



NETAPP WHITE PAPER

Empowering IT to Optimize Storage Capacity Management

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1 EXECUTIVE OVERVIEW

All enterprises, large and small, are dealing with storage capacity management issues and solving them one way or another. To cope with increased demand for storage, cost reduction mandates, and declining budgets, IT managers are thoroughly evaluating all of their enterprises' storage costs—from initial equipment acquisition and resource management, to capacity usage by each business unit. These managers are seeking solutions that can drive down capacity and operational expenditures by better leveraging their existing infrastructure and more efficiently planning overall capacity. As storage consumption continues to grow, however, its dynamic nature has storage administrators struggling to predict how much of what resource is needed to support enterprise applications and meet storage service-level requirements.

Most companies have a capacity management process in place to manage service levels and control costs for their networks and servers. Yet many of these organizations overlook the fastest-growing component of the IT infrastructure—storage. While storage may appear to be highly affordable, in reality the opposite is true. Even as storage unit prices continue to decline by as much as 25% annually, capacity continues to rise by 50% or more due to the exponential growth of storage consumption by applications, compliance requirements, and data protection strategies. The result is an alarming increase in storage spending of 10% to 15% every year. In most businesses, storage costs are rising much faster than IT budgets and have become a financial burden that is affecting the rollout of major company initiatives.

To curb these costs, optimizing storage capacity management has become a top IT priority. But storage administrators are currently constrained by a lack of visibility into their complex environments that leads to unacceptably low rates of utilization. This lack of visibility prohibits administrators from maximizing the ROI and decreasing the TCO of their storage infrastructure—leaving them with no choice but to overprovision storage to avoid shortages. With limited insight into the storage infrastructure, they face the possibility of missing or incorrect resources and run the risk of running out of storage.

This white paper explores today's storage capacity management challenges, defines what is needed in an effective capacity management solution, and introduces NetApp® SANscreen® 5.0 with its new data warehouse and reporting capabilities. The paper concludes with several SANscreen 5.0 use case examples, illustrating how the solution can empower IT teams to address the many challenges of storage capacity management.

2 CAPACITY MANAGEMENT CHALLENGES

Effective storage management is one of the key goals for IT today. To achieve that goal, IT organizations must address the following challenges:

- **Enterprise-wide monitoring and forecasting:** Finding and resolving potential storage issues before they become emergencies.
- **Capacity Planning:** Forecasting the right amount of physical storage growth, at the right time, for the right locations in the infrastructure.
- **Capacity budgeting:** Implementing disciplined supply chain and inventory management principles.
- **Predictive analytics:** Getting detailed analysis and reports on the current and projected storage environment. For example: understanding the storage costs of applications, departments, and business units (chargeback); getting logical unit number (LUN) and disk details; seeing the VMware® virtualization storage relationship; identifying areas that will exceed usage thresholds in the near future; and pinpointing orphaned storage.
- **Storage supply-to-demand mapping:** Determining the logical relationship between logical devices (LUNs) on storage arrays and applications or hosts.

With inefficient or nonexistent storage request processes, users face long turnaround times for business requests. Missing processes, such as reservations, lead to rework; and inefficient or inaccurate purchasing processes can result in overprovisioning storage to meet potential demand. Recent studies show an industry average of 20% to 25% in spare storage capacity for the average enterprise, which results in unnecessary capital expenditures.

CAPACITY MANAGEMENT PAIN POINTS

Capacity management challenges can be viewed from two perspectives:

- **Financial perspective:** The financial perspective is concerned with shortening and streamlining planning cycles, reducing operational costs, better understanding capacity levels from a purchasing and usage view, and minimizing capital outlay.
- **Operational perspective:** This is the perspective of storage administrators who need to answer questions such as, What is needed for implementation? How can I plan for capacity growth? And how do I allocate storage to different business units? To address these questions and manage storage effectively, application and SAN administrators need end-to-end visibility into the storage environment.

Each participant in the capacity planning ecosystem has a different set of pain points, as shown in Table 1.

Table 1) Capacity planning pain points are different for the various stakeholders.

