIe 3.0 x 8
Link Rate	8 GT/s
Max. Power Consumption	9.5W
Bracket Height	Full Height and Low Profile
Card PCB Dimensions (WxD)	5.91″x2.68″ (150x68mm) (without bracket)
Connectivity (VT-c)	Yes
RoCE	No
SR-IOV	Yes
NVGRE	Yes
GENEVE	Yes
VXLAN	Yes

DPDK	Yes
iWARP	No
OS Support	Windows, Linux, VMware, FreeBSD
Storage Over Ethernet	iSCSI, NFS, FCoE
Storage Humidity	90% max. non-condensing relative humidity at 35ºC
Operating Humidity	85% max. non-condensing relative humidity
Storage Temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)

100G Intel®/Intel Based Ethernet Adapters

Attribute	E810CAM2-2CP	AG023R25A-1CP
Ports	Dual	Single
Controller	Intel E810-CAM2	Intel Agilex 7 FPGA
Data Rate Per Port	100GbE	100GbE
System Interface Type	PCIe 4.0 x 16	PCIe 4.0 x 16
Link Rate	16 GT/s	16 GT/s
Max. Power Consumption	20.8W	75W
Bracket Height	Full Height and Low Profile	Full Height
Card PCB Dimensions (WxD)	6.61×2.68″ (168x68mm) (without bracket)	18.74″x111.15″x169.5″(mm)
Connectivity (VT-c)	Yes	Yes
RoCE	Yes	Yes
SR-IOV	Yes	Yes
NVGRE	Yes	Yes
GENEVE	Yes	No
RDMA	No	Yes
Adaptive Path	No	Yes
QP Trace	No	Yes
VXLAN	Yes	Yes
DPDK	Yes	Yes
iWARP	Yes	Yes
Go-Back-N	No	Yes
TSO	No	Yes
NVME-OF	No	Yes
OS Support	Windows, Linux, VMware, FreeBSD	Windows, Linux, VMware, FreeBSD
Storage Over Ethernet	iSCSI, NFS, FCoE	NVMe-oF, iSCSI, NFS
Storage Humidity	90% max. non-condensing relative humidity at 35ºC	5% to 95%
Operating Humidity	85% max. non-condensing relative humidity	10% to 90%
Storage Temperature	-40 °C to 70 °C (-40 °F to 158 °F)	-40 °C to 70 °C (-40 °F to 158 °F)
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)	0°C to 45°C (32°F to 113°F)

Feature

SR-IOV

Single-Root I/O Virtualization (SR-IOV) provides a mechanism to bypass the host system hypervisor in virtual environments providing near metal performance and server efficiency. SR-IOV provides a mechanism to create multiple Virtual Functions (VFs) to share single PCIe resources. The Card is capable of SR-IOV, and requires Server BIOS support, controller firmware, and OS support.

GENEVE

GENEVE (Generic Network Virtualization Encapsulation) is a network encapsulation protocol designed to support the transmission of

virtualized network traffic within IPv4 or IPv6 packets. It features flexible, extensible option fields that allow for the customization of packet content for various applications. GENEVE provides multi-tenancy support and traffic isolation, optimizing network performance while being compatible with SDN and NFV technologies, making it suitable for complex network environments like data centers and cloud computing.

NVGRE

NVGRE (Network Virtualization using Generic Routing Encapsulation) is a tunneling protocol that facilitates the creation of virtualized networks by encapsulating Layer 2 Ethernet frames within Layer 3 IP packets. Designed to support network virtualization in data centers, NVGRE enables the abstraction of physical network resources, allowing multiple virtual networks to coexist over a shared physical infrastructure. By leveraging generic routing encapsulation, NVGRE provides efficient scalability and flexibility, allowing for the seamless migration of virtual machines across heterogeneous environments while maintaining network isolation and improved resource utilization.

RDMA

Remote Direct memory Access (RDMA) is an accelerated I/O delivery mechanism that allows data to be transferred directly from the user memory of the source server to the user memory of the destination server bypassing the operating system (OS) kernel. Because the RDMA data transfer is performed by the DMA engine on the adapter's network processor, the CPU is not used for the data movement, freeing it to perform other tasks such as hosting more virtual workloads (increased VM density).RDMA protocols include RoCEv1, RoCEv2 and iWARP. All of these protocols reduce overall latency to deliver accelerated performance for applications such as Microsoft Hyper-V Live Migration, Microsoft SQL and Microsoft SharePoint with SMB Direct.

Adaptive Path

Adaptive Path is a network technology that dynamically adjusts data transmission paths in response to changing network conditions. It utilizes algorithms to analyze real-time metrics such as latency, bandwidth, and packet loss, enabling optimized routing decisions. This enhances overall network performance and reliability, particularly in environments with variable traffic patterns. By leveraging machine learning techniques, Adaptive Path can predict congestion and reroute traffic proactively, ensuring efficient resource utilization and improved user experience.

QP Trace

QP Trace (Queue Pair Trace) is a network performance analysis technique that tracks and records the flow of packets through queue pairs (QPs) in a network interface card (NIC). It helps identify key performance indicators such as latency, throughput, and packet loss. QP Trace provides detailed timestamps and event sequences, supporting troubleshooting and performance optimization, particularly in high-performance computing and data center environments. By analyzing this trace data, network administrators can gain insights into traffic patterns and resource utilization, optimizing network configurations to enhance overall performance.

