Technical Brief

How Are EonStor High-Performance iSCSI Storage Systems Qualified as Tier-1 Storage

Abstract

This document describes how EonStor® high-performance iSCSI arrays can serve as tier-1 storage in terms of performance, scalability and availability.

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Networked Storage Solution Provider

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Market Trend for IP SAN

Since the x86 architecture was widely adopted in 1980s, IT environments have become quite distributed. They often consist of multiple servers, each with its individual Direct-Attached Storage (DAS). The inherent limitations of this structure lead to many cost and service challenges, such as low capacity utilization rate, insufficient scalability, difficult maintenance, and etc. Faced with the continuing need for greater storage capacity and the complexity that traditionally accompanies such growth, many organizations decide to implement Storage Area Network (SAN).

Sharing storage among multiple servers in SAN enhances deployment flexibility, reduces maintenance efforts, improves resource utilization, and thus decreases overall costs. However, before the emergence of IP SAN in 2004, data consolidation through the SAN technology was a privilege for only large enterprises. A Fibre switch priced 10,000 US dollars, a Fibre HBA costing 1,000 US dollars, and the complicated maintenance tasks – budget concerns and expertise shortage are two main factors that have made companies of smaller scale hang back from FC SAN. IP SAN is widely known as a poor man's SAN because it leverages the current investment on Gigabit Ethernet network structure. The hardware components require only one-third the price of their FC counterparts and no additional maintenance training is necessary for the IT personnel. When the 10 GbE technology is coming to rescue iSCSI from bandwidth scarcity, iSCSI becomes an even more attractive resort to the companies which want to enjoy SAN benefits with limited budget.

Infortrend Participates in the Trend

Anticipating the promising future of iSCSI, Infortrend released the industry's first iSCSI to SATA-II external RAID subsystem, A12E-G2121, in 2004 and later announced a performance-enhanced 3U model, A16E-G2130, in 2006. Many recent researches conducted on the adoption of IP SAN in company's IT environment prove that Infortrend has taken the right step toward the right direction. An in-depth end-user survey conducted by Peripheral Concepts[1] in 2007 shows that 37% of the 5,000 respondents have implemented an iSCSI SAN, compared to less than 20% a year ago. An IDC report forecasts that in 2010, the revenue for iSCSI will reach 5 billions, and the terabyte of data stored will come close to 4,000. Probing into the nuance of these adoption

[1] Peripheral Concepts, INC. is company specializing in market research and consulting in the industries related to Computer Mass Storage and Storage Management.

cases, researchers further prove that iSCSI is not only prevalent, but prevalent in various applications and tiers. Another survey conducted by Peripheral Concepts finds that iSCSI penetrates almost all kinds of applications, including financial, database, office, web applications, scientific, rich media, and engineering data. The results of this survey represent the situation of SMBs since most of the respondents (about 90 percent) come from the sites whose storage capacity ranges between 1TB and 200TB. To know more about how iSCSI arrays are used in enterprise environment, we have to turn to another research done by ESG, where 61% of the respondents come from enterprises (with employees ranging between 1,000 and 20,000 or more). This research shows that most of the respondents use their iSCSI arrays for file data (74%), database data (64%) and email (50%) storage; moreover, about half of them use the arrays as fist-tier, business-critical storage. In an Infostor article, “iSCSI goes beyond SMBs and Windows,” Ann Silverthorn claims that those enterprises having adopted iSCSI arrays and benefited from them are extending use of the technology to mission-critical applications. To meet the requirements of tier-1 storage, Infortrend knows that its iSCSI arrays need to evolve. In 2008, it launches the new-generation high-performance iSCSI-to-SAS/SATA arrays, the S16E and S12E series. In the following paragraphs, we will illustrate how these high-performance arrays qualify for the first tier storage in terms of performance, scalability and availability.

