PRODUCT BRIEF
Intel® Raid Expanders

A Better Alternative to High Port Count RAID Adapters

Explore Intel® RAID Expander Boards

Expander boards allow for a more cost effective and flexible architecture to expand RAID arrays without sacrificing performance

What is an Expander Board?

Servers with more than 8 drives typically include either a high port count RAID add-in card, or a standard RAID adapter and an expander. Both of these options provide increased connectivity for internal drives. Yet an expander board is often much more affordable than a high port count RAID card, while allowing flexibility in the solution architecture.

An expander board is basically a "switch" that manages inputs from more than 8 target devices, allowing all of these devices to communicate with a 4 or 8 port SAS or RAID initiator device simultaneously. It often provides 24 or 36 ports, which enable the connection of between 20 to 32 directly attached SAS or Serial ATA (SATA) devices; plus one SAS or RAID adapter card.

While a common misconception is that expanders reduce performance, the opposite is true; expander boards enable a RAID controller to achieve optimal performance. To confirm this, just check any RAID performance whitepaper. It will show that one or more expanders are included in the tested configuration. For example, Intel's RAID Controller RS3DC080 achieved its maximum throughput of near 6000MB/s when connected to a large number of hard-disk drives through an expander[1].

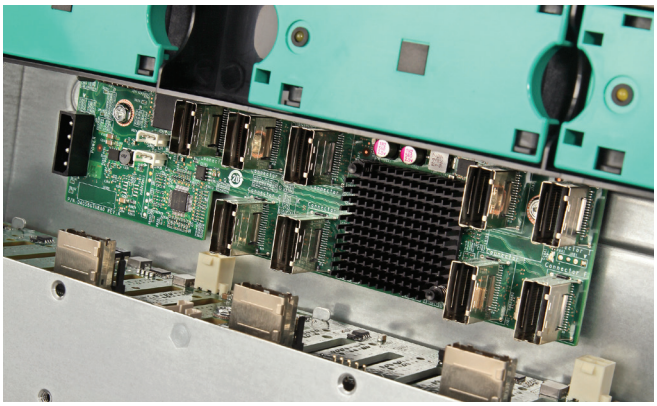
Expander boards can be designed with a narrow form factor design, that can be mounted on a chassis wall or duct. Power is obtained by using a power cable with a standard 4-pin power connector. Some expanders include PCIe "fingers" so that they can be mounted in a standard PCIe slot and obtain power from this slot.

What are the Top Five Key Benefits of Expander Boards?

1. Cost Savings	One of the key benefits of expander boards is cost savings since they provide the ability to save hundreds of dollars compared to a high port count RAID card.
2. Flexibility	Expander boards also provide high flexibility by allowing systems to scale from 4 to 24 or more drives with the only change in hardware being the expander.
3. Reliability	Since high port count RAID cards can get very hot, they often require extra attention to cool properly. A separate expander board reduces the power required by the RAID card. Also, the expander can be mounted in a location that does not create thermal challenges.
4. Choice	Expander boards offer the choice to use the SAS or SAS RAID card desired.
5. Scalability	Expander boards offer room to grow. Expanders can be added when needed and they don't need to be replaced even if a RAID card is upgraded.

Suggested Uses of Expander Boards

Intel® RAID Expander RES2CV360



- Shown in a 2U Intel Server System with a 2.5" drive backplane
- Includes 6 short cables for connection to the drive backplane

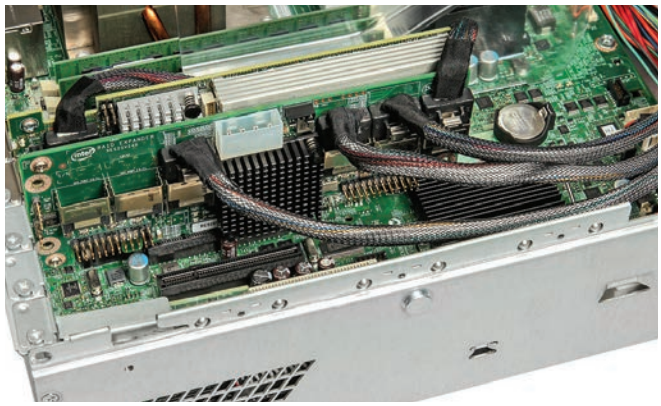
For Installation as a Mid-Plane

Intel's 2U Rack Server Systems for 2.5" drives include a mounting location specifically for the Intel RES2CV360. The standard model (see order table on page 4) includes short cables sized to connect to the backplane within the Intel systems.

The Intel® RAID Expander RES2CV360, powered by LSI® technology, provides a cost effective alternative to a high port count RAID card. It allows the connection of up to 32 directly attached SAS or Serial ATA (SATA) devices and provides table routing to support connections for up to 1024 SAS addresses.

Organizations can benefit from excellent performance, inside-the-box design flexibility, scalability and more for storage solutions with more than 8 drives. Plus, the Intel RAID Expander RES2CV360 provides exceptional quality and support. It has been thoroughly tested with Intel's SAS-2 RAID product line to ensure ease of deployment and is backed by a three-year warranty. (Extended five-year warranty also available.)

