

MOBILE DATA SOLUTIONS CASE STUDY



Leading world-wide supplier of mobile data solutions deploys VirtualWisdom to monitor its SAN to help ensure 100% data availability

Overview

This U.S.-based provider of mobile data solutions enables wireless carriers and enterprises around the world to deliver high-value, highly personalized mobile data services to their subscribers and consumers. It provides a comprehensive suite of hosted, managed service offerings which enable wireless carriers and enterprises to deliver customized, branded mobile data experiences to millions of subscribers.

At the center of the services solution is a carrier-grade platform that enables consumers to easily reach the information, content and applications that matter most to them on a real-time basis. The platform delivers a complete solution, including portal, marketplace, connect, search, managed web, mobile campaign management, messaging, billing and settlement. All of these services are delivered on a hosted, managed service basis, to provide wireless carrier and enterprise customers with a cost-effective means to meet the challenges of the increasingly complex mobile data ecosystem.

IT Environment

The IT staff supports almost 2 PB of online data in several datacenters with over 125 HP servers. Storage is primarily HP EVA and secondarily, NetApp Filers, supporting over 60 storage ports. The primary datacenter supports two Brocade fabrics. VMware ESX hosts are deployed though not yet supporting the primary database-based applications. Like many IT departments, this

Challenges:

- Pressure on IT staff to do more with existing CAPEX and OPEX
- Availability requirements dictate the need to predict problems before they escalate to application slowdowns or outages
- Being alerted to failing components and quickly replacing them before users are impacted

Solution:

- Virtual Instruments VirtualWisdom ProbeSW and professional services QuickStart Assessment Consulting

Customer Benefits:

- With VirtualWisdom, causes of potential application slowdowns can be identified and corrective action provided before users are even aware of a problem
- Productivity of existing staff is maximized, to ensure that issues are quickly identified and remediated without wasted time
- VirtualWisdom enables a reduction in the need to replace suspected bad SAN components because of superior fault diagnosis, which saves on both CAPEX and OPEX

MOBILE DATA SOLUTIONS CASE STUDY



team is challenged with tight budgets and with getting more and more performance out of existing hardware assets and personnel. The SAN team's success is measured by a simple metric: keep the data available. So taking a purely reactive approach to SAN troubleshooting and performance optimization was out of the question.

Solution Evaluation

Like many IT shops, they were challenged with tight budgets and with getting maximum productivity from existing resources – hardware, software, and personnel. To do this, IT knew it must be proactive; it had to avoid problems and anticipate issues before the application owners felt the pain. The only way to do this without increasing the staff size was to find some way to proactively automate the monitoring and analysis of the SAN to ensure application availability.

The company looked at several solutions, including the SAN management tools from their system, switch, and storage vendors, and settled on Virtual Instruments' VirtualWisdom ProbeSW software in late 2010. The company wanted a solution that was:

- Capable of seeing physical layer issues in the SAN to help predict problems before they became serious
- Flexible, so reporting and alerting could be tweaked to ensure that the staff would not be bombarded with meaningless data, but would not miss critical events
- Easily implemented in stages, allowing them to meter the degree of sophistication in their SAN management architecture, as resources allowed
- Hardware agnostic and vendor-neutral

Role of VirtualWisdom

A more proactive approach to system availability was needed, and in early 2011, this IT team deployed VirtualWisdom ProbeSW software. After the initial installation service, VI completed the second half of the QuickStart Service. Together, VI and the customer established a baseline of metrics, and developed additional reports and alerts using custom filters. VirtualWisdom sees loss of sync, link resets, packet discards, aborts, code violations, and CRC errors and can send alarms for out-of-bounds conditions.

SAN QuickStart Assessment

Virtual Instruments was initially engaged to help provide visibility into the Fibre Channel SAN on an ongoing basis to assist with troubleshooting issues and finding root cause. During the analysis period, VirtualWisdom identified several configuration, connectivity and capacity planning items for review. Very often VI finds that storage-related outages and/or performance incidents are not caused by a single issue but are the result of multiple, seemingly unrelated issues in the environment. The net result is that the SAN infrastructure, running in a somewhat vulnerable state is not able to deal with additional issues as they arise resulting in outages or "brownouts". Some of the initial findings and recommendations:

Multipath balancing

The multipath verification and redundancy showed that 45% of the HBAs were balanced while 21% were Active/Active but not balanced. 17% of the ports were found to have no

"Virtual Wisdom provides critical information about storage infrastructure that is not available from traditional monitoring solutions. We have found that the ProbeSW solution, when used in tandem with host and array-based monitoring, provides a holistic picture of utilization and capacity at the host, fabric, and disk level."

