

# SAS Card for People

## ■ SAS controllers

HighPoint RocketRAID  
2640X4 and RocketRAID  
2642

■ Manufacturer:  
HighPoint Technologies  
■ Website:  
[www.highpoint-tech.com](http://www.highpoint-tech.com)

Interface Serial ATA 3 Gb / s, it might firmly entrenched in the users' computers and its' position is unshaken. Nevertheless, advanced users who work by PC and work station for enough serious problems, all pay more attention to his elder brother—interface Serial Attached SCSI (SAS), which at a rate of 3 Gb/s can provide much more opportunities and provide sequence of significant work more reliable. Fortunately, the SAS controllers can connect not only expensive SAS-drives, but also more affordable SATA-drives, including Enterprise series with high reliability.

Tendency of SAS to the people (especially this interface has been given exceptional professionals) confirms the appearance of desktop (by positioning the manufacturer) motherboards, where there seats 2\_ports SAS RAID(see: H'n'S. 2009. № 6. C. 38 or [www.hardnsoft.ru/?trID=73&artID=8044](http://www.hardnsoft.ru/?trID=73&artID=8044)). True, the "mother board" with such controller is more costly, but implementation of on-board is not quite optimal - in fact, after all, the SAS chip connects by the bus PCI Express x1 from the "mother" desktop SAS system chipset., which even has lower bandwidth than single port SAS (2,5 Gbit / s to 3). Therefore, the real rate of streaming data for such SAS is around 200MB / s against for example, 260 for "honest" condition. The performance of a single SAS/SATA-disk is not strong, so RAID\_array certainly be retarding.

However, the market already existed a lot of cheap SAS controllers in PCI Express x4, which could save cost on "motherboard" (taking the cheaper model without the integrated SAS), but get full speed for 1 to 3 SAS drives (4 SAS/SATA interface while working simultaneously. Yet set in the bandwidth of PCIe x4).

Moreover, there are in the market there are cheaper SAS\_card, PCIe x1, similar in speed (and chip) . But because due to few materials, we decided to compare the basic features of the simplest SAS\_solution which is PCIe x4 and PCIe x1.

We use ASUS P6T Deluxe motherboard (see link above) with onboard SAS which is Marvell 88SE6320 chip (PCIex1, it is similar exists in the form of individual PCIe card from different vendor). As well as a pair of individual 4 ports SAS RAID controller (Marvell 88SE6445 chip, PCIe x4) from famous company HighPoint Technologies. From our opinion, they provide very interesting and wide specter not expensive SAS controller.

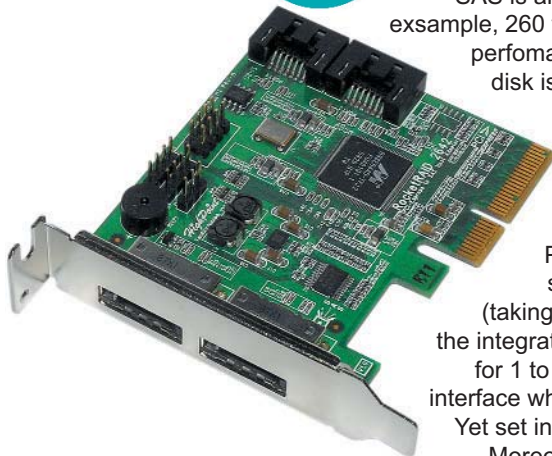
HighPoint RocketRAID 2640x1 and RocketRAID 2642 SAS controllers belongs to Value RAID PCIe1.0 series. (Entry level SAS) Meaning of symbols, pair of RR26xx is saying for classic controllers, there are six models in the series. The third number represents the total quantity of SAS port (4 or 8), and 1,2 or 4 in the last number means the external SAS ports. For model RR2640(i.e. with 4 internal ports) which has two differences – with X4 or X1 in the end, which means bus of PCI Express. But RR2640X4 is observed to be used for mode x1 and jumper J5 switching the type for mode PCIe x4 (default) and on PCIx1 (for open PCIe x1 slot using, there are some motherboards don't have PCIe x4 slot). And we tested this controller in both modes.

Controller RR264x adapted low profile which is benefit for using in the narrow chassis. In the kit includes "bracket" for both type, cable-adapter SATA in SAS with power supplier from Molex-connector, CD with software and complete user manual . Product is supported for Windows 2000/XP/2003/2008/Vista/7, includes 64bit, as well as different Linux version, Mac OS X and FreeBSD. Management RAID through BIOS, and also web-interface and special software.

