

## HIGHLIGHTS

- Plan effectively to anticipate changing resource loads
- Track performance in heterogeneous SAN environments
- Prevent storage network congestion from becoming network downtime

*Finisar*

# WHITE PAPER

A more effective approach to SAN capacity planning. Finisar's NetWisdom provides SAN Administrators better ways to anticipate changing resource loads and plan more effectively.

User demands for data are dynamic. At certain times of the day or month, user requests for data and applications can skyrocket, putting stress on SAN resources. From end-of-month accounting to mid-morning data processing, business demands on the SAN can create bottlenecks – or even the failure of critical systems - in otherwise healthy networks. Capacity planning is the process of anticipating these surges in network traffic and compensating for them before mission-critical processes come grinding to a halt.

Network congestion is one of the most common reasons for network brownouts, stalls, or shutdowns, and are most often encountered when the load on the hierarchy increases. Network administrators can now prevent capacity problems and failures by using NetWisdom performance monitoring tools.

Potential problems abound. "It is not uncommon to find an MS SQL cluster sharing storage ports with an email cluster" explains Jon Hudson, Sr. SAN & Unix Architect for Finisar. "If MS SQL usage spikes, it might consume the entire bandwidth, prohibiting Exchange from accessing data." Capacity planning ensures that, when applications fight one another for bandwidth, the load is effectively managed by existing hardware. So instead of purchasing more network capacity, appliances or storage, customers save money by making better use of the resources they already have.

How do SAN administrators anticipate changing resource loads in order to plan effectively? Until recently, tracking the performance of server hardware resources - CPU, disk, memory, links, ports, and switches – was a time consuming, complicated process, often involving every vendor of every hardware component in the system. Today, tracking performance within heterogeneous systems can be relatively easily accomplished using NetWisdom from Finisar.

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## NETWISDOM – MONITOR THE VITALS

NetWisdom is a Storage Area Network (SAN) performance monitoring solution that provides system administrators with the critical information they need to pinpoint capacity issues and plan accordingly. A dedicated hardware and software-monitoring tool also available as a software-only

solution, NetWisdom enables SAN administrators to proactively manage their SAN for spikes in demand for data and applications and to avoid the problems they cause.

NetWisdom uses a 3-tiered architecture consisting of a Probe that connects to the SAN data paths or runs through the SPAN port on a switch, the Portal software that collects data from the Probes, and the Views software that presents the data in a flexible, graphical user interface. Briefly, the three function as follows:

### **NetWisdom Probe**

NetWisdom Probes are connected either directly in-line through a switch or mirror port or through the use of Finisar's Network Taps. Probes gather all of the transactions at the Initiator/Target/LUN level, providing detailed statistics on device health and performance. Finisar also offers alternative software-only "switch probe" that gathers the statistics in and out of the fabric's switches.

### **NetWisdom Portal**

The Portal is a self-managing database that gathers the data from the probes and stores it for viewing and analysis. The Portal collects statistics and aggregates them over time according to user-defined schedules. It also allows Alarms to be set to that specified actions are carried out when pre-defined thresholds are breached. Users who are comfortable working with MySQL will benefit from NetWisdom Portal use of MySQL as the data container. Users can mine and collect data either from Netwisdom, or use their own home-grown tools that are already customized to their environment.

### **NetWisdom Views**

This GUI software provides a powerful user interface for viewing, analyzing and processing data collected by the Portal, yielding a consolidated picture of overall network traffic. Data can be viewed in a variety of formats, including tables, graphs and charts. Views software provides both real-time and historical data. Event recording is available as well as customizable reporting.

NetWisdom is able to measure entire SAN utilization in real time. SAN Managers can account for the precise amount of storage capacity they use currently and will need to use in the future. With historical statistic collection and the ability to trend performance and capacity across time, SAN Administrators are provided with accurate usage information so that they can purchase only the hardware they really need.

