

Lenovo ThinkSystem RAID 930 Series Internal RAID Adapters

Product Guide

The ThinkSystem RAID 930 family of internal 12 Gbps SAS RAID controllers are high-performance RAID-on-chip (ROC) adapters. These adapters support RAID levels 0/1/10/5/50/6/60 as well as JBOD, and include an extensive list of RAS and management features.

The family is comprised of four adapters:

- The ThinkSystem RAID 930-4i supports up to four internal SAS and SATA drives
- The ThinkSystem RAID 930-8i supports up to eight internal SAS and SATA drives
- The ThinkSystem RAID 930-16i supports up to 16 internal SAS and SATA drives
- The ThinkSystem RAID 930-24i supports up to 24 internal SAS and SATA drives

The ThinkSystem RAID 930-8i is shown in the following figure.

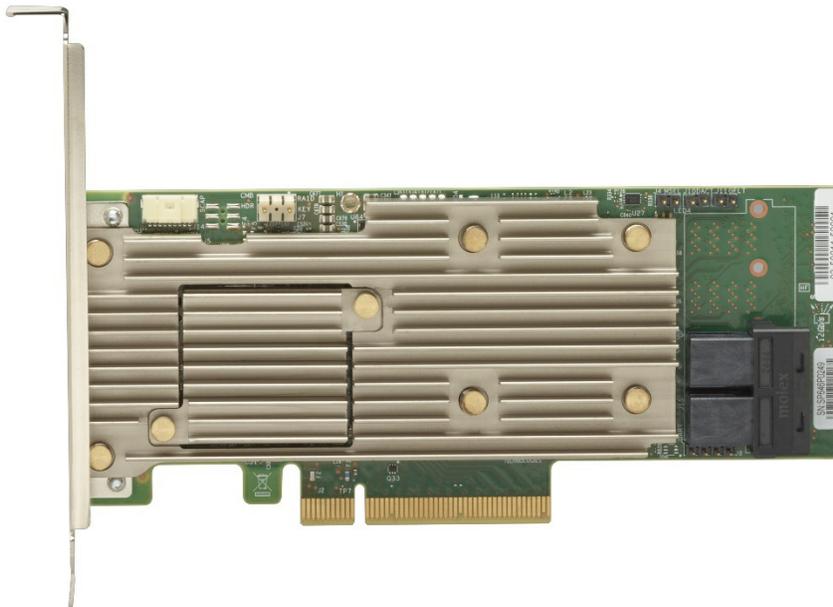


Figure 1. ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter

Did you know?

RAID on Chip-based controllers such as the RAID 930 adapters have a dedicated processor that offloads all RAID functions from the server's CPU. With hardware acceleration for RAID 5 and 6 operations plus dedicated memory for caching, the 930-8i, 16i and 24i offer the ultimate performance for ThinkSystem servers.

Part number information

The following table provides the ordering part numbers for the adapters.

Table 1. Part numbers and feature codes

Part number	Feature code	Description
7M27A03917	AUYS	ThinkSystem RAID 930-4i-2GB 2 Drive Adapter Kit for SN550
7M17A03933	AVED	ThinkSystem RAID 930-4i-2GB 4 Drive Adapter Kit for SN850
7Y37A01084	AUNJ	ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter
7Y37A01085	AUNK	ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter
4Y37A09721	B31E	ThinkSystem RAID 930-16i 8GB Flash PCIe 12Gb Adapter
7Y37A01086	AUV1	ThinkSystem RAID 930-24i 4GB Flash PCIe 12Gb Adapter

The following figure shows the ThinkSystem RAID 930-16i.