For disk provided "hot" connection/ disconnection, 64bit LBA-access supports partition larger then 2TB, supports NCQ, on the board has "tweeter" and connector for LED to show activity or disk failure. Also support SMTP-protocol for e-mail alert, OCE (Online Capacity Expansion) and ORLM (Online RAID Level Migration), has auto rebuild array. Controllers are supplied by the voltage 3.3. In the PCI Express and consume no more than 5 watts. Working temperature +5 ... +55 ° C. Claimed time MTBF- 920 585 hours. Other characteristic list in the table.



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■ Chip Marvell88SE6445 for four ports  
Serial Attached SCSI on bus PCI-  
Express x4.

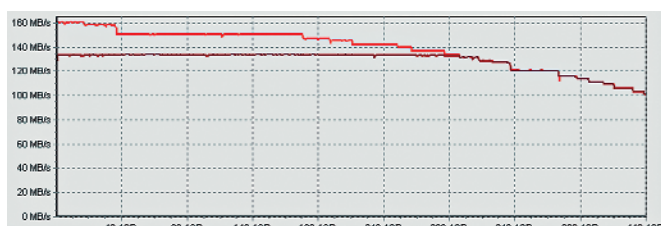
Except the strangeness of RR2640X4 on the motherboard ASUS P6T Deluxe: when M/B connected to PCIe lane Northbridge Intel X58 (they are known to support the version 2.0 interface), the controller performs in some tests significantly decreased-- When the controller is demonstrated in the mode of PCIe x1(although the interface speed at the same time does not fall). But while connecting to PCIe x4 south bridge ICH10R (they belong to the previous version 1.0 interface), the performance of RR2640X4 is identical with RR2642.

By the way, the effect in the last data doesn't been observed, and the board for any connection works at the maximum speed. Also there was no problems if work with RR2640X4 PCIe\_lane Northbridge chipset Intel P45, which also have a version 2.0 interface. In addition, we emphasize that if the arrays RAID 0, 1 and 10. Performance of these controllers is quite decent, but as RAID 5 due to software raid the performance won't better then hardware RAID controller whcih with onboard cache. However, detailed testing of different RAID levels with these controllers, we will postpone in next testing. But in this publication are comparable to the basic rate of various SAS solution entrylevel, as stated in this article. For this testing, we took use highly productive(15 000 rpm, buffer 16 MB) SAS disk Hitachi Ultrastar 15K450 HUS154545VLS-300 which is the latest (at the time of testing) generation (linear speed of up to 160 MB /s), as well as processor Intel Corei7\_920, 2GB DDR3\_1066 and video card AMD Radeon HD 4550. We had a lot of different tests in Intel Iometer, Intel NASPT, Frturemark PCMark and etc., but in the table and figure, only show the most significant result.

As you can see, even in the case one of the high performance SAS disk, controller on PClex1 unable to unleash the potential full speed of the drive-- the speed of HD Tach 3 Burst Speed on the interface of SAS «cut oneself » from 265 MB / s to 200, sequential write speed of disk limited to more conservative to 130MB/s. All of these adversely affect the performance of caching disk data buffer, which results in its backlog of real applications to the case of full connectivity SAS\_controller PCIe x4. In PClex1 mode, both onboard RAID and independent card are performs deplorably.

### SAS-Controller HighPoint RocketRAID 2640X4 and RocketRAID 2642: only facts.

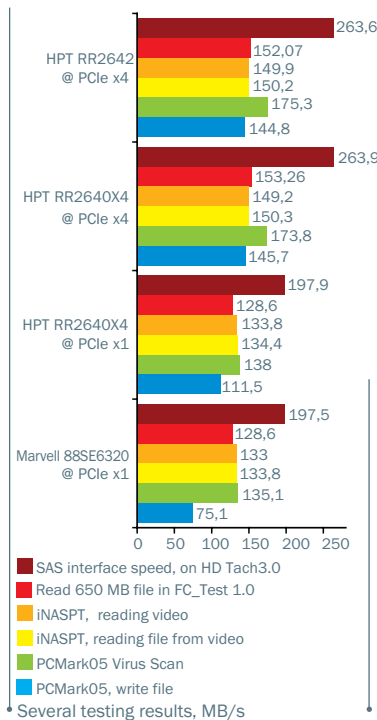
Controller model	RocketRAID 2640X4	RocketRAID 2642
Controller chip	Marvell 88SE6445	
Support Bus	PCI Express x4 and x1	PCI Express x4
Disk interface	4 internal port SAS/SATA 3 Gb/s	2 internal and 2 external ports SAS/SATA 3 Gb/s
Controllers type	SATA	SATA и eSATA
RAID -array Level	0, 1, 5, 10 and JBOD	
Dimensions, mm	88 x 64	79 x 68
Approximate price*, rub.	7000	7000