Pain Point	VP/CXO	Business Unit Mgr.	Application Admin.	SAN Admin
Uncertainty about what capacity is available on the floor	■	■	■	■
Uncertainty about future demand pipeline to justify purchases	■	■		
Uncertainty about future demand pipeline to support operational service delivery			■	■
How to improve resource and asset utilization while maintaining good service delivery time	■			■
Complex and nonrepeatable service delivery due to lack of a standardized service catalog	■	■	■	■
Inefficient resource consumption as a result of lack of price differentiation	■	■	■	
Inefficient storage procurement due to an inaccurate estimate	■			■
Lack of capacity visibility leading to inefficient operational processes				■

3 WHAT TO LOOK FOR IN A CAPACITY MANAGEMENT SOLUTION

Today's IT and SAN managers are seeking storage capacity management solutions that enable them to:

- Reduce the costs of storage infrastructure and streamline management
- Create an efficient decision-making model
- Extend their reach and visibility beyond the storage domain
- Define a set of standardized storage tiers to create a comprehensive service catalog
- Implement effective delivery processes
- Minimize the number of customer requests to create new reports
- Provide flexibility to modify existing reports to accommodate new requests
- Ultimately increase customer satisfaction

The following sections explore some of the functionality needed to help everyone involved in planning and implementing SAN storage in the enterprise—from the CFO and other executives to application and SAN administrators—to improve and optimize capacity management in a uniform way.

PROVIDING A MASTER RECORD OF ALL STORAGE FOR END-TO-END VISIBILITY

An effective capacity management solution creates “one system of truth,” a master storage record of the environment—that provides end-to-end visibility of the storage infrastructure. Empowered by this visibility, IT can purchase and provision storage quickly and cost effectively to meet the capacity needs of applications and business units. A capacity management solution should provide the ability to:

- Collect and present timely accurate storage information
- Reveal storage usage trends
- Easily record information and create reports

In addition, it should:

- Offer the flexibility to create custom reports and queries
- Provide consistency across all storage environments (by using the same terminology on disparate systems)

CREATING SERVICE CATALOGS WITH STANDARDIZED, TIERED STORAGE OPTIONS

Capacity management tools are needed to create service catalogs that describe what kinds of “packaged” storage services can be delivered. The service catalog is a dynamic application tied into IT workflow and service request management. When implemented properly, service catalogs continue to improve user productivity and IT service quality, often with tangible cost savings.

Today’s service catalog automates IT operations by providing specific interfaces and views that enable business executives and IT to manage the IT portfolio, while simultaneously allowing consumers to efficiently obtain IT services. In addition to standardizing and streamlining IT operations, the service catalog makes governance and demand management a reality, leading to business-IT alignment.

The service catalog presents users with a list of options so that they can choose from a predetermined set of attributes. The catalog should use a standard nomenclature that everyone can use across the enterprise, regardless of platform (for example, consistent definitions of “raw” versus “usable” storage). This enables the SAN management team to optimize service delivery and means that the right storage is allocated to the right application at the right price. Service catalog questions should include:

- What level of availability is needed? (for example, how many 9s?)
- How much downtime is acceptable?
- How much load will the application generate?
- What kind of throughput is needed?
- What kind of response time is expected?
- Does the application need to be backed up or replicated?
- What is the recovery point objective (RPO) for the application?

ENABLING CHARGEBACK AND ENSURING ACCOUNTABILITY FROM USERS

An effective storage capacity management tool should enable the IT team to charge back for services delivered to end users. Even if the enterprise does not use a chargeback model, this capability introduces accountability to end-user organizations, so that all storage is used efficiently by each group. With accountability by group, IT management can identify individual business units or applications that are consuming large amounts of storage but generating minimal or no revenue for the enterprise. This information can be used to make better business decisions.

4 NETAPP SANSCREEN

Data center automation delivers significant benefits to server and network management, providing more efficient and agile operations by aligning the IT infrastructure to application, business, and service-level requirements. These benefits, however, have largely bypassed networked storage—until now. NetApp SANscreen software delivers data center automation for storage by automating the core processes used to manage storage services, many of which are currently manual, device-centric, or spreadsheet-driven.

A storage service is the end-to-end connectivity between a host and a volume and their level of resilience (the required security, sharing, minimum sessions, minimum connections, and so on). SANscreen provides real-time, multivendor, multiprotocol (Fibre Channel [FC] and iSCSI) service-level views of the storage environment. It enables an organization to manage storage as a true end-to-end service, dramatically reducing capital and operational costs and improving application service quality by driving storage efficiencies.