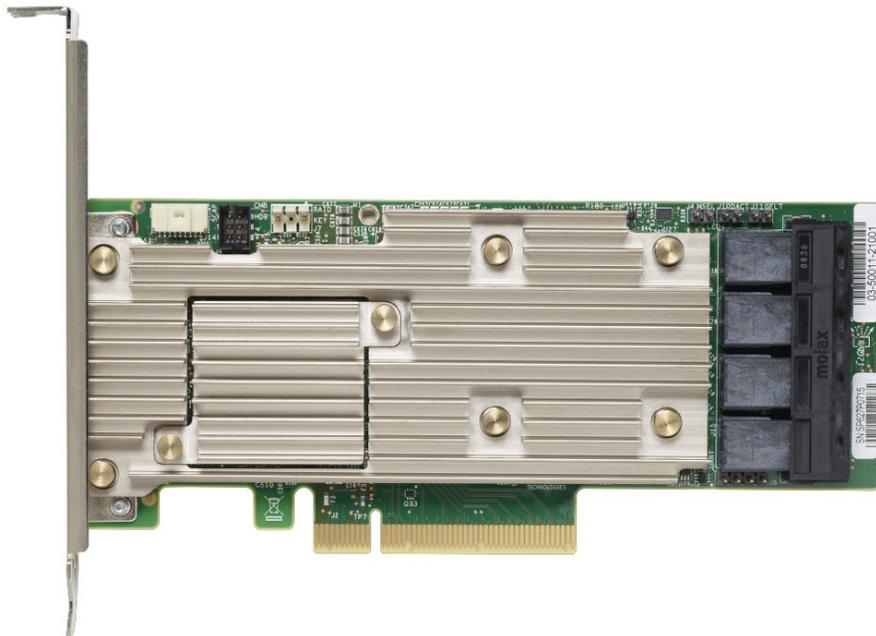


Figure 2. ThinkSystem RAID 930-16i PCIe 12Gb Adapter

Technical specifications

The ThinkSystem RAID 930 Series internal RAID adapters have the following specifications:

- PCIe 3.0 x8 host interface
- 12 Gbps SAS/SATA RAID controllers, based on the Broadcom MegaRAID 9460 adapter family
- 2GB, 4GB or 8GB of integrated flash-backed cache
- Connectivity for up to 2, 8, 16 or 24 internal SAS or SATA drives
- Support for intermixing SAS and SATA HDDs and SSDs. Mixing SAS and SATA drives in the same array is not supported. Mixing of HDDs and SSDs in the same array is not supported.
- Support for intermixing of 12 Gbps and 6 Gbps drives.

- Support for RAID 0, 1, 10, 5, 50, 6 and 60 standard (The 930-4i supports only RAID 0, 1 in the SN550 and RAID 0, 1, 5, 6 in the SN850 because those blade servers only support two and four drives respectively)
- Support for JBOD (non-RAID) drive state
- Support for up to 64 virtual disks, up to 128 arrays, up to 16 virtual disks per array
- Support for logical drive sizes greater than 2 TB.
- Configurable stripe size from 64 KB up to 1 MB
- Supports 512e, 512n and 4K sector formatted drives
- Compliant with Disk Data Format (DDF) configuration on disk (CoD).
- S.M.A.R.T. support.
- Configuration through
 - XClarity Provisioning Manager UEFI interface
 - XClarity Controller web interface
 - XClarity Administrator Configuration Patterns
 - StorCLI command-line interface
 - LSI Storage Authority (LSA) GUI interface
 - UEFI Human Interface Infrastructure (HII)

Note: CacheCade is not supported by these adapters

The following table compares the specifications of the RAID 930 adapters.

Table 2. Specifications

Feature	RAID 930-4i	RAID 930-8i	RAID 930-16i	RAID 930-24i
Part number	7M27A03917 7M17A03933	7Y37A01084	7Y37A01085 4Y37A09721	7Y37A01086
Form factor	Custom	Low profile	Low profile	Full height half length
Controller chip	LSI SAS3504	LSI SAS3508	LSI SAS3516	LSI SAS3508 + LSI SAS35x36R
Host interface	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8
Port interface	12 Gb SAS	12 Gb SAS	12 Gb SAS	12 Gb SAS
Number of ports	2 or 4*	8	16	24
Port connectors	1x Mini-SAS HD x4 (SFF-8643)	2x Mini-SAS HD x4 (SFF-8643)	4x Mini-SAS HD x4 (SFF-8643)	6x Mini-SAS HD x4 (SFF-8643)
Drive interface	SAS, SATA	SAS, SATA	SAS, SATA	SAS, SATA
Drive type	HDD, SED, SSD	HDD, SED, SSD	HDD, SED, SSD	HDD, SED, SSD
Hot-swap drives	Yes	Yes	Yes	Yes
Max devices	2	8	16	24
RAID levels	0, 1, 5, 6*	0, 1, 10, 5, 50, 6, 60	0, 1, 10, 5, 50, 6, 60	0, 1, 10, 5, 50, 6, 60
JBOD drive state	Yes	Yes	Yes	Yes
Cache	2GB (Standard)	2GB (Standard)	4GB (Standard) 8GB (Standard)	4GB (Standard)
CacheVault cache protection with flash	Yes	Yes	Yes	Yes
Performance Accelerator (FastPath)	Yes	Yes	Yes	Yes
SED support (SafeStore)	Yes	Yes	Yes	Yes

* The 930-4i for use in the SN550 blade server only supports RAID 0 and RAID 1 because the server has only two drives. The 930-4i for use in the SN850 blade server only supports RAID 0, 1, 5 and 6 because the server has only four drives.