The figure line for write speed on disk Hitachi HUS154545VLS300 through SAS controller connection on bus PCIe x4(red) and PCIe x1(claret)

### Controller testing result SAS- Controller

Controller model and Bus Type	HPT RR2642 @ PCIe x4	HPT RR2640X4 @ PCIe x4	HPT RR2640X4 @ PCIe x1	Marvell 88SE6320 @ PCIe x1
Everest 5.0 Average Read Access, мс	5,93	5,94	5,97	5,97
Everest 5.0 Average Write Access, мс	2,95	2,93	2,92	2,98
Everest 5.0 Buffered Read, Mbit/s	226,8	226,1	177,2	173,2
Everest 5.0 Buffered Write, Mbit/s	124,6	124,6	124,7	123,8
HD Tach 3 Burst Speed, Mbit/s	263,6	263,9	197,9	197,5
HD Tach 3 Average Lin. Read, Mbit/s	138,7	138,7	138,7	138,6
HD Tach 3 Average Lin. Write, Mbit/s	138,4	138,4	128,6	126,3
HD Tune 1MB Random Reads, Mbit/s	70,5	70,7	65,3	54,8
HD Tune 1MB Random Writes, Mbit/s	70,08	69,8	69,3	65,6
FC-Test 1.0 Read 1x650MB, Мбайт/с	152,07	153,26	128,6	128,6
FC-Test 1.0 Read 1000x650KB, Мбайт/с	76,05	73,8	57,63	57,06
H2BenchW App Index, Mb/s	23,9	23,9	23,8	23,7
Iometer, Database 8K, QD=64, Mb/s	2,87	2,88	2,92	3,02
Iometer, File Server, QD=64, Mb/s	3,90	3,89	3,90	4,22
Iometer, Web Server, QD=64, Mb/s	5,28	5,17	5,17	6,03
Intel NASPT (Average of 5 runs)	64,33	64,14	59,12	46,23
HD Video Playback, Mb/s	149,9	149,2	133,8	133
2x HD Playback, Mb/s	71,6	71,1	68,2	53,8
4x HD Playback, Mb/s	87,0	87,8	86,8	65
HD Video Record, Mb/s	119,4	118,6	84,3	85
HD Playback and Record, Mb/s	89,2	90,9	127,7	44,8
Content Creation, Mb/s	8,1	8,20	7,8	5,9
Office Productivity, Mb/s	56,1	56,6	53,9	47,7
File copy to NAS, Mb/s	111,7	105,8	71,2	63
File copy from NAS, Mb/s	150,2	150,3	134,4	133,8
Dir copy to NAS, Mb/s	27,2	26,9	26,1	11,1
Dir copy from NAS, Mb/s	60,3	60	54,4	56,5
Photo Album, Mb/s	40,4	40,5	37,4	36,2
<b>PCMark Vantage 64-bit, HDD tests</b>	<b>25,39</b>	<b>26,02</b>	<b>25,40</b>	<b>24,38</b>
Windows Defender, Mb/s	29,3	29,9	29,4	29,64
Gaming, Mb/s	23,6	24,1	24,07	23,22
Windows Photo Gallery, Mb/s	64,9	70,05	63,2	53,83
Vista Startup, Mb/s	26,8	26,2	26,94	26,9
Windows Movie Maker, Mb/s	31,3	32,9	30,71	31,17
Windows Media Center, Mbit/s	55,0	59,5	55,77	53,94
Windows Media Player, Mbit/s	11,2	11	11,2	10,75
Application Loading, Mbit/s	7,5	7,37	7,49	6,93
PCMark05, HDD tests	9650	9640	8670	7850
XP Startup, Mbit/s	15,2	15,2	15,1	14,9
Application Loading, Mbit/s	10,7	10,7	10,6	10,3
General Usage, Mbit/s	8,4	8,4	8,3	8
Virus Scan, Mbit/s	175,3	173,8	138	135,1
File Write, Mbit/s	144,8	145,7	111,5	75,1
Average performance	52,7	52,6	49,6	48,1



Therefore, for single disk is preferable using SAS controller in PCI Express x4, among these are recommended not expensive RAID model HighPoint RR2640x4 and RR2642—in our opinion it is the best choice base on value (price/quality).

