

New Lenovo RAID/HBA adapter features and specifications

Product features, technical specifications

The Lenovo logo is positioned vertically on the right side of the slide. It consists of the word "Lenovo" in white, sans-serif font, set against a vertical rectangular background with a color gradient from green at the top to blue at the bottom.

Lenovo

Features and specifications

Comparison of roughly equivalent ThinkSystem storage controllers and new RAID/HBA adapters. Click the buttons for information about different series.

4 Series

5 Series

9 Series

	8 ports HBA		16 ports HBA	
Feature	430-8i	4350-8i	430-16i	4350-16i
Form factor	PCIe low profile	PCIe low profile	PCIe low profile	PCIe low profile
Controller chip	LSI SAS3408	SmartIOC 2100 PM8222	LSI SAS3416	SmartIOC 2100 PM8238
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	8	8	16	16
Port connectors	Two Mini-SAS HD x4 (SFF-8643)	Two Mini-SAS HD x4 (SFF-8643)	Four Mini-SAS HD x4 (SFF-8643)	Four Mini-SAS HD x4 (SFF-8643)
Drive interface	SAS, SATA	SAS, SATA	SAS, SATA	SAS, SATA
Drive type	HDD, SSD, SED*	HDD, SSD	HDD, SSD, SED*	HDD, SSD
Maximum devices	8	8	16	16
RAID levels	No RAID	No RAID	No RAID	No RAID
JBOD mode	Yes	Yes	Yes	Yes
Cache	No	No	No	No
SED support	Yes*	No	Yes*	No
IOFQ Performance (4K random read)	1.7M	1.5M	1.7M	1.7M

*SED support is achieved by using software on the server (SED commands are passed through the HBA to the drives).

Features and specifications

Comparison of roughly equivalent ThinkSystem storage controllers and new RAID/HBA adapters. Click the buttons for information about different series.

4 Series

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9 Series

	8 ports Basic RAID	
Feature	530-8i	5350-8i
Form factor	PCIe low profile	PCIe low profile
Controller chip	LSI SAS3408	SmartROC 3100 PM8222
Host interface	PCIe 3.0 x8	PCIe 3.0 x8
Port interface	12 Gb SAS	12 Gb SAS
Number of ports	8	8
Port connectors	Two Mini-SAS HD x4 (SFF-8643)	Two Mini-SAS HD x4 (SFF-8643)
Drive interface	SAS, SATA	SAS, SATA
Drive type	HDD, SED*, SSD	HDD, SSD
Hot-swap drives	Yes	Yes
Max devices	8	8
RAID levels	0, 1, 10, 5, 50	0, 1, 10, 5
JBOD mode	Yes	Yes
Cache	None	None
IOPS Performance (4K random read)	1.7M	1.5M

*SED support is achieved by using software on the server (SED commands are passed through the HBA to the drives).

Features and specifications

Comparison of roughly equivalent ThinkSystem storage controllers and new RAID/HBA adapters. Click the buttons for information about different series.

4 Series

5 Series

9 Series

	8 ports RAID		16 ports RAID	
Feature	930-8i	9350-8i	930-16i	9350-16i
Form factor	Low profile	Low profile	Low profile	Low profile
Controller chip	LSI SAS3508	SmartROC 3100 PM8204	LSI SAS3516	SmartROC 3100 PM8236
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	8	8	16	16
Port connectors	Two Mini-SAS HD x4 (SFF-8643)	Two Mini-SAS HD x4 (SFF-8643)	Two Mini-SAS HD x4 (SFF-8643)	Two Mini-SAS HD x4 (SFF-8643)
Drive interface	SAS, SATA	SAS, SATA	SAS, SATA	SAS, SATA
Drive type	HDD, SED*, SSD	HDD, SSD	HDD, SED*, SSD	HDD, SSD
Hot-swap drives	Yes	Yes	Yes	Yes
Max devices	8	8	16	16
RAID levels	0, 1, 10, 5, 50, 6, 60	0, 1, 10, 5, 50, 6, 60, 1 Triple, 10 Triple	0, 1, 10, 5, 50, 6, 60	0, 1, 10, 5, 50, 6, 60, 1 Triple, 10 Triple
JBOD drive state	Yes	Yes	Yes	Yes
Cache	2GB	2GB	4GB	4GB
SuperCap protection	Yes	Yes	Yes	Yes
Battery or SuperCap	SuperCap	SuperCap	SuperCap	SuperCap
IOPS performance (4K random read)	1.5M	1.5M	1.7M	1.7M

*SED support is achieved by using software on the server (SED commands are passed through the HBA to the drives).

New Lenovo RAID adapter special features

The new Lenovo RAID adapters have the following special features not available with current ThinkSystem 430-530-730-930 Series adapters:

- Support for SSD Caching (RAID 9350 Series adapters)
 - maxCache 4.0 SSD Caching
- Support for triple mirror, RAID1 Triple, and RAID10 Triple (RAID 9350 Series adapters)
- Mixed Mode support
- One driver and firmware used for both RAID and HBAs
- Different RAID volume management architecture
 - No concept of foreign configurations or virtual drives (VDs) – The RAID configuration is automatically “import”
- Different hardware and software user guides
- Different SuperCap and SuperCap cables
- Different PCIe brackets

