

Application Note



How does IP SAN Benefit SMB Storage Environments?

Abstract

This document describes how IP SAN allows SMBs to enjoy all SAN benefits but requires lower costs and less maintenance training than FC SAN. It also mentions two additional benefits - data protection and 10GbE technology - which make IP SAN an even more promising choice for SMBs. Infotrend's EonStor iSCSI arrays are ideal candidates for a cost-effective and reliable IP SAN solution.

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Networked Storage Solution Provider

Revision 1.0

Aug, 2008

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High availability, improved disk utilization, simplified management and efficient backup – these are widely-known Storage Area Network (SAN) benefits over Direct-Attached Storage (DAS). However, when SMBs want to migrate from DAS to SAN, they need to concern whether the migration is affordable both in terms of costs and technical expertise. The clash between needs and concerns drives the rise of IP SAN in SMB IT environments. IP SAN allows SMBs to enjoy all SAN benefits without requiring high costs and complex maintenance. Moreover, the comprehensive data protection features and the maturing 10GbE technology advance it from a viable to an indispensable choice for SMBs desiring to be competitive in the business world.

The Rise of IP SAN in SMB IT Environment

Many recent researches prove IP SAN's proliferation in company's IT environment. An in-depth end-user survey conducted by Peripheral Concepts¹ in 2007 shows that 37% of the 5,000 respondents have implemented an IP 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. According to another survey done by Peripheral Concepts, iSCSI is not only prevalent in SMBs, but penetrates almost all kinds of applications, including financial, database, office, web applications, scientific, rich media, and engineering data. The results of this survey can be taken as the general representation of the situation of SMBs since most of the respondents (about 90 percent) come from the sites whose storage capacity ranges between 1TB and 200TB.

When SAN Was Desirable But Unattainable

To understand why more and more SMBs adopt IP SAN, we need to probe into the problem it solves. When FC was the only choice of SAN protocol, the adoption of SAN meant a dilemma to SMBs. The SAN benefits were desirable, but the required costs and maintenance expertise made these benefits unattainable.

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 DAS. The inherent limitations of such structure lead to many cost and service challenges, such as low capacity utilization rate, insufficient

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

scalability, difficult maintenance, and etc. Seeing the continuing need for greater storage capacity and the complexity that traditionally accompanies such growth, many SMBs wish to implement SAN. As commonly known, sharing storage among multiple servers can enhance deployment flexibility, reduce maintenance efforts, improve resource utilization², better data availability and etc. However, the wish of SAN migration often failed to be realized when Fibre Channel had been the only SAN protocol choice. According to a 2007 survey by Baseline³, IT spending and maintenance costs are first two major IT challenges of SMBs. The survey result perfectly explains why SMBs are refrained from FC SAN. Theoretically, the DAS-to-SAN structure migration can enable better ROI. However, when SMBs evaluate the acquisition cost itself, a Fibre switch priced 10,000 US dollars and a Fibre HBA costing 1,000 US dollars can easily make them hang back.

Even if SMBs indeed squeeze their budget for an FC SAN, complicated maintenance tasks may follow to become their nightmare. Most SMBs have restricted IT manpower, to say nothing of technical personnel with FC expertise. Along with the implementation of FC SAN, they either have to train the current staff or hire new staff for the infrastructure administration. No matter which way they choose, the administration costs will continue to culminate after the necessary training is done or new employees are hired. If a typical company with 50TB storage adopts FC SAN, the storage administration fees for one year will cost more than 1.1 million US dollars. This amount is devastating to the budget already heavily consumed by hardware investment.

IP SAN, Cost-Effective Choice for Uncompromised Benefits

When the needs for SAN encounter the concerns over costly expenditure and expertise shortage, the clash draws back companies of smaller scale from FC SAN. SMBs failed to find a satisfactory resolution to this dilemma until the iSCSI specification confirmed by the Internet Engineering Task Force contributed to IP SAN in 2003. IP SAN is widely known as a poor man's SAN. It runs on the current Gigabit Ethernet (GbE) network infrastructures and therefore can greatly leverage the existing facilities. The major components of an IP SAN include: network, servers, iSCSI initiator drivers, NICs, GbE cables,

² According to a study by Merrill Lynch and McKinsey & Company, a typical DAS environment uses only about 50% of available disk space, while disk utilization in a SAN averages about 85 percent.

³ Baseline is a well-known magazine guide to costing, planning and managing next generation IT solutions.

How does IP SAN Benefit SMB Storage Environments?