High-performance EonStor iSCSI Storage Systems as Tier-1 Storage

Performance

When users choose suitable tier-1 storage, performance is an indispensable concern. Surveying through the market, we find that most of the iSCSI RAID arrays provide two GbE ports on each controller and few provide three. Infortrend’s EonStor high-performance iSCSI arrays distinguish themselves by providing four channels on each controller. When data of larger size are transferred, the wider the bandwidth is, the less likely it would become the bottleneck of IOPS performance. Broadened bandwidth, multi-channel processing and high-speed SAS drives – only if network traffic is not overloaded, the IOPS performance of the high-performance iSCSI arrays in random IO environment can match even that of Fibre-host arrays, which are often taken as the representative choice for the first tier storage. According to our internal tests on the 3U, redundant model, S16E-R1130, when the bandwidth of four host channels is combined to reach the total bandwidth of 4G,

the performance can reach:

(RAID5 End-to-End / Random IO)

I/O Parameters (Random)		**WB** (IOPS) **W/ Cache Sync.**	
Host Channels	**I/O Size**	**Read**	**Write**
Four Channel	512 Bytes	6267.31	2853.61
	4K Bytes	5915.51	2745.27

In the extreme case when users need the best possible IOPS performance for their application, the performance delivered through the eight host channels can reach:

(RAID5 End-to-End / Random IO)

Eight Channel	512 Bytes	12781.22	5173.06
	4K Bytes	12382.56	4799.20

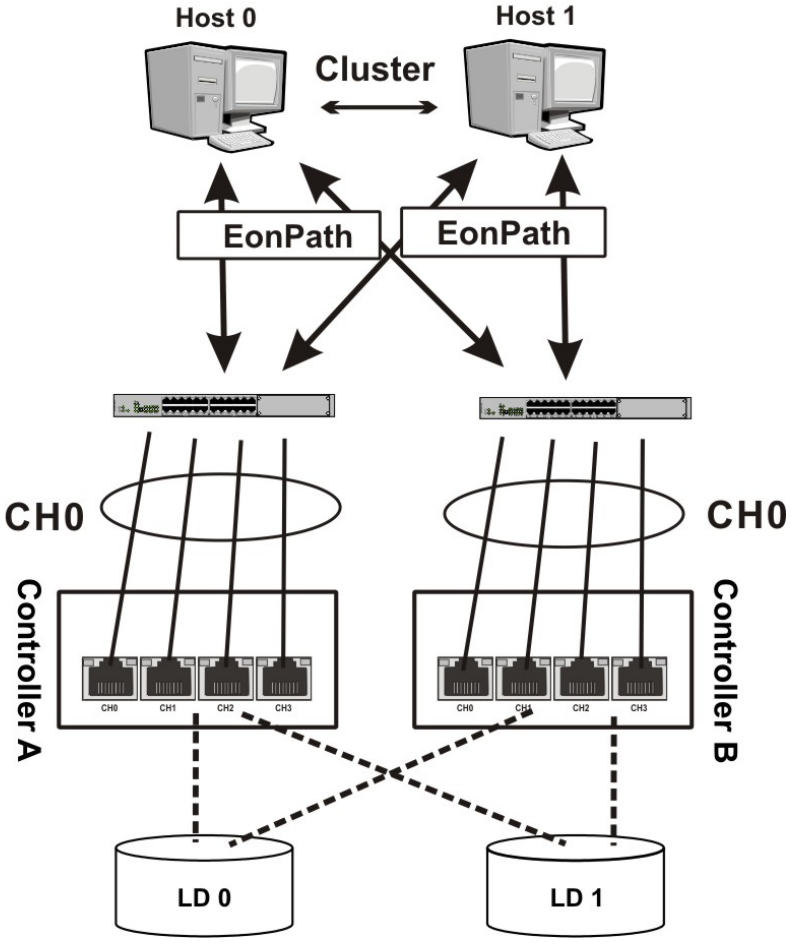
Scalability

Most iSCSI subsystems on the market provide the maximum capacity of 30 to 40 TB. Infortrend's high-performance iSCSI arrays beat them by almost doubling the maximum capacity. Through the SAS expansion port, the single controller model can connect to up to four JBODs, while the redundant controller model can connect up to three JBODs. Take the S16E series as example, capacity of the single-controller S16E-1130 can be expanded up to 80TB, while that of the redundant-controller S16E-R1130 can be expanded up to 64TB, using 1TB SATA drives. The remarkable scaling ability allows users to start with the capacity they currently need and scale for more capacity when future needs arise. Take surveillance as example, which is one of the applications IP SAN most often applied to. According to the data listed by ACti, a leading company in IP surveillance, one CCTV recording video with D1 resolution, at 30 frame rate and 1.5M bit rate can consume more than 16G of capacity for 1-day time frame. If users have 100 cameras connected to the same storage, the rapidly-accumulated data amount can easily overwhelm the storage devices without enough scalability in less than a month. The capacity shortage problem will take users additional time and cost to solve and thus lead to rising TCO. In this sense, a highly scalable subsystem as S16E means

not only worry-free capacity provider but better ROI.

