

Solarflare SFN5162F 2x10GbE SFP+ Performant Adapter

Product Guide (withdrawn product)

The Solarflare SFN5162F 2x10GbE SFP+ Performant Adapter, part of the Solarflare Performant Server family of adapters, enables application performance leadership by delivering the industry's lowest latency along with full line-rate performance. Featuring a rich set of stateless offloads, these adapters provide efficient acceleration of the most demanding network protocol tasks.

Note: This product guide also describes the Solarflare SFN6122F 2x10GbE SFP+ Onload Adapter, however this adapter is now withdrawn from marketing.

Figure 1 shows the adapters. The SFN5162F and SFN6122F are physically identical.



Figure 1. Solarflare SFN5162F MR and SFN6122F LL Dual Port 10GbE SFP+ Adapters

Did you know?

With a latency of less than 3 microseconds, the Solarflare SFN6122F LL Dual Port 10GbE SFP+ Adapter provides significant performance benefits when used with an operating system compatible with the OpenOnload drivers.

Part number information

Table 1 provides the ordering part numbers and feature codes for the Solarflare adapters.

Table 1. Ordering part numbers and feature codes

Part number	Feature code	Description
47C9952	A47H	Solarflare SFN5162F 2x10GbE SFP+ Performant Adapter
47C9960*	A47J	Solarflare SFN6122F 2x10GbE SFP+ Onload Adapter

* Withdrawn from marketing

The adapter option part numbers includes the following items:

- One Solarflare 10 GbE adapter with a full height PCIe bracket attached
- One low profile PCIe bracket (included in the box)
- Support CD
- Important Notices Flyer

Note: The adapters ship without any SFP+ transceivers or direct attach cables. These items need to be ordered separately (see Table 2 and Table 3 for details).

Supported transceivers and direct-attach cables

The Solarflare SFN5162F and SFN6122F Dual Port 10GbE SFP+ Adapters have two empty SFP+ cages that support SFP+ SR transceivers and Twinax direct attached copper cables, as listed in Table 2 and Table 3.

Table 2. Supported SFP+ transceivers

Part number	Feature code	Description
Optical Transceivers		
49Y4216	0069	Brocade 10Gb SFP+ SR Optical Transceiver
46C3447	5053	SFP+ SR Transceiver (10Gb)
49Y4218	0064	QLogic 10Gb SFP+ SR Optical Transceiver

Table 3 lists the supported direct attach copper (DAC) cables.

Table 3. Supported direct attach copper cables

Part number	Feature code	Description
Active DAC/Twinax cables		
81Y8295	A18M	1m 10GE Twinax Act Copper SFP+
81Y8296	A18N	3m 10GE Twinax Act Copper SFP+
81Y8297	A18P	5m 10GE Twinax Act Copper SFP+
95Y0323	A25A	1m Active DAC SFP+ Cable
95Y0326	A25B	3m Active DAC SFP+ Cable
95Y0329	A25C	5m Active DAC SFP+ Cable
Passive DAC/Twinax cables		
00D6288	A3RG	.5m Passive DAC SFP+ Cable
90Y9427	A1PH	1m Passive DAC SFP+ Cable
90Y9430	A1PJ	3m Passive DAC SFP+ Cable
90Y9433	A1PK	5m Passive DAC SFP+ Cable

Features

The Solarflare SFN5162F MR (midrange) and SFN6122F LL (low-latency) adapters deliver dual-port, line-rate 10 Gbps throughput for moving large amounts of data and eliminating server I/O bottlenecks. The SFN5162F combines excellent performance and outstanding value for general business 10 GbE applications. The SFN6122F adapter delivers industry-leading network performance with ultra-low latency at the highest message rates.