Ethernet switches, and the storage with iSCSI host interface. Besides the storage, most of these components are readily available in SMBs. Even if they need to acquire additional devices, the hardware components require only one-third the price of their FC counterparts. IP SAN further extends the TCO benefits to soft costs. For the IT staff familiar with Ethernet technology, no extra training is necessary before they can handle administration tasks. Moreover, in the same company with 50TB storage, IP SAN will cost about 130 thousand less than FC SAN in terms of annual administrator cost. Enabling reduced implementation and maintenance costs, IP SAN makes SAN technology no longer a privilege for large enterprises.

Anticipating the promising future of iSCSI, Infortrend has continuously developed new EonStor iSCSI arrays since 2004. With fault-tolerant hardware designs and full RAID features, these arrays constitute high-availability IP SAN solution. EonStor iSCSI arrays also offer best-of-class scalability. Through the easy connection with JBODs, the capacity can be expanded up to 80TB, using 1TB SATA drives. The flexible SAS or SATA-II drive choice allows users to make the storage pool tiered, which further extends the cost benefits of IP SAN. The fast, reliable SAS drives can be used for critical data and IO-intensive applications, while the low cost-per-GB SATA drives are suitable for data archives and D2D (disk-to-disk) backup. In 2008, answering the market demand for an iSCSI subsystem qualified as tier-1 storage, Infortrend launched the new-generation high-performance iSCSI-to-SAS/SATA arrays. They are the first iSCSI subsystems providing four 1GbE host ports on each controller. Its IOPS performance in random IO environment matches that of Fibre-host arrays. Before the coming of 10GbE IP SAN, these EonStor high-performance arrays are ideal iSCSI storage for mission-critical applications.

Additional Benefits: Data Protection and 10 GbE Technology

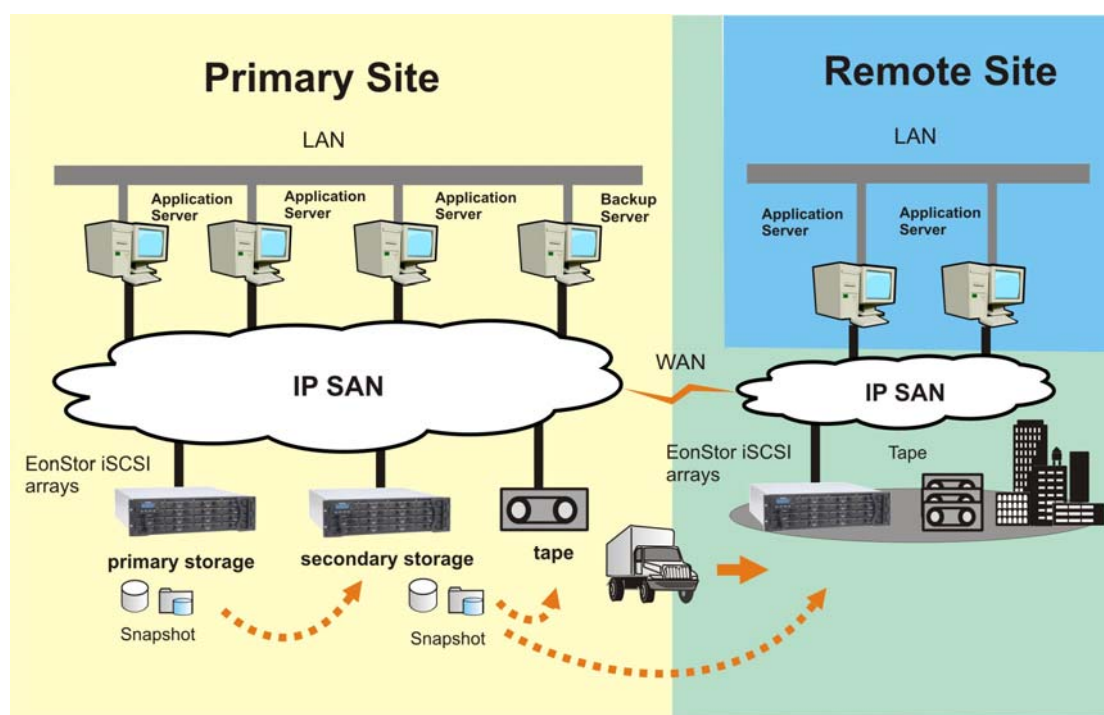
Surveying through the maturing iSCSI market, we find that IP SAN is offering, or promises to offer, more and more high-end benefits. Comprehensive data backup features and evolving 10 GbE technology profit SMBs the most.