Intel® RAID Expander RES2SV240



- Shown in an 2U Intel Server System installed in a PCIe slot (for power)
- Includes cables with high-bend radius capability for 2U use

For Installation in a PCIe Slot

The Intel® RAID Expander RES2SV240 is a 24 port expander card that offers ultimate flexibility for architecting a high drive count (greater than 8 drive) storage solution in any sized system. The low profile height enables simple installation into a 1U or 2U system with a low profile chassis cutout. In addition, the MD2-compliant depth (6.6") fits in motherboards with heat-sinks that would interfere with longer add-in cards.

Furthermore, the standard SKU of the Intel RES2SV240 (see order table on page 4) includes 6 cables which are designed for very tight bends typical of a 2U form factor system. In cases where an add-in slot is not available, the Intel RAID Expander Card RES2SV240 can also be mounted to a chassis wall or air-duct if desired.

The RES2SV240 can be cascaded to accommodate as many drives as the associated SAS/RAID card allows with table routing for up to 1024 SAS connections. Furthermore, the RES2SV240 supports usability functions such as discovery and enclosure management.

Next Generation SAS 3.0 12Gbps Expanders

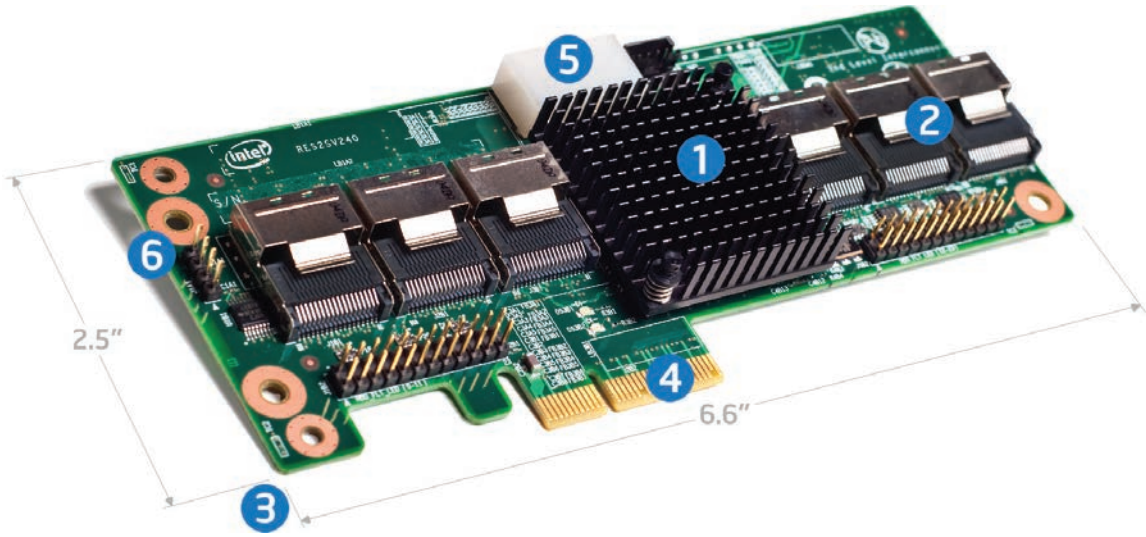
Intel is anticipating the launch of our first set of the 12Gb/s expanders in Q2 2014[2]. These new expanders allow for third generation SAS throughput performance, while protecting the investment in first and second generation SAS storage. Bandwidth aggregation is a unique performance acceleration feature designed to allow users to take advantage of 12Gb/s speeds while using existing 6Gb/s drive infrastructure.

- Deliver up to a 2x increase in throughput performance for 6Gb/s systems
- Intelligently buffer data and transfer it to drives at speeds that match the performance of the host with slower SAS or SATA end devices (i.e. aggregate bandwidth from 6gb/s and 3Gb/s end devices to a 12Gb/s data stream)
- Support 12Gb/s, 6Gb/s and 3Gb/s hard disk or solid state drives
- Compatibility with the 12Gb/s SAS T10 specification

Anatomy of an Expander Board

Intel® RAID Expander RES2SV240 Key Features:

1. LSI® SAS2x24 SAS/SATA Expander to enable communications with 24-ports at 3 or 6Gb/s
2. Six SFF8087 SAS/SATA connectors for attaching up to 24 targets or initiators
3. Low profile, MD2 depth for use in low profile slots and motherboards with add-in card depth constraints
4. PCIe x4 connector with power pins to mount and power for a PCIe slot (if desired)
5. RA 4 pin power connector to power from a cable (if desired)
6. Mounting holes for attaching to a chassis or duct wall (if desired)



Ordering Information for Intel® RAID Expanders

Intel Order Codes	RES2SV240	RES2CV360	RES2CV240	RES3FV288	RES3TV360
SAS Generation	2.0	2.0	2.0	3.0	3.0
Number of Ports	24 ports	36 ports	24 ports	28 internal ports and 8 external ports	36 ports
Form Factor	Low Profile MD2	mid-plane board	mid-plane board	Low Profile MD2	mid-plane board
PCIe x1 Power	Yes	No	No	Yes	No
4-Pin Power	Yes	Yes	Yes	Yes	Yes
Availability	Now Available	Now Available	Now Available	Q2 2014[2]	Q2 2014[2]

Choose the right expander for your high drive count solution today. Visit www.intel.com/go/RAID

1 - Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing.

2 - The information within including product launch dates is subject to change without notice. Do not finalize a design with this information.

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