SSD caching – maxCache

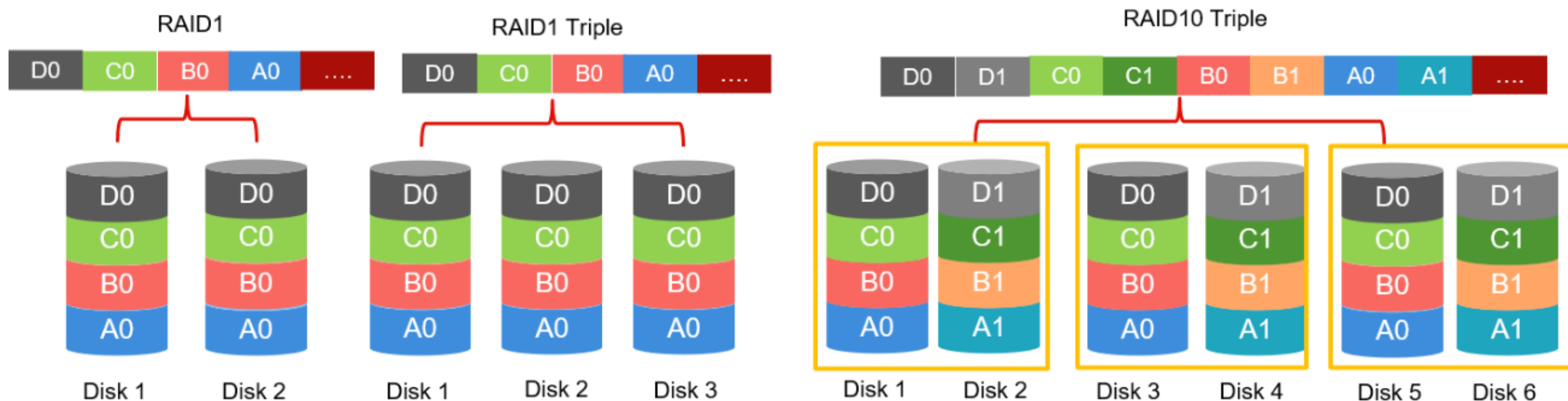
ThinkSystem RAID 9350 Series adapters support a form of SSD caching called maxCache 4.0 SSD Caching. The RAID 930 Series do not support Broadcom's (BRCM) SSD caching variant ("CacheCade" in BRCM terms).

This feature accelerates HDD-based RAID arrays and logical drives, advancing the performance capabilities for a broader set of application workloads. RAID 9350 Series adapters support read- and write-back caching. By caching writes to a redundant SSD cache pool, maxCache 4.0 leverages the performance and latency capabilities of SSD technology for both read and write workloads. Read performance is also improved by caching frequently accessed data on the SSD tier with additional optimizations through the learned-path algorithm, which leverages the aggregate performance of all available storage devices. Refer to the [maccha 4.0 SSD Read and Write Caching Solutions – White paper](#) from Microchip for more information.

On 9350 Series adapters, write cache (write-back and write-through) policy and I/O bypass ("FastPath" in BRCM terms) are only enabled for maxCache on logical drives. On 930 Series adapters, these functions are available on all types of drives.

RAID1 Triple and RAID10 Triple

ThinkSystem RAID 9350 Series adapters support RAID1 Triple and RAID10 Triple – also known as Advanced Data Mirroring (ADM). This feature allows users to create mirrored RAID sets using three identical hard drives, which provides users with a second live spare for RAID 1 or RAID 10 configurations. This allows users to rebuild a failed drive in a RAID 1 or RAID 10 set without the array entering a degraded state.



Connector mode support

The connector mode setting configures controller connectors for different operating modes:

- Mixed mode: Allows devices connected to the same adapter to be simultaneously used in RAID protected logical drives and HBA accessed physical drives
- HBA mode: Support for the JBOD drive state only (non-RAID, called “raw” or “HBA mode” in Adaptec parlance) – exposes physical drives to the operating system
- RAID mode: All the controller’s RAID functions are enabled for the connector. This exposes only RAID volumes to the operating system
 - Support for RAID 0, 1, 10, 5, 50
 - RAID 6, 60, RAID1 Triple, and RAID10 Triple are for the RAID 9350 Series only

By default, RAID card configurations are set to Mixed mode rather than RAID mode. This is for consistency across the portfolio, and it allows clients to use drives both in a RAID volume or as HBA drives immediately out of the box.

Setting the controller to HBA, RAID, or Mixed mode will force that configuration onto all the connectors. It is also possible to individually set the mode of each port.

Note: The HBA drive state on the new Lenovo RAID/HBA adapters is similar to the JBOD drive state on ThinkSystem storage adapters and does NOT refer to a kind of external storage.

One driver and firmware used for both RAID and HBAs

All ThinkSystem 4350, 5350, and 9350 storage adapters use the same drivers and firmware. There aren't separate HBA drivers for HBA adapters and RAID drivers for RAID adapters.

Package naming scheme:

- Driver : `Invgy_dd_storehba_smartpqi-XX.XX.XX.XX-`
- Firmware : `Invgy_fw_storehba_smartpqi.350-XX.XX.XX.XX-`
- OS CLI : `Invgy_utl_storehba_smartpqi.arccconf-XX.XX.XX.XX-`
- OS GUI* : `Invgy_utl_storehba_smartpqi.storman-XX.XX.XX.XX-`
- OS Event monitor: `Invgy_utl_storehba_smartpqi.eventmonitor-XX.XX.XX.XX-`

* The full name of the OS GUI is MaxView Storage Manager, but do not abbreviate this to MSM as the ThinkSystem storage adapter utility MegaRAID Storage Manager (MSM) already uses this abbreviation. MaxView Storage Manager is browser-based software that helps users to view, monitor, and configure all the storage in a system built on new Lenovo RAID/HBA adapters. Refer to the [maxView Storage Manager User Guide](#) for detailed information.