Availability

The redundant hardware design of EonStor high-performance iSCSI arrays combined with Infortrend's multipathing and snapshot technology can contribute to a highly available configuration. To take both availability and performance into consideration, we recommend the following configuration for the redundant controller model:



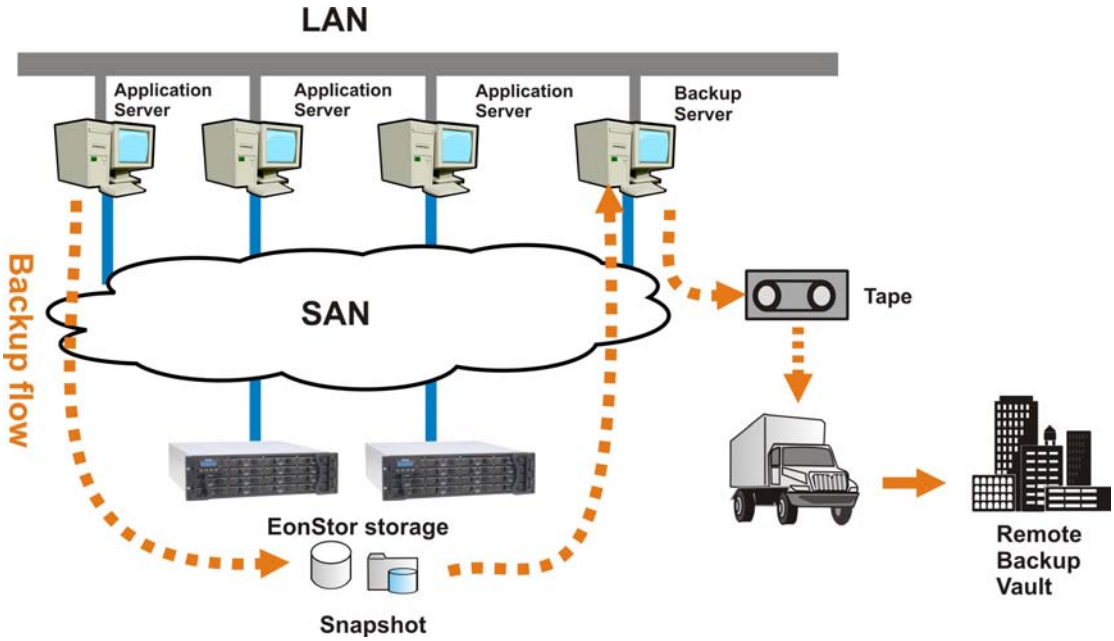
The high performance of four channels combined in random IO environment has been listed above. The high-performance arrays are also capable of delivering outstanding performance with sequential IOs. Below is the performance data of S16E-R1130.

(RAID5 End-to-End / Sequential IO)

I/O Parameters		**WB** (IOPS) **W/ Cache Sync.**	
Host Channels	**I/O Size**	**Read**	**Write**
Four Channel	512 Bytes	79399.26	33691.56
	4K Bytes	59098.26	21653.85

In this suggested configuration, no single point of failure would lead to system downtime. Bearing the fault-tolerant hardware design, the high-performance iSCSI arrays can function normally even when one of the key hardware components (including controllers, PSUs, cooling modules and BBUs) in redundant pair fails. Moreover, Infortrend's multi-pathing driver, EonPath, enhances path availability between array and host. From array to host, whether it is array components, connection cables, switch, HBA/NIC or host server that fail(s), data transfer can still continue.

Besides making the data on IP SAN highly available, EonStor array also ensures data integrity through the snapshot functionality provided by Infortrend's proprietary management software suite, SANWatch.



Business-critical data in tier-1 storage can be copied to tier-2 storage for quick

backup and later moved to the tape when they are outdated but need to be retained for business or regulatory requirements. In Windows environment, SANWatch Snapshot has been integrated with backup software through VSS for easy backup and restore. To know detailed procedures, please refer to the related documentation on our website:
http://www.infortrend.com/main/3_support/appNote.asp

When the market trend suggests expanding iSCSI to the first tier application, Infortned has met harsh requirements with their high-performance iSCSI arrays. Leading-edge performance, best-of-class scalability and high availability designs – all these benefits make EonStor iSCSI arrays the most qualified choice for high-end storage on the market.