The Solarflare SFN5162F and SFN6122F Adapters have the following common features:

- Delivers industry-leading performance, providing high throughput, low latency, and high CPU efficiency, which improves the performance of network communications, network-attached storage, and remote file system access.
- Suitable for applications such as email, database, OLTP, data mining, web serving, and big data.
- Includes Solarflare's unique hardware-accelerated virtual channel architecture. Each virtual channel provides an independent channel between the network adapter and host software, allowing network I/O processing to be distributed efficiently over multiple CPU cores. With 1024 virtual channels per port, I/O performance scales as the number of CPU cores and virtual machines increase.

Note: In the Solarflare documentation, the virtual channel feature is referred to as vNIC. This feature is different from the Virtual Fabric vNIC capability.

- Supports Receive Flow Steering (RFS) acceleration, which improves processing efficiency by steering received packets to the CPU core that is running the application that consumes those packets.
- Accelerates guest applications in leading hypervisors by efficiently distributing virtual machine network I/O traffic across multiple CPU cores with supporting NetQueue and VMQ in VMware, and Microsoft VMQ in Hyper-V.
- At less than 5 watts, the SFN5162F makes a power-efficient 10G network not only possible, but it can save thousands of dollars of operating costs for a typical data center.
- Graphical user interface and scriptable command-line interface for ease of management.

In addition, the Solarflare SFN6122F LL Dual Port 10GbE SFP+ Adapter supports the Solarflare OpenOnload application acceleration middleware on Linux operating systems. OpenOnload bypasses the network stack in the Linux kernel by dedicating a virtual channel to each accelerated application.

OpenOnload enables the following capabilities:

- Suitable for the most demanding, latency-sensitive applications in environments requiring the highest message rates.
- Delivers ultra-low latency and high throughput even as message rates increase.
- Enables accelerated application performance through TCP/IP, UDP, and multicast acceleration.
- Streamlines and reduces interrupts, context switches, and data copies.
- Reduces the processing that is associated with networking and improves processor core scaling.
- Reduces latency from less than 6 μ s to less than 3 μ s.
- Increases message rates by 300% or more.
- Binary compatibility with industry standard APIs, so no software modifications are needed, and OpenOnload seamlessly integrates into the existing infrastructure.
- A standards-based solution using TCP/IP and UDP, so no specialized protocols are needed.

Note: Solarflare OpenOnload runs only on non-Xen Linux distributions. Windows and VMware are not supported.

Technical specifications

The adapters have the following common specifications:

- Based on the Solarflare Solarstorm SFC9020 controller.
- Two 10GbE SFP+ ports with support for optical SFP+ modules and Direct Attach Copper (DAC) cables.
- Full line-rate performance across all ports.
- Very low latency:
 - SFN5162F: 5.4 μ s
 - SFN6122F without OpenOnload: 5.4 μ s
 - SFN6122F with OpenOnload: 2.3 μ s (TCP), 2.4 μ s (UDP)
- Low-profile form factor.
- PCI Express 2.0 x8 Gen 2.0 host interface at 5.0 GTps for full, 40 Gbps bidirectional bandwidth.
- Jumbo Frames support (9216 byte frames).
- IEEE 802.1q VLAN support provides enhanced network management and efficiency.
- Support for VMware NetQueue and Microsoft VMQ improves network performance in virtualized environments.
- Support for NIC teaming.
- IEEE 802.3x flow control support.
- Receive Side Scaling (RSS) with 2048 virtual channels (1024 per port) distributes IPv4/IPv6 loads across CPU cores.
- Accelerated Receive Flow Steering (RFS) intelligently aligns I/O processing with application processing to a single CPU core by using on-chip advanced packet filtering.
- TCP, IP, and UDP checksum offload.
- IP flow filtering enables the hardware to steer packets that are based on IP, TCP, and UDP header contents to a virtual channel.
- MAC address filtering enables the hardware to steer packets that are based on the MAC address to a virtual channel.
- Message Signaled Interrupts (MSI) and MSI-X support maximizes server processing performance by reducing CPU impact and lowering interrupt latency.
- Support Large Send Offload (LSO), Giant Send offload (GSO) TCP Segmentation Offload (TSO), and Large Receive Offload (LRO) for improved adapter performance and reduced CPU utilization.
- Power consumption (typical):
 - SFN5162F: 4.9 W
 - SFN6122F: 5.9 W

The adapters currently have the following restrictions:

- No support for SR-IOV.
- No support for iSCSI boot or PXE boot.
- No UEFI support. The adapters boot by using legacy BIOS only.

Standards supported

- PCI Express Base Specification, rev. 2.0
- PCI Express Card Electromechanical Specification, rev. 2.0
- PCI Bus Power Management Interface Specification, rev. 1.2
- IEEE 802.3ae (10 Gb Ethernet)
- IEEE 802.1Q (VLAN)
- IEEE 802.3ad (Link Aggregation)
- IEEE 802.1p (Priority Encoding)
- IEEE 802.3x (Flow Control)
- IPv4 (RFC 791)
- IPv6 (RFC 2460)
- IEEE 802.3ae 10GBASE-SR short range fiber optics 10 Gb Ethernet
- 10GSFP+Cu SFP+ Direct Attach copper
- Jumbo frames

Server support

The Solarflare adapters are supported on the System x servers that are listed in the following tables.

The following tables list the System x servers that are compatible.

Support for System x and dense servers with Xeon E5/E7 v4 and E3 v5 processors

Table 4. Support for System x and dense servers with Xeon E5/E7 v4 and E3 v5 processors

Part number	Description	x3250 M6 (3943)	x3250 M6 (3633)	x3550 M5 (8869)	x3650 M5 (8871)	x3850 X6/x3950 X6 (6241, E7 v4)	nx360 M5 (5465, E5-2600 v4)	sd350 (5493)
47C9952	Solarflare SFN5162F 2x10GbE SFP+ Performant Adapter	N	N	Y	Y	Y	Y	N
47C9960	Solarflare SFN6122F 2x10GbE SFP+ Onload Adapter	N	N	N	N	Y	N	N

Support for servers with Intel Xeon v3 processors

Table 5. Support for servers with Intel Xeon v3 processors

Part number	Description	x3500 M4 (7383, E5-2600 v2)	x3530 M4 (7160, E5-2400 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3650 M4 HD (5460)	x3750 M4 (8752)	x3750 M4 (8753)	x3850 X6/x3950 X6 (3837)	x3850 X6/x3950 X6 (6241, E7 v2)	dx360 M4 (E5-2600 v2)	nx360 M4 (5455)
47C9952	Solarflare SFN5162F 2x10GbE SFP+ Performant Adapter	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
47C9960	Solarflare SFN6122F 2x10GbE SFP+ Onload Adapter	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N

Support for servers with Intel Xeon v2 processors

Table 6. Support for servers with Intel Xeon v2 processors

Part number	Description	x3500 M4 (7383, E5-2600 v2)	x3530 M4 (7160, E5-2400 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3650 M4 HD (5460)	x3750 M4 (8752)	x3750 M4 (8753)	x3850 X6/x3950 X6 (3837)	x3850 X6/x3950 X6 (6241, E7 v2)	dx360 M4 (E5-2600 v2)	nx360 M4 (5455)
47C9952	Solarflare SFN5162F 2x10GbE SFP+ Performant Adapter	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
47C9960	Solarflare SFN6122F 2x10GbE SFP+ Onload Adapter	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

For the latest information about the System x servers that support each adapter, see ServerProven:
<http://www.lenovo.com/us/en/serverproven/xseries/lan/matrix.shtml>

Operating system support

The Solarflare adapters support the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2012
- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 12
- VMware vSphere 5.0 (ESXi)
- VMware vSphere 5.1 (ESXi)
- VMware vSphere 6.0 (ESXi)

Solarflare OpenOnload is supported by the Solarflare SFN6122F LL Dual Port 10GbE SFP+ Adapter only on non-Xen versions of Linux:

- SUSE Linux Enterprise Server 11 for x86
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 12
- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition

Download the OpenOnload software from (no cost registration required):

https://support.solarflare.com/index.php?option=com_cognidox&view=categories&Itemid=25

For the latest information about the specific versions and service packs supported, see ServerProven:
<http://www.lenovo.com/us/en/serverproven/xseries/lan/matrix.shtml>

Select the check mark that is associated with the server in question to see the operating system support details.