Data corruption and system downtime resulting from system/application malfunctions, human errors, virus attacks or natural disasters will not only cost great revenue loss but even lead to legal issues. Devising a robust business continuity plan is therefore critical for companies of all sizes. However, before

How does IP SAN Benefit SMB Storage Environments?

the advent of IP SAN, only enterprises able to afford FC SAN could achieve ideal RTO (Recovery Time Objective) and RPO (Recovery Point Objective) with centralized and efficient backup. The common backup plan of SMBs was making backup tapes for dispersed servers and storing them off-site. The poor RTO and RPO often led to extended downtime and great data loss when accidents happened. After iSCSI emerged as an alternative protocol of SAN, SMBs finally go beyond the time and space consuming tape backup. With the data service features widely supported by most iSCSI arrays on the market, such as snapshots and remote replication, SMBs can now enjoy data protection, disaster recovery and even business continuity formerly unavailable in DAS environment.

Below is a configuration example of SMBs' data protection continuum.



This continuum is composed of three levels of data protection. The first level (the yellow column in the figure) can deal with any data loss out of hardware problems, software corruption, virus/hacker attacks and human errors. Thanks to disk-based snapshot technology⁴, users can store point-in-time copies of data for multiple restore points. When problem occurs, the system can be rapidly restored to the state at a desired moment. These copies can also be

⁴ To know more about Snapshot technology, please refer to *Snapshot Technology: Improving Data Availability and Redundancy* (http://www.infortrend.com/doc/tech_brief/Snapshot_en.pdf).

How does IP SAN Benefit SMB Storage Environments?

used for other purposes, including replicated system deployments, testing, decision support and the improvement of backup operations. In the second level of data protection (the yellow and the green columns in the figure), data loss can be reduced to the minimum even when the primary site is destroyed by disasters. Cheap cabling for extended distance and low TCO of IP SAN make it viable for SMBs to achieve disaster recovery by deploying a remote site. Complemented by servers, the remote site can become a duplicate data center, providing the highest level of data protection (the yellow, the green and the blue column in the figure). When the primary data center fails, the service can be shifted to the remote site, allowing business operations to be restarted in the ideal RTO. Even if SMBs don't have enough budgets to deploy the same number of servers as in the primary site, they can leverage the server virtualization technology to maximize the utilization of hardware resources and reduce the required number of physical servers.

Besides the high-end data protection functionalities, IP SAN also promises to provide enterprise-level performance. When IP SAN is compared with FC SAN side by side, "performance" has always been its inherent disadvantage. Limited by the existing 1GbE infrastructure, IP SAN is still mostly applied in the less bandwidth-demanding environments, no matter how attractive its cost advantages over FC SAN are. Although more and more SMBs have adopted IP SAN for tier-1, mission-critical applications, the concern always lurks that one day their growing business will defeat the performance 1GbE IP SAN can deliver. Now, with the evolving 10GbE technology, IP SAN is being purged of its original sin. It will surpass the performance of FC SAN, qualified as the ideal storage choice for even business-critical deployments in enterprises. Although the cost for 10GbE IP SAN is now comparable with 4Gbps FC SAN, the former costs less than half than the latter in terms of price-per-Gigabit. 10GbE IP SAN may not be such a possible choice for SMB users for the moment whether concerning technology maturity or TCO. However, in the near future when the costs decline until they become more acceptable, SMB users can be assured that only with some device replacements, their current IP SAN infrastructures can be easily upgraded for greatly magnified performance. Then, IP SAN no longer signifies a choice compromising on performance for cost saving but a choice addressing demanding performance needs in a cost-effective way.

Infortrend iSCSI arrays now come with SANWatch storage management suite. It provides all functions necessary to discover, configure, administer, and

How does IP SAN Benefit SMB Storage Environments?

monitor Infortrend's RAID subsystems, be they local or remote, one or many. Snapshot functionality is now available on SANWatch platform. Immediate images of data can be created manually by IT managers or automatically by the scheduler. With these space-efficient differential copies, important data can be constantly protected at fine granularity. Whether it's block-level or file-level recovery that is necessary, the desired RTO and RPO can be easily achieved. More data service features, such as volume copy and remote replication, will be implemented on SANWatch platform in the near future. Then SMBs can enjoy the data protection continuum mentioned above with the affordable, reliable and scalable EonStor IP SAN. The server virtualization technology can also be leveraged to simplify IT infrastructure and improve its efficiency after EonStor iSCSI arrays complete the VMware certification process. Next year, when Infortrend launches the iSCSI subsystems coming with 10GbE host ports, SMB users can further seamlessly upgrade the performance of their current infrastructure to an exuberant level.