

# WHITE PAPER

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## Modern RAID Technologies with Growing Data Stocks

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## Rebuild Time on Traditional RAID Too Long?

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### Performance Impact and Risk of Disk Failure during Rebuild

The rebuild process consumes system resources, reducing the overall performance of the application system about 50% to 70%. If users restrict the rebuild priority, the rebuild time will be even longer to slow down the overall operations. Most important of all, during time-consuming rebuilding, a large number of access operations could cause the failure of other disk drives in the pool, dramatically increasing the probability of disk failure and the risk of data loss. In a company, downtime means money. Downtime caused by data loss can adversely impact the company's productivity and profitability. An hour of disruption can cost a small company USD \$8,000, a medium company USD\$74,000, and larger enterprises roughly USD \$700,000<sup>1</sup>.

## Solutions to Reduce Rebuild Time

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To reduce the rebuild time, 2CRSI offers Fast Rebuild and RAID EE technologies.

### Fast Rebuild

When executing rebuild, the Fast Rebuild feature skips any partition of the volume where no write changes have occurred, it will focus only on the parts that have changed. This mechanism may reduce the amount of time needed for the rebuild task.

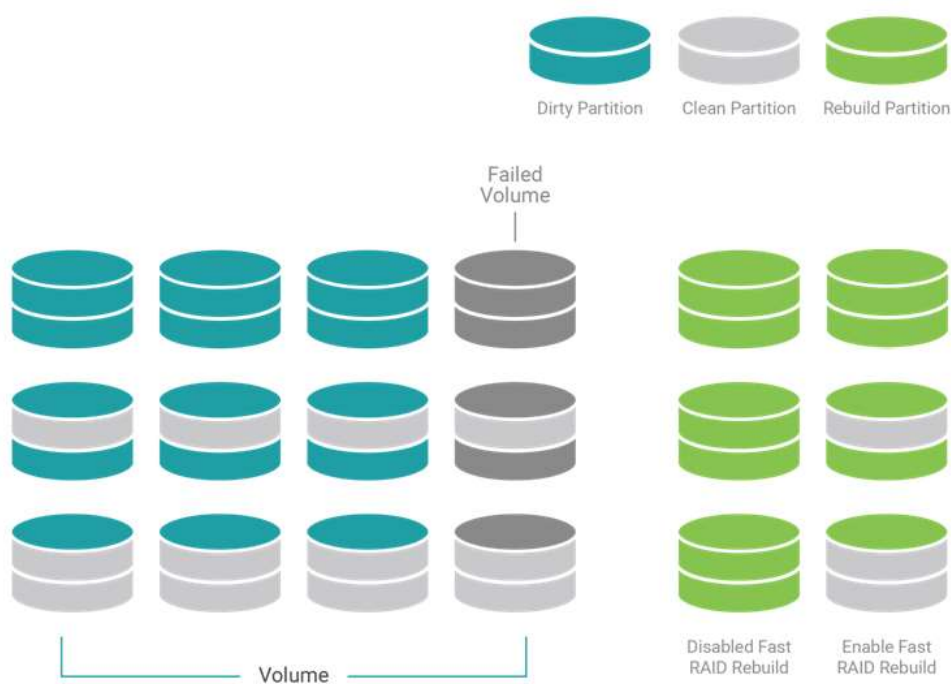


Figure 1 Fast Rebuild

From the test result of Fast Rebuild, the build time can be saved depending on the capacity used. The less capacity used, the faster the build. It is showing linear growth.

Table 1 The Test Result of Fast Rebuild

Capacity	Usage	Disable Fast Rebuild	Enable Fast Rebuild	Improved
1TB	250GB	52'20"	13'42"	382%
1TB	500GB	52'18"	25'26"	206%
1TB	750GB	52'32"	38'36"	135%

## RAID EE, also called RAID 2.0

RAID EE adds more spare disks in a disk group, we call them **RAID EE spares** to separate the original global, local, and dedicated spares. Spare areas are preserved in each stripe of the disk group and are distributed in the disk group by means of disk rotation. When disks have failed in the disk group, missing data is rebuilt into the preserved spare areas. Since all disks in the set are destination of rebuilt data, the bottleneck of traditional RAID rebuild is gone, rebuild performance dramatically improved. If new disks are added in, data in spare areas are copied back to new joined disks.

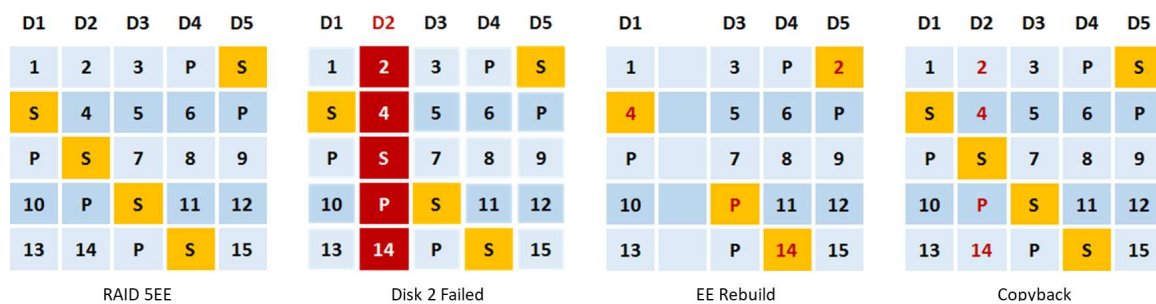


Figure 2 Example of RAID 5EE with 1 RAID EE spare

Based on the test results, we have some conclusions. The more RAID EE spare disks are used, the less rebuild time is. In the best case, RAID EE can improve rebuild time by up to **96%** and average around 60% to 90%.

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## Conclusion

As drive capacity grows and the launch of higher density storage system the RAID rebuild time has been growing exponentially in past decades and such growth will never stop. It will be always exciting to hear new technologies and learn how they can maximize your investment on the storage. However, “back to basics” to emphasize how the valuable data will be well-protected without loss and downtime should be always the core when planning the storage. While calculating the TCO of your storage procurement, the impact of the RAID rebuild time should not be ignored. The smarter way implemented by 2CRSI combining Fast Rebuild and RAID EE technologies will greatly reduce the rebuild time to mitigate the risk of downtime and data loss.