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## **HOW IT'S DONE**

Capacity Planning using NetWisdom begins with an end-to-end scan of the entire SAN for a given time period. NetWisdom Probe, performing at full line rate, provides accurate real-time statistics covering individual end-device conversations between switches, storage ports, links (physical cables) and LUNs. Administrators know which server or application may have generated the spike in volume, and what hardware was affected. By selecting strategic links, SAN managers can collect detailed performance and event statistics for key servers or storage devices and identify the weak links in the chain.

NetWisdom Probe delivers real-time Fibre Channel and SCSI statistics to NetWisdom Portal. Portal then gathers, aggregates and records the SCSI and Link statistics for every second and performs statistical calculations, generates alarms and records the storage centric statistics for play-back. Key statistics are aggregated for Initiators, Targets and Target/LUNs, allowing the SAN manager to monitor accesses to a server or a device. With these device-level statistics, SAN managers can analyze exactly which devices are communicating through which link. In this way it is easy to identify potential bottlenecks like the one in our example above.

For analysis, NetWisdom Views provides a flexible graphical user interface that enables monitoring of multiple links simultaneously. Multiple views of Portal metrics allow the user to analyze or debug at all levels of protocol traffic (Link to Device) of the Fabric. Among the useful views available, capacity planning is largely facilitated by the Graph View, which provides real-time comparison and combination of metrics. This allows trend-of-activity comparisons for

Device level or Link level analysis. The Record and Playback feature of NetWisdom Views is useful for comparison of performance and health at a later date. This feature permits users with good baseline data to identify, scrutinize, report, and act on very minor variations, thus giving the SAN manager a granularity not available with other products.

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## KEY ISSUES FOR CAPACITY PLANNERS

### Shared Resources – First Come, First Served

It is not uncommon for a network to share as many hardware components as possible – such as multiple connections to a storage array. “Problems results when a surge in demand consumes the capacity of a given component” explains Hudson. A 200MB link, for example, might be shared by two servers and function correctly most of the time. But when an application on one of the servers demands the entire 200MB pipe, or even just a larger percentage than usual, the second server may get frozen out. Users requesting applications or data on the second server will likely experience delays or errors. With the Fibre Channel protocol in particular, it’s first come, first served.

NetWisdom quickly identifies shared resource issues and potential bottlenecks so SAN administrators can reroute data and keep the SAN functioning efficiently.

### Queue Depth

Queue management is an important part of capacity planning. Unexpected delays and even data flow interruption can result when disc access bogs due to overloaded queues. The maximum queue depth represents the number of outstanding commands to a single LUNs (logical unit number) or target port.

Often, the fix is as simple as increasing the queue-depth from low pre-set factory HBA defaults to a higher setting. Other problems can be more difficult, such as slow disk access resulting from an overloaded storage controller, or storage servers sharing the same switch with application servers. “The problem can be hardware – multiple connections to a storage array, for example – or software” explains Hudson. “When multiple software applications are running on a host, one application can steal resources from the others.”

Regardless of the problem, NetWisdom provides the means of identifying potential issues due to queue depth and fixing them before they develop into larger issues or affect SAN performance.

### Low-Level Errors

SAN administrators have no way of watching or tracking low-level errors. “Most operating systems can not report on low-level errors because they are being handled at a lower part of the stack” says Hudson. “Unfortunately, that information is critical for both error detection and capacity planning. NetWisdom gives administrators the specific LUN-level details required for this type of work.”

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## CONCLUSION: CAPACITY PLANNING WITH NETWISDOM: FROM A “DARK” ART TO A SCIENCE

“By providing real-time statistics covering individual end-device conversations and overall SAN performance, NetWisdom allows SAN managers to become proactive instead of a reactive” says Hudson. By identifying trends, managers can create an infrastructure that is sustainable even during peaks and surges of user demand. As network design tools become more prevalent for network modeling, it is even more critical that decisions and designs are made based on real data – not assumptions. NetWisdom provides the specific data points that help transform capacity planning from a “dark” art to a precise science and that allow SAN administrators to make the adjustments required to keep their networks humming.

For more information about Finisar and its NetWisdom product go to [www.finisar.com](http://www.finisar.com). For questions about Finisar and its products, call 408 400 1021 or email [sales@finisar.com](mailto:sales@finisar.com)

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