With a single console for FC and iSCSI information across multivendor storage environments, SANscreen provides actionable service-level information that is leveraged by both storage teams and IT management, effectively integrating storage into the entire IT service delivery chain. The SANscreen product suite includes Service Insight, Service Assurance, Application Insight, Capacity Manager, and VM Insight.

- **Service Insight** is the baseline SANscreen product. It provides visibility into the storage environment, including host-to-storage access paths, storage availability, and change management. Service Insight operates without agents, out of band, in near real time, and across all major storage vendors' platforms and protocols. It continuously discovers storage devices, along with their configuration, identifying volumes, mapping and security, network protocols (NICs), and more.

The Service Insight technology is based on the idea of service paths, representing the relationship between a particular application on a given server and its data on a storage device. Service Insight provides the information that the IT organization needs to manage storage services proactively, resulting in increased service quality, prevention of application failures, and improved recovery time by immediately identifying an incorrectly implemented change. With proactive management, IT can reduce operating costs in the data center by decreasing the time and effort required for troubleshooting.

Service Insight includes an open enterprise-class data warehouse that provides a central repository for all inventory information. This warehouse enables the IT organization to roll up multisite environments, gain global visibility across distributed infrastructures, and access critical analysis and reporting capabilities. Additionally, the warehouse facilitates integration with third-party applications and processes such as configuration management databases (CMDBs), financial accounting systems, and asset management systems. The Service Insight reporting capabilities provide a centralized portal for querying and viewing critical information from the data warehouse. The Service Insight reporting solution empowers the IT organization to make operational, strategic, and tactical storage-related decisions.

- **Service Assurance** builds on the service path modeling of Service Insight to manage and deliver storage as a true end-to-end service. Service Assurance defines multiprotocol global, application, or host-based policies based on parameters such as security, sharing, minimum sessions, and minimum connections, and so on. In real time, it then validates changes against the service model to determine whether there is a policy violation that could lead to latent quality issues or actual outages.
- **Application Insight** discovers near real-time performance data from the storage environment, (including fabric and storage devices, and maps it to applications, hosts, and service paths. Application Insight empowers the IT organization to proactively perform load balancing in the SAN or on the array to avoid SAN congestion or array contention in the context of affected hosts and applications.
- **Capacity Manager** provides real-time visibility into global multiprotocol SAN resource allocations, rule-based service-tier management, and a variety of capacity-related issues. In conjunction with the SANscreen data warehouse, Capacity Manager aggregates relevant storage and switch information from multiple SANscreen instances. The enterprise-class data warehouse enables access to an open database designed to facilitate capacity-related reports such as chargeback, consumption analysis, and forecasting. To handle the dynamic state of the storage environment, as well as ever-changing business requirements, Capacity Manager provides a flexible report authoring solution that enables custom

reports to support capacity planning, purchasing, storage tier analysis, storage service catalogs, trending and historical usage, audit, chargeback, and much more.

- **VM Insight** builds on the SANscreen service path awareness and change management technologies to create cross-domain visibility from the virtual machine (VM) to the volume, enabling both the storage and server administration teams to more easily manage their storage and server architectures.

SANSCREEN CAPACITY MANAGEMENT BENEFITS

With NetApp SANscreen, storage administrators can:

- Gain global visibility of storage network assets to quickly understand their availability, relationships, and usage at the data center or enterprise level
- Reduce capital expenditures by identifying and reclaiming unused storage resources in the environment
- Improve service quality by proactively discovering the storage services delivered to applications
- Manage and audit changes over time to enable technical review, compliance, and IT governance
- Drive service quality improvements in the storage environment
- Accelerate migrations and consolidations
- Provide server administrators with visibility into which services were provisioned by the storage team

NEW IN SANSCREEN 5.0

This section describes the new data warehouse and enterprise reporting features in SANscreen 5.0 that empower the IT organization to deliver a disciplined storage capacity planning methodology.

