

ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter

Product Guide

The ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter is an advanced programmable network adapter enabling customized hardware acceleration and offload. The U25 programming model supports both high-level network programming abstractions such as HLS and P4, as well as compute acceleration frameworks such as Vitis to enable both Xilinx and third-party accelerated applications.

The following figure shows the ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter.



Figure 1. ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter

Did you know?

In addition to standard NIC drivers, the U25 adapter also supports Onload kernel bypass to provide both TCP and packet-based APIs for network application acceleration. The Xilinx Onload software accelerates and scales network-intensive applications such as in-memory databases, software load balancers, and web servers. With Onload, data centers can support 400% or more users on their cloud network while delivering improved reliability, enhanced quality of service (QoS) and higher return on investment, without modification to existing applications.

Part number information

The following table shows the part number for the adapter.

Table 1. Ordering information

Part number	Feature code	Description
4XC7A08317	BFPU	ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter

The part numbers include the following:

- One Xilinx adapter
- Low-profile (2U) and full-height (3U) adapter brackets
- Documentation

Supported transceivers and cables

The following table lists the supported transceivers.

Table 2. Transceivers

Part number	Feature code	Description
25Gb Transceivers		
7G17A03537	AV1B	Lenovo Dual Rate 10G/25G SR SFP28 Transceiver
4TC7A88638	BYBJ	ThinkSystem Finisar Dual Rate 10G/25G SR SFP28 Transceiver

25Gb transceivers: When installed in the Xilinx Alveo U25 Ethernet adapter, the supported 25Gb transceiver will currently only operate at 25Gb/s speeds.

The following table lists the supported fiber optic cables and Active Optical Cables.

Table 3. Optical cables

Part number	Feature code	Description
LC-LC OM3 Fiber Optic Cables (these cables require a 10 GbE SFP+ SR or 25 GbE SFP28 SR transceiver)		
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable
OM4 LC to LC Cables (these cables require a transceiver)		
4Z57A10845	B2P9	Lenovo 0.5m LC-LC OM4 MMF Cable
4Z57A10846	B2PA	Lenovo 1m LC-LC OM4 MMF Cable
4Z57A10847	B2PB	Lenovo 3m LC-LC OM4 MMF Cable
4Z57A10848	B2PC	Lenovo 5m LC-LC OM4 MMF Cable
4Z57A10849	B2PD	Lenovo 10m LC-LC OM4 MMF Cable
4Z57A10850	B2PE	Lenovo 15m LC-LC OM4 MMF Cable
4Z57A10851	B2PF	Lenovo 25m LC-LC OM4 MMF Cable
4Z57A10852	B2PG	Lenovo 30m LC-LC OM4 MMF Cable

The following table lists the supported direct-attach copper (DAC) cables.

Table 4. Copper cables

Part number	Feature code	Description
SFP28 25Gb Passive DAC Cables		
7Z57A03557	AV1W	Lenovo 1m Passive 25G SFP28 DAC Cable
7Z57A03558	AV1X	Lenovo 3m Passive 25G SFP28 DAC Cable
7Z57A03559	AV1Y	Lenovo 5m Passive 25G SFP28 DAC Cable

Features

The Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter offers a number of features, including the following:

A Powerful SmartNIC

The U25 delivers ultra-high throughput, small packet performance and low-latency. The host interface supports standard NIC drivers as well as Onload kernel bypass to provide both TCP and packet-based APIs for network application acceleration. IEEE1588v2 precision timing protocol (PTP) is provided for applications that require synchronized time stamping of packets with single-digit nanosecond accuracy.

A Programmable Fabric

The U25 SmartNIC contains a programmable FPGA handling all network flows. Each flow can be individually delivered to the host and/or streamed in hardware to through bump-in-the-wire network acceleration functions and/or compute acceleration kernels for application processing within the FPGA.

A Platform for Hardware Accelerated Clouds

Cloud service providers are deploying SmartNIC fabrics to achieve virtual switching and micro-segmentation of services that scale linearly with CPU cores and network links.

Technical specifications

The adapter has the following specifications:

- Adapter Hardware
 - XtremeScale™ Ethernet Controller
 - Zynq® UltraScale+™ XCU25 FPGA
 - 2x PCIe Gen 3 x8 (x16 connector in bifurcated mode)
 - 2x 10/25 GbE SFP28 cages supporting DAC cables or optical transceivers
 - 1x 2GB x 40 DDR4-2400
 - 1x 4GB x 72 DDR4-2400
- Acceleration
 - SDx Compute Acceleration
 - Universal Kernel Bypass
 - DPDK Poll Mode Driver - Packet (Cloud, Telco)
 - Onload® – TCP (Cloud, Telco, Enterprise)
 - Onload®/ TCPDirect - TCP/UDP (Fintech)
- Security
 - Tamper resistant adapter – Digitally signed firmware
- Time Synchronization and Hardware Timestamping
 - Hardware timestamping for all packets
 - On-board Stratum 3 stable oscillator
 - Solarflare Software PTP Daemon delivers enhanced stability and clock synchronization accuracy and can be used to synchronize the adapter clock to external time source
- Stateless Offloads
 - TCP/UDP Checksum Offload (CSO) TCP Segmentation Offload (TSO) Giant Send Offload (GSO)
 - Large Send Offload (LSO) Large Receive Offload (LRO) Receive Side Scaling (RSS)
 - Receive Segment Coalescing (RSC)