VXLAN

VXLAN (Virtual Extensible LAN) is a network virtualization technology that encapsulates Ethernet frames within UDP packets, enabling the creation of overlay networks over existing Layer 3 infrastructure. By using a 24-bit segment ID called the VXLAN.Network Identifier (VNI), VXLAN supports up to 16 million unique logical networks, addressing the limitations of traditional VLANs, which are restricted to 4096 IDs. This encapsulation allows for improved scalability, flexibility, and isolation in multi-tenant data center environments, facilitating seamless virtual machine mobility and better resource allocation across distributed networks.

DPDK

DPDK with benefit for packet processing acceleration and use in NFV deployments.

iWARP

Delivers RDMA on top of the pervasive TCP/IP protocol. iWARP RDMA runs over standard network and transport layers and works with all Ethernet network infrastructure. TCP provides flow control and congestion management and does not require a lossless Ethernet network. iWARP is a highly routable and scalable RDMA implementation.

Go-Back-N

Go-Back-N (GBN) is an Automatic Repeat reQuest (ARQ) protocol primarily used in the data link layer and transport layer of computer networks. This protocol allows the sender to transmit multiple data frames consecutively without waiting for acknowledgments, with the number determined by the window size (N). When the sender transmits frames beyond the receiver's window capacity, the receiver will only accept frames in order

and, upon detecting an error, will request the sender to retransmit all subsequent frames starting from the erroneous one. This mechanism enhances the efficiency of data transmission but may lead to bandwidth wastage, especially in high-latency networks. GBN is suitable for scenarios where data order and integrity are of high importance.

NVMe-oF

Accessing non-volatile storage media, such as SSDs, over a PCIe (Peripheral Component Interconnect Express) interface. By minimizing latency and maximizing parallelism, NVMe significantly enhances data transfer speeds and I/O operations compared to traditional storage protocols like SATA and SAS. Its architecture is optimized for modern workloads, enabling faster data processing and improved overall system responsiveness, making it ideal for data-intensive applications and environments.

TSO

A network performance optimization technique that allows the TCP/IP stack in a computer's operating system to offload the

segmentation of large data packets to the network interface card (NIC). By enabling the NIC to handle the division of large TCP segments into smaller packets, TSO reduces CPU load and enhances throughput by minimizing the number of interrupts and context switches required during data transmission. This leads to improved efficiency in handling high-bandwidth applications, resulting in better overall network performance.

Order Information

Part No.	Product ID	Product Description
X550AT2-2TP	135977	Intel X550-AT2 Based Ethernet Network Interface Card, 10GBase-T Dual-Port,PCIe 3.0 x 4, Comparable to Intel X550-T2, Tall&Short Bracket
82599ES-2SP	135978	Intel 82599ES Based Ethernet Network Interface Card, 10G Dual-Port SFP+, PCIe 2.0 x8, Comparable to Intel X520-DA2, Tall&Short Bracket
X710BM2-2SP	75600	Intel X710-BM2 Based Ethernet Network Interface Card, 10G Dual-Port SFP+, PCIe 3.0 x 8, Comparable to Intel X710-DA2, Tall&Short Bracket
XL710BM1-4SP	238591	Intel XL710-BM1 Based Ethernet Network Interface Card, 10G Quad-Port SFP+, PCIe 3.0 x 8, Comparable to Intel X710-DA4, Tall&Short Bracket
XXV710DA2	160023	Intel® XXV710-DA2 Ethernet Network Interface Card , 25G Dual-Port SFP28, PCIe 3.0 x 8, Full Height&Low Profile
E810XXVDA4	160021	Intel® E810-XXVDA4 Ethernet Network Interface Card, 25G Quad-Port SFP28, PCIe 4.0 x 16, Full Height
E810XXVAM2-2BP	147578	Intel E810-XXVAM2 Based Ethernet Network Interface Card, 25G Dual-Port SFP28, PCIe 4.0 x 8, Comparable to Intel E810-XXVDA2, Tall&Short Bracket
XXV710AM2-2BP	75603	Intel XXV710 Based Ethernet Network Interface Card, 25G Dual-Port SFP28, PCIe 3.0 x 8, Comparable to Intel XXV710-DA2, Tall&Short Bracket
XL710BM2-2QP	75604	Intel XL710-BM2 Based Ethernet Network Interface Card, 40G Dual-Port QSFP+, PCIe 3.0 x 8, Comparable to Intel XL710-QDA2, Tall&Short Bracket
E810CAM2-2CP	141788	Intel E810-CAM2 Based Ethernet Network Interface Card, 100G Dual-Port QSFP28, PCIe 4.0 x 16, Comparable to Intel E810-CQDA2, Tall&Short Bracket

AG023R25A-1CP	208195	Intel FPGA Based Ethernet Network Interface Card, 100G Single-Port QSFP28, PCIe 4.0 x16, Comparable to Intel AGF023R25A, Tall Bracket

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Documents / Resources

	Intel X550AT2 Intel Based Ethernet Adapters [pdf] User Guide X550AT2-2TP, 82599ES-2SP, X710BM2-2SP, XL710BM1-4SP, XXV710DA2, E810XXVDA4, E810XXVAM2-2BP, XXV710AM2-2BP, X550AT2 Intel Based Ethernet Adapters, X550AT2, Intel Based Ethernet Adapters, Based Ethernet Adapters, Ethernet Adapters, Adapters

References

- FS.com - HPC, Data Center, Enterprise, Telecom
- User Manual