IP SAN Solutions: Where Do They Fit?

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IP SAN Defined

An IP SAN is a storage area network based on IP networking infrastructure using the iSCSI (Internet SCSI) storage protocol. This is directly analogous to a Fibre Channel SAN, which is based on FC networking infrastructure and uses the FCP (Fibre Channel SCSI) protocol. IP SAN solutions, therefore, consist of iSCSI initiators (software driver or adapter) in the servers connected to iSCSI storage systems by means of standard Gigabit Ethernet switches and cables.

The benefits of IP SANs derive from the cost, flexibility, manageability, distance, and familiarity advantages associated with Ethernet networking technology. IP SAN solutions are particularly interesting for storage consolidation in server environments where simplicity, flexibility, and price/performance are critical IT decision factors, as well as for cost-effective and efficient backup and disaster recovery solutions.

To understand where customers are deploying IP SAN solutions, it's best to start with a global view of the overall IT infrastructure of a typical organization.

Typical IT Environment

Figure 1 illustrates the typical IT infrastructure of a large organization. It consists of a core data center, usually running the company's mission-critical applications. Up to 20% of the company's data assets are likely to be managed here. The other 80% of the data is distributed among the company's regional and departmental data centers and across the various remote offices around the globe.
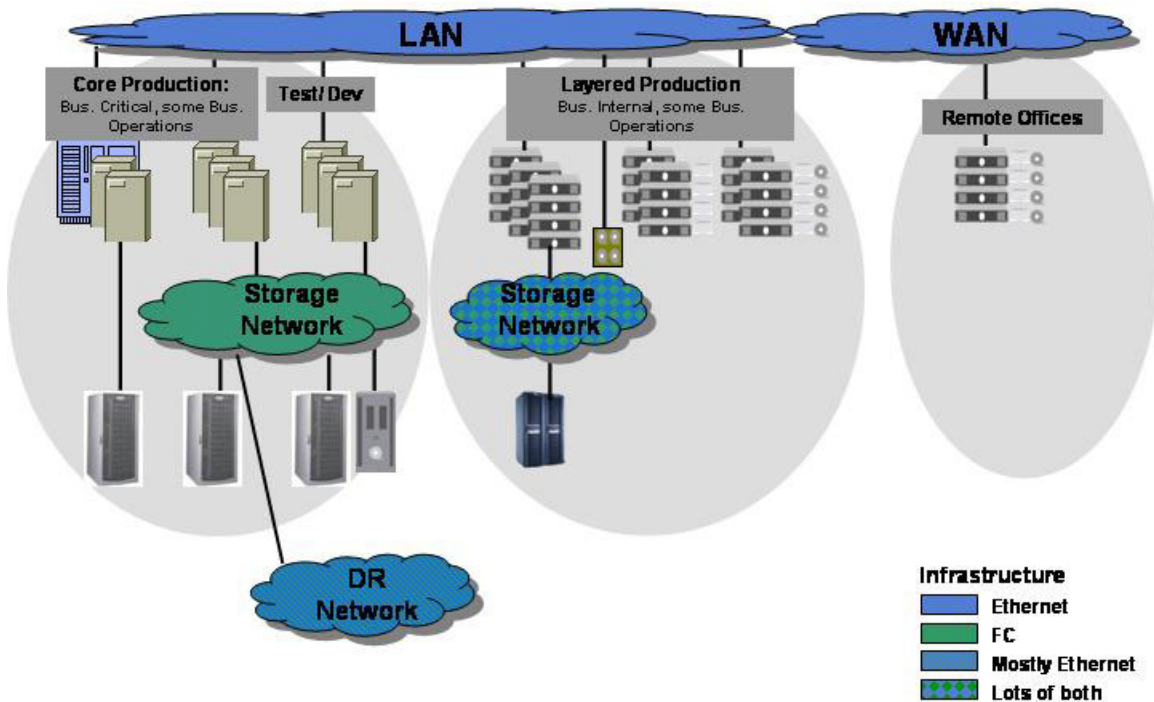

Figure 1) Typical IT Infrastructure.

The core data center usually houses the company's largest servers, is divided into production and test and development environments, and is usually considered home base for corporate IT. The penetration of networked storage, as opposed to direct-attached storage, is likely to be up to 70% of the storage in the core data center—the vast majority being in the form of Fibre Channel SAN environments. Core data centers are most likely to have Fibre Channel–savvy storage specialists, as well as Ethernet-savvy server administrators.

This core data center can be duplicated at a remote facility for disaster recovery purposes, but the more likely scenario is that the disaster recovery facility is one of the company's regional or departmental data centers.

Regional and departmental data centers usually look quite different from the core data center. Servers here are likely to be smaller and much more numerous. The applications running in these environments may not be mission-critical, but they are certainly business-critical, and they are most likely to be driving significant data growth. And that data growth causes a constant staffing and asset management problem. The need for networked storage solutions is likely to be most acute here, but the penetration of networked storage is likely to be only around 30%—breaking down into a fairly even mix of network attached storage solutions and small SAN environments. This type of data center is unlikely to have either storage-focused or Fibre Channel–savvy support staff.

The organization is likely to have a significant number of remote offices outside the regional and departmental data centers. Interestingly, these offices are now likely to employ not only desktop systems but also a number of small servers, often running small enterprise applications. Providing IT support for remote offices is often difficult, and data availability can be a real problem. Most companies are struggling with the issues of integrating these offices into their corporate data protection and management environment.

Interestingly, smaller organizations (those with revenues of $1billion or less) are also likely to have an IT environment with multiple data centers and computer labs, but the core data center will look much more like the regional/departmental data center of a larger organization—that is, they will have low networked storage and Fibre Channel SAN penetration.