SANSCREEN DATA WAREHOUSE

SANscreen 5.0 provides a data warehouse that consolidates multiple SANscreen operational databases. New data warehouse features include:

- An independent database made up of an inventory and capacity data mart
- Current and historical configuration and inventory data
- An easy-to-understand database schema
- A platform for integration with third-party reporting and business intelligence engines
- An optimized database for predefined queries or user-defined queries

SANSCREEN ENTERPRISE REPORTING

Enterprise reporting is part of the SANscreen Service Insight and Capacity Manager products. It enables the creation, running, management, and distribution of reports and dashboards by leveraging data within the SANscreen data warehouse. New enterprise reporting features in SANscreen 5.0 include a reporting platform (a report engine), powerful end-user management reports, different reporting styles, dashboards, customizable reports, and an array of report publishing and distribution options. A new user home page uses an intuitive dashboard view that is visible through the enterprise reporting portal (Figure 1). The dashboard is organized according to functionality (capacity, inventory, and so on).

SANscreen 5.0 also provides a set of preconfigured, customizable reports. Examples include:

- Data center storage capacity reports for trending, forecasting, and location awareness
- Chargeback reports
- Business unit capacity allocation trending and forecast reports
- Capacity consumption comparisons between dates and applications

All SANscreen reports can be formatted as PDF, HTML, Microsoft® Excel-based CSV, or Microsoft Word files. Users can schedule reports to be delivered to them by e-mail. These easy-to-understand reports can extend the reach of SANscreen throughout the enterprise, increasing collaboration by enabling groups other than storage to benefit from data that is discovered and stored in SANscreen.

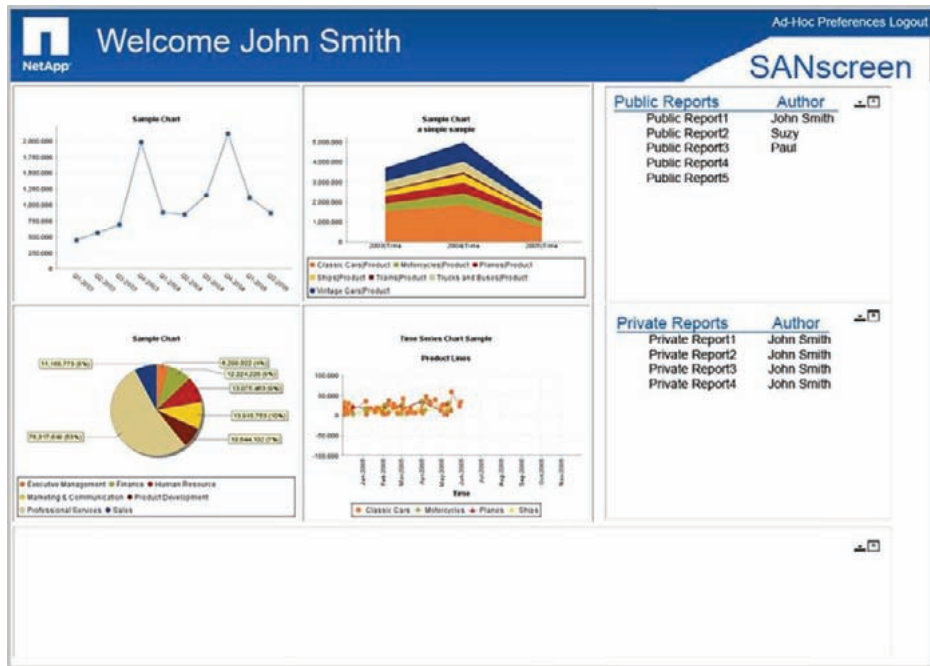


Figure 1) SANscreen Enterprise Reporting Dashboard view.

5 SANSscreen 5.0 USE CASE EXAMPLES

This section offers a few examples of the new SANSscreen 5.0 data warehouse and reporting functionality in action.

MONITORING STORAGE CAPACITY

The storage capacity reports included in SANSscreen 5.0 provide the information needed to monitor capacity trends and usage (Figures 2 and 3).