- Manageability and Remote Boot
 - PXE and UEFI
 - NC-SI over MCTP SMBus
 - PLDM over MCTP SMBus MCTP PCIe VDM
 - Management and Utilities
 - Solarflare Boot Manager
- Traffic Engineering
 - XtremePacket™ Engine for parsing, filtering, and flow steering
 - TCP/UDP/IP, MAC, VLAN, RSS filtering Accelerated Receive Flow Steering (ARFS) Transmit Packet Steering
- Virtualization
 - Linux Multiqueue
 - SR-IOV: 16 physical functions; 240 virtual functions 2048 Guest OS protected vNICs
 - VXLAN, tunneling offload; adaptable to custom overlays.
 - VLAN and VLAN Q-in-Q Insertion/Stripping
- Ethernet Standards
 - IEEE802.3-2018 Ethernet Base Standard
 - IEEE 802.3by Ethernet consortium 25 Gigabit Ethernet
 - IEEE 802.3ad, 802.1AX Link Aggregation
 - IEEE 802.1Q, 802.1P VLAN Tags and Priority IEEE 1588-2008 PTPv2
 - Jumbo Frame support (9000 bytes)

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 5. Server support (Part 1 of 4)

Part Number	Description	2S AMD V3				2S Intel V3			4S 8S Intel V3			Multi Node		GPU Rich			1S V3				
		SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD535 V3 (7DD8 / 7DD1)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)	SR670 V2 (7Z22 / 7Z23)	SR675 V3 (7D9Q / 7D9R)	SR680a V3 (7DHE)	SR685a V3 (7DHC)	ST50 V3 (7DF4 / 7DF3)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)
4XC7A08317	ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 6. Server support (Part 2 of 4)

Part Number	Description	Edge					Super Computing				1S Intel V2		2S Intel V2			
		SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)
4XC7A08317	ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 7. Server support (Part 3 of 4)

Part Number	Description	AMD V1			Dense V2			4S V2	8S	4S V1	1S Intel V1										
		SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR655 Client OS	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)	
4XC7A08317	ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 8. Server support (Part 4 of 4)

Part Number	Description	2S Intel V1						Dense V1					
		ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4XC7A08317	ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter	N	N	N	N	N	N	N	N	N	N	N	N

Operating system support

The adapter supports the operating systems listed in the following table.

Tip: This table is automatically generated based on data from [Lenovo ServerProven](#).

Table 9. Operating system support for ThinkSystem Xilinx Alveo U25 25GbE SFP28 2-Port PCIe FPGA Adapter, 4XC7A08317

	SR645	SR665
Operating systems		
Red Hat Enterprise Linux 7.6	Y ¹	Y ¹

¹ The OS is not supported with EPYC 7003 processors. HW is not supported with EPYC 7003 processors.

Regulatory approvals

The adapter has the following hardware certifications:

- FCC 47 CFR Part 15 Class A
- UL 94-V
- CE Mark
- RoHS - Complies with EU directive 2011/65/EU

Physical specifications

The adapter has the following physical specifications:

- Length: 168 mm (6.6 inches)
- Width: 64 mm (2.54 inches)

Operating environment

The adapter is supported in the following environment:

- Temperature:
 - Operating: 0°C to 55°C (32°F to 131°F)
 - Storage: -40°C to 65°C (-40°F to 149°F)
- Humidity:
 - Operating: 10% to 80%
 - Storage: 5% to 90%

Warranty

One year limited warranty. When installed in a Lenovo server, this adapter assumes the server's base warranty and any warranty upgrades.

Related publications

For more information, refer to these documents:

- Networking Options for ThinkSystem Servers:
<https://lenovopress.com/lp0765-networking-options-for-thinksystem-servers>
- ServerProven compatibility
<http://www.lenovo.com/us/en/serverproven>
- Alveo U25 SmartNIC Accelerator Card product page
<https://www.xilinx.com/products/boards-and-kits/alveo/u25.html>

Related product families

Product families related to this document are the following:

- [25 Gb Ethernet Connectivity](#)
- [Coproductors and Accelerators](#)
- [Ethernet Adapters](#)

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