IP SANs in the IT Environment

IP SAN solutions greatly broaden the options available to IT executives to address the cost, availability, performance, and manageability issues caused by continual data growth, and to accelerate their transition from a direct-attached to a networked storage model. Figure 2 illustrates where IP SANs are primarily being deployed today, in the context of the IT infrastructure previously described.

IP SAN solutions are providing **primary storage** in environments where Fibre Channel has not been considered a feasible solution (due to its cost and complexity, or the lack of appropriately trained staff). Examples of this are in departmental or regional data centers where there are lots of lower-end servers—where Fibre Channel host and switch interconnect costs can be significant when compared with the cost of the servers themselves.

These environments typically run midrange enterprise applications (often Microsoft applications), which are an excellent price and performance fit for IP SAN solutions. As noted earlier, core data centers for medium-sized companies also fall into this category, and we are now seeing IP SANs supporting the mission-critical applications in these companies (which often have plenty of Ethernet expertise and investment, but little or no Fibre Channel expertise or investment).

Another sweet spot for IP SANs is in the provisioning of **secondary storage** in these "departmental" data center environments—disk-based storage for regulated, archived, or simply rapidly growing data. Disk storage in these solutions is usually based on ATA drives and offers a cost per megabyte comparable with that of small tape silos, with the advantage of much faster data restore.

IP SAN solutions are also becoming popular for secondary storage in the core data center of very large organizations. Attaching secondary storage using Fibre Channel SAN technology within the data center has been a hard sell, primarily due to cost. However, IP SAN secondary storage can provide a cost-effective, disk-based staging area for Fibre Channel–based tape and backup infrastructures. The result extends both the economic life of perfectly suitable older Fibre Channel backup devices as well as the reach of these devices to more application data without the constraints of the backup window.
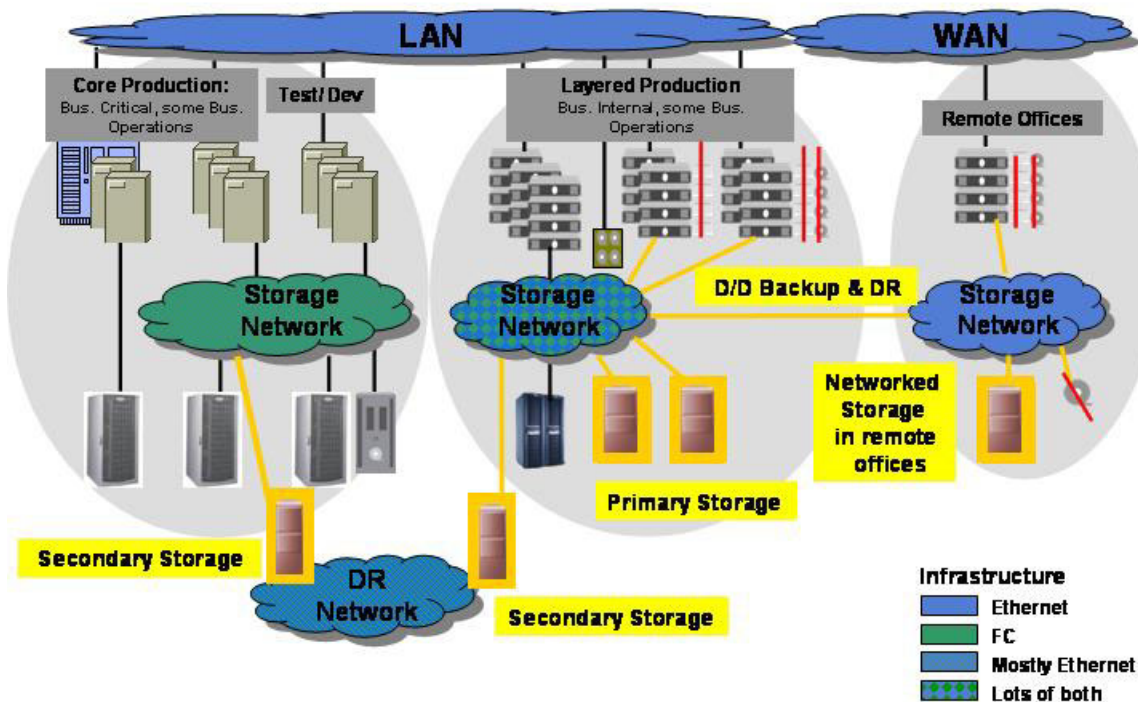
Figure 2) IP SANs in the IT Infrastructure.

A third sweet spot for IP SANs is as **shared storage** for business applications in remote offices, providing the performance and availability benefits of centralized storage. Solutions in this space often also support file storage—an area where we see SAN/NAS convergence.

These remote office solutions are often linked back to primary or secondary storage in the regional data center. The combination of regular point-in-time copies (snapshots) on the remote IP SAN with remote replication to a regional data center not only eliminates the backup window and need for tape in the remote office, but also delivers extremely high data availability. And all this can be accomplished with minimal administrative resources.

Examples of each of these "sweet spot" uses for IP SAN solutions can be found in the customer deployments scenarios on the Customer Stories page at *www.netapp.com/solutions/iscsi/deployments.html*.

Increasingly, the combination of multitier disk storage (primary and secondary storage), sophisticated data management capabilities (such as snapshots, mirroring, and vaulting), and ubiquitous IP connectivity will enable companies of all sizes to integrate and manage their global IT data assets easily and effectively. For more information on how specific companies are accomplishing this today, be sure to check out the case studies at the link above.