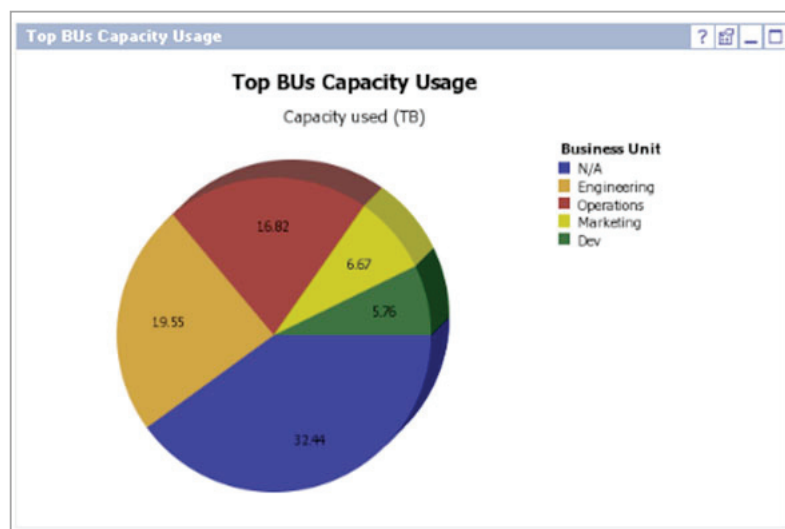


Figure 2) Capacity consumption by business unit.

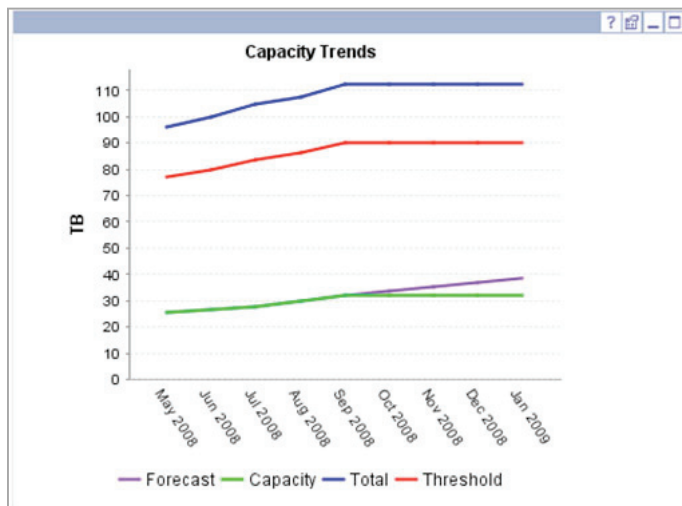


Figure 3) Trending capacity consumption to drive forecasts.

MAINTAINING A TIERING STRATEGY

By monitoring storage capacity, administrators gain the information needed to avoid outages or delays. And by monitoring the usage of expensive tiers, they can shift storage over time to less expensive tiers. As a result, global indicators such as average price per TB and yield go down, along with storage infrastructure costs (Figure 4).



Figure 4) Tier analysis reports.

ENABLING CHARGEBACK

Chargeback reporting is one of the most daunting and time-consuming tasks for storage teams. Even if the company does not have a formal chargeback process in place, knowing to whom the storage is assigned is very important to the IT organization. Also, business units and application owners need to know how much to budget for storage in the coming year. Automating the chargeback reporting and planning processes is essential in order for the storage team to provide this important function.

SANscreen 5.0 provides IT organizations with the information necessary to enable chargeback for storage (Figure 5). Triggers can be generated monthly (by the chargeback provider) or on demand (by the chargeback consumer). The goals of the chargeback provider are to identify the users or entities that are accountable for storage resource usage, accurately determine what the usage is, and charge accordingly—all of which drive a responsible behavior pattern among storage consumers. The chargeback consumer receives a detailed explanation of all resources and services used by his or her department. This enables the various business units to balance the business needs of the enterprise against the price of storage resources and services.