Physical specifications

The adapters have the following physical specifications (approximate):

- Length: 134 mm (5.3 in.)
- Width: 69 mm (2.7 in.)
- Depth: Standard 120 mm (4.725 in.); Low profile 79 mm (3.12 in.)
- Weight: 99 g (3.3 oz.)

Shipping box dimensions (approximate):

- Height: 189 mm (7.5 in.)
- Width: 90 mm (3.5 in.)
- Depth: 38 mm (1.5 in.)
- Weight: 205 g (7.0 oz.)

Operating environment

These adapters are supported in the following environment:

- Operating temperature: 0 - 55 °C (32 - 131 °F)
- Storage temperature: -20 - 70 °C (-4 - 158 °F)
- Relative humidity (operating): 10% - 90%
- Relative humidity (storage): 5% - 95%

Warranty

One-year limited warranty. When installed in a System x server, these cards assume your system's base warranty and any warranty upgrade.

Agency approvals

The adapters conform to the following standards:

- EMI
- EMC
- EN55022
- EN55024
- EN60950 / CE
- FCC Part 15 Class B
- UL 1950 / 60950-1
- CSA C22.2 60950-1-07 2nd Ed
- VCCI
- AS/NZS CISPR22:2006 and CISPR24:1997 + A1:2001 + A2:2002
- RRL for MIC (KCC)
- BSMI
- UL 94-V
- RoHS compliant

Top-of-rack Ethernet switches

The adapters support end-to-end 10 GbE connections to the top-of-rack Ethernet switches from Lenovo Networking that are listed in the following table.

The maximum cable distance (optical) is 300 m using OM3 multi-mode fibre.

Table 7. Top-of-rack Ethernet switches

Description	Part number
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6
Lenovo RackSwitch G8264 (Rear to Front)	7159G64
Lenovo RackSwitch G8264CS (Rear to Front)	7159DRX
Lenovo RackSwitch G8272 (Rear to Front)	7159CRW
Lenovo RackSwitch G8296 (Rear to Front)	7159GR6

For more information, see the Product Guides in the Top-of-rack switches categories:
<http://lenovopress.com/networking/tor/10gb?rt=product-guide>

Related publications

For more information, see the following documents:

- US Announcement Letter:
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-082>
- Networking adapters for System x product page
<http://shop.lenovo.com/us/en/systems/servers/options/systemx/networking/adapters/>
- System x Configuration and Options Guide:
<http://www.lenovo.com/us/en/cog/>
- Device drivers, tools, and Solarflare Server Adapter User's Guide (no cost for registration is required):
https://support.solarflare.com/index.php?option=com_cognidox&view=categories&Itemid=25
- Product Guide: Solarflare SFN7122F 2x10 GbE SFP+ Flareon Ultra Adapter
<https://lenovopress.com/tips1156-solarflare-sfn7122f>

Related product families

Product families related to this document are the following:

- [10 Gb Ethernet Connectivity](#)
- [Ethernet Adapters](#)

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2024. All rights reserved.

This document, TIPS1021, was created or updated on June 7, 2016.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<https://lenovopress.lenovo.com/TIPS1021>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <https://lenovopress.lenovo.com/TIPS1021>.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®

ServerProven®

System x®

The following terms are trademarks of other companies:

Intel® and Xeon® are trademarks of Intel Corporation or its subsidiaries.

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

Microsoft®, Hyper-V®, Windows Server®, and Windows® are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.