Features

The ThinkSystem RAID 930 adapters have the following standard features:

- MegaRAID FastPath SSD performance acceleration

MegaRAID FastPath software provides high-performance I/O acceleration for SSD-based virtual drives by using a low latency I/O path to increase the maximum I/O per second (IOPS) capability of the controller. This feature boosts the performance of applications with a highly random data storage access pattern, such as transactional databases.

- MegaRAID flash cache protection

MegaRAID flash cache protection uses NAND flash memory, which is powered by a CacheVault Power Module supercapacitor, to protect data that is stored in the controller cache. This module eliminates the need for a lithium-ion battery, which is commonly used to protect DRAM cache memory on PCI RAID controllers. To avoid the possibility of data loss or corruption during a power or server failure, flash cache protection technology transfers the contents of the DRAM cache to NAND flash using power from the offload power module. After the power is restored to the RAID controller, the content of the NAND flash is transferred back to the DRAM, which is flushed to disk.

- Auto-resume on array rebuild or array reconstruction after the loss of system power

Auto-resume uses non-volatile RAM (NVRAM) to save the rebuild progress during a host reboot or power failure to automatically resume from the last checkpoint. Auto-resume ensures that data integrity is maintained throughout the process. The card supports a number of features that can be implemented without rebooting the server. Applications, such as email and web server, benefit from avoiding downtime during the transition.

- Online Capacity Expansion

Online Capacity Expansion (OCE) allows the capacity of a virtual disk to be expanded by adding new physical disks or making use of unused space on existing disks, without requiring a reboot.

- Online RAID Level Migration

Online RAID Level Migration (RLM), which is also known as logical drive migration, can migrate a virtual disk from any RAID level to any other RAID level without requiring a reboot. System availability and application functionality remain unaffected.

- Fast initialization for quick array setup

Fast initialization quickly writes zeros to the first and last sectors of the virtual drive. This feature allows you to immediately start writing data to the virtual drive while the initialization is running in the background.

- Consistency check for background data integrity

Consistency check verifies that all stripes in a virtual disk with a redundant RAID level are consistent. The consistency check mirrors data when an inconsistent stripe is detected for RAID 1 and re-creates the parity from the peer disks for RAID 5 or RAID 6. Consistency checks can be scheduled to take place periodically.

- Extensive online configuration options and advanced monitoring and event notification

Management tools provide convenience for the configuration of logical volumes and alerting when errors have occurred or are about to occur.

- Patrol read for media scanning and repairing

Patrol read is a background sentry service that pro-actively discovers and corrects media defects (bad sectors) that arise normally as a disk drive ages. The service issues a series of verify commands, and if a bad block is discovered, the card's firmware uses RAID algorithms to re-create the missing data and remap the sector to a good sector. The task is interruptible based on controller activity and host operations. The firmware also provides an interface where the patrol read task can be initiated, set up for continuous operation, and terminated from a management application. Patrol read can be activated by a manual command or automatically.

- Global and dedicated hot spare with revertible hot spare support

A hot spare rebuilds data from all virtual disks within the disk group in which it is configured. You can define a physical disk as a hot spare to replace a failed drive. Hot spares can be configured as either global or dedicated. A global hot spare allows any physical drive to be designated as a hot spare. A dedicated hot spare allows the user to assign a hot spare drive to a particular array of the same drive type.

- Drive roaming

Drive roaming occurs when the physical disks are changed to different ports on the same controller. When the drives are placed on different channels, the controller detects the RAID configuration from the configuration data on the drives.

- MegaRAID SafeStore support for self-encrypting drive (SED) services

MegaRAID SafeStore encryption services offer instant secure erase and local key management for self-encrypting drives. This technology represents a step forward in securing data on a disk drive from any unauthorized access or modification resulting from theft, loss, or repurposing of drives. Instant secure erase permanently removes data when repurposing or decommissioning SEDs. SafeStore local key management provides the necessary management and protection of SEDs by using a simple pass phrase, security key identifier, and security key file that can be set and applied to all SEDs that are assigned to a RAID adapter. This feature removes the complexity of managing each SED's unique encryption key, and it essentially relieves the administrator of most of the daily tasks of securing data.

- XClarity Provisioning Manager for pre-boot array configuration and management

Provisioning Manager is the ThinkSystem UEFI-based application that includes a RAID setup wizard to help you configure drive groups and virtual disks before installing or booting the operating system.

- XClarity Controller web interface for remote storage management

XClarity Controller (XCC) is the systems management processor integrated in all ThinkSystem servers. The XCC web interface allows you to perform storage inventory, create and edit virtual disks, view events, import a new controller configuration, and perform firmware updates on the adapter.

Note: MegaRAID CacheCade and MegaRAID Storage Manager are not supported.

The ThinkSystem RAID 930-24i is shown in the following figure.

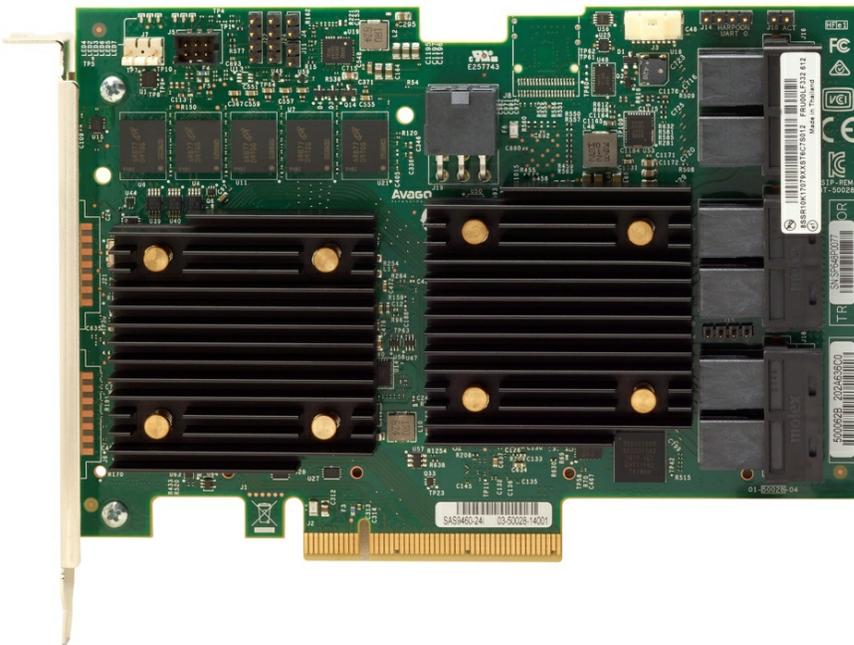


Figure 3. ThinkSystem RAID 930-24i 4GB Flash PCIe 12Gb Adapter

Server support

The following table lists the ThinkSystem servers that are compatible.

Table 3. ThinkSystem server support

Part number	Description	1S Rack & Tower				2S Rack & Tower								4S Rack			Dense/ Blade			
		ST50 (7Y48/7Y50)	ST250 (7Y45/7Y46)	SR150 (7Y54)	SR250 (7Y51/7Y52)	ST550 (7X09/7X10)	SR530 (7X07/7X08)	SR550 (7X03/7X04)	SR570 (7Y02/7Y03)	SR590 (7X98/7X99)	SR630 (7X01/7X02)	SR650 (7X05/7X06)	SR670 (7Y36/7Y37/7Y38)	SR850 (7X18/7X19)	SR860 (7X69/7X70)	SR950 (7X11/12/13)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
7M27A03917	ThinkSystem RAID 930-4i-2GB 2 Drive Adapter Kit for SN550	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N
7M17A03933	ThinkSystem RAID 930-4i-2GB 4 Drive Adapter Kit for SN850	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
7Y37A01084	ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	
7Y37A01085	ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter	N	Y	N	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	
4Y37A09721	ThinkSystem RAID 930-16i 8GB Flash PCIe 12Gb Adapter	N	N	N	N	Y	N	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	
7Y37A01086	ThinkSystem RAID 930-24i 4GB Flash PCIe 12Gb Adapter	N	N	N	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N	

Operating system support

The ThinkSystem RAID 930 adapters support the following operating systems:

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Microsoft Windows Server 2019
- Microsoft Windows Server version 1709
- Microsoft Windows Server version 1803
- Red Hat Enterprise Linux 6.10
- Red Hat Enterprise Linux 6.9
- Red Hat Enterprise Linux 7.3
- Red Hat Enterprise Linux 7.4
- Red Hat Enterprise Linux 7.5
- SUSE Linux Enterprise Server 11 SP4
- SUSE Linux Enterprise Server 11 SP4 with Xen
- SUSE Linux Enterprise Server 12 SP2
- SUSE Linux Enterprise Server 12 SP2 with Xen
- SUSE Linux Enterprise Server 12 SP3
- SUSE Linux Enterprise Server 12 SP3 with Xen
- SUSE Linux Enterprise Server 15
- SUSE Linux Enterprise Server 15 with XEN
- VMware vSphere Hypervisor (ESXi) 6.0 U3
- VMware vSphere Hypervisor (ESXi) 6.5
- VMware vSphere Hypervisor (ESXi) 6.5 U1
- VMware vSphere Hypervisor (ESXi) 6.5 U2
- VMware vSphere Hypervisor (ESXi) 6.7
- VMware vSphere Hypervisor (ESXi) 6.7 U1

For more information about the specific versions and service levels that are supported and any other prerequisites, see the ServerProven website: <http://www.lenovo.com/us/en/serverproven>

The ThinkSystem RAID 930-4i is shown in the following figure.

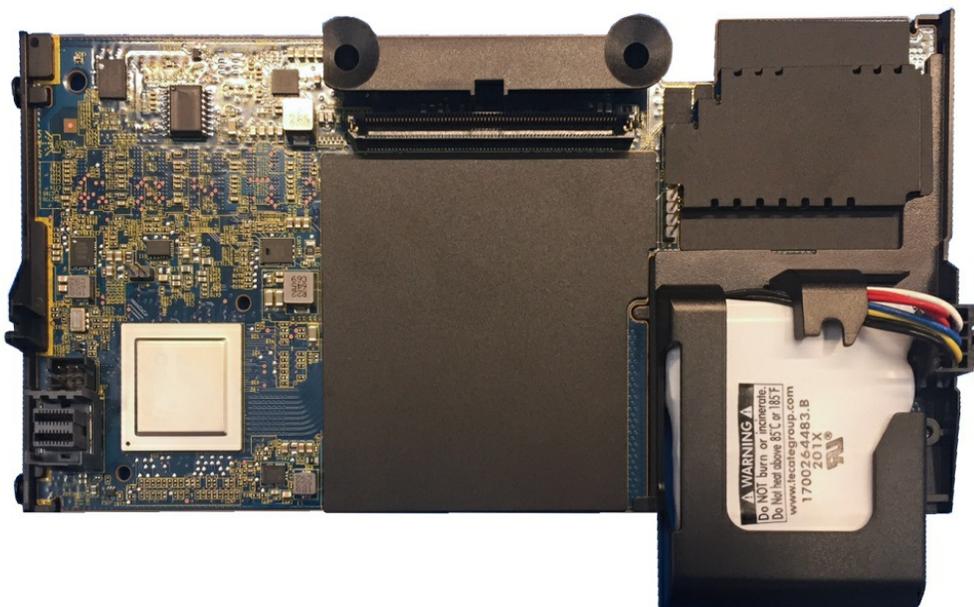


Figure 4. ThinkSystem RAID 930-4i-2GB 2 Drive Adapter Kit for SN550 (included heatsink not shown)

Warranty

The adapters carry a 1-year limited warranty. When installed in a supported ThinkSystem server, the adapter assumes the server's base warranty and any warranty upgrades.

Operating environment

The ThinkSystem RAID 930 Series adapters are supported in the following environment:

- Operating:
 - Temperature: 10°C to 55°C (50°F to 131°F)
 - Relative humidity: 20% to 90% (non-condensing)
- Storage
 - Temperature with package: -40°C to 70°C (-40°F to 158°F)
 - Relative humidity: 5% to 95% (non-condensing)

Agency approvals

The ThinkSystem RAID 930 adapters have the following agency approvals:

- FCC Part 15 Class A
- Australia/New Zealand (AS/NZS CISPR 22)
- Canada (ICES-003 Class B)
- Europe (EN55022/EN55024)
- Japan (VCCI V-3)
- Korea (RRA no 2013-24 & 25)
- RoHS compliant
- EN/IEC/UL 60950
- Taiwan (CNS 13438)
- USA (FCC 47 CFR part 15 Subpart B class B)
- WEEE

Related publications and links

For more information, see the following documents:

- Lenovo ThinkSystem product publications:
<http://thinksystem.lenovofiles.com/help/index.jsp>
- ServerProven hardware compatibility:
<http://www.lenovo.com/us/en/serverproven>
- Lenovo RAID Management Tools and Resources:
<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- Lenovo RAID Introduction
<https://lenovopress.com/lp0578-lenovo-raid-introduction>

Related product families

Product families related to this document are the following:

- [RAID Adapters](#)

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