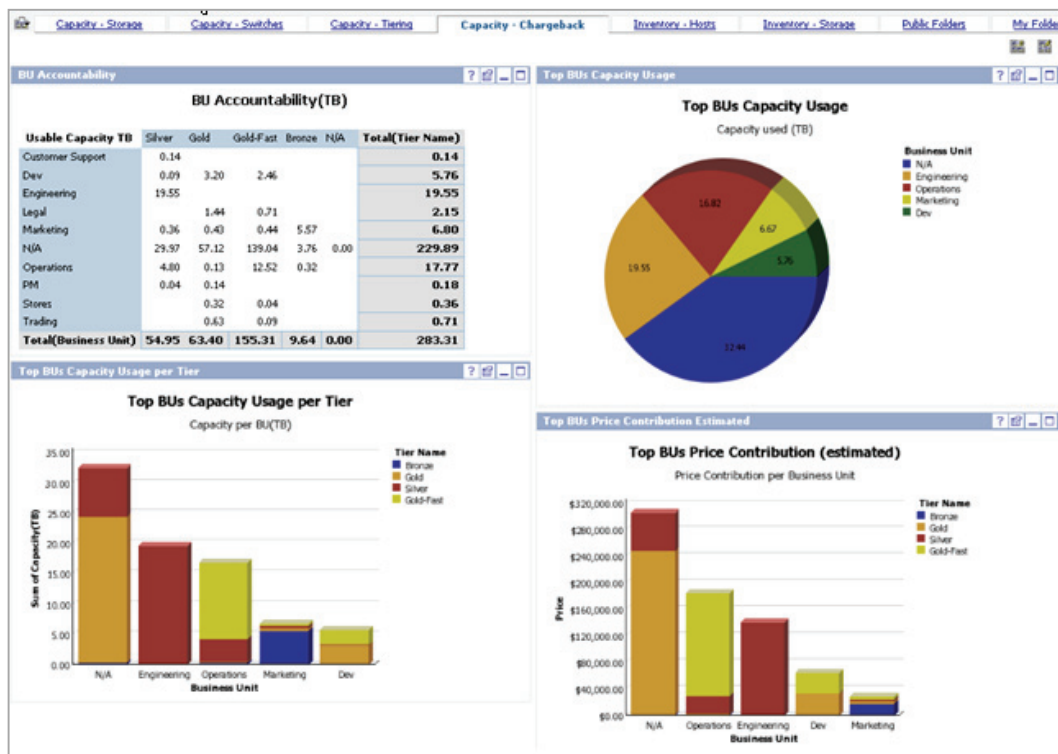


Figure 6: Reports to drive chargeback.

6 BENEFITS OF USING SANSCREEN 5.0

SANscreen 5.0 enables enterprises to extend data center automation to storage by optimizing capacity management. Benefits include:

- **Understanding storage capacity usage trends:** By tracking usage trends over time, storage teams can quickly identify changes in storage usage.
- **Generating usage forecasts:** Projecting future usage on all storage entities enables storage teams to properly plan and justify future storage purchases.
- **Planning future allocations:** Based on projected storage usage, storage administrators can calculate when and how much storage needs to be allocated and/or purchased for each chargeback group.
- **Developing chargeback reports:** Storage administrators can generate detailed chargeback reports.
- **Determining whether additional storage is really required:** IT teams can avoid overprovisioning storage by relying on accurate forecasts of user demand.
- **Identifying available configured storage:** By identifying available configured storage, IT can easily allocate storage to the requesting groups.
- **Reclaiming orphaned storage:** Administrators can quickly reclaim unused storage that has been allocated to hosts but remains idle, and can easily reallocate it to other hosts as needed.
- **Reclaiming overprovisioned storage:** Storage administrators can identify where storage is currently underutilized (and forecasted to remain underutilized) and reclaim the unused storage.

7 SUMMARY

SANscreen empowers storage teams to accomplish their capacity management projects and processes much more efficiently. Benefits of using NetApp SANscreen include:

- Improved administrator productivity by eliminating unnecessary provisioning tasks
- Clear, accurate, and objective cost justification for future storage purchases
- Reduced storage capacity—and fewer administrators to manage it
- Fewer requests from end users for storage that they don't need
- Proactive planning of provisioning tasks, enabling better workload balancing
- Fewer emergency, out-of-hours provisioning tasks to solve out-of-storage problems
- Fewer reprovisioning tasks due to inaccurate sizing estimates

NetApp's innovative storage and data management solutions help organizations accelerate business breakthroughs and achieve outstanding cost efficiency. Its dedication to the principles of simplicity, innovation, and customer success have made NetApp one of the fastest-growing storage and data management providers today.

Companies around the world choose NetApp for its “go beyond” approach and broad portfolio of solutions for business applications, storage for virtual servers, disk-to-disk backup, and more. NetApp solutions provide non-stop availability of critical business data and simplify business processes—enabling companies to deploy new capabilities with confidence and get to revenue faster than ever before. For more information about SANscreen or other NetApp products or services, please visit www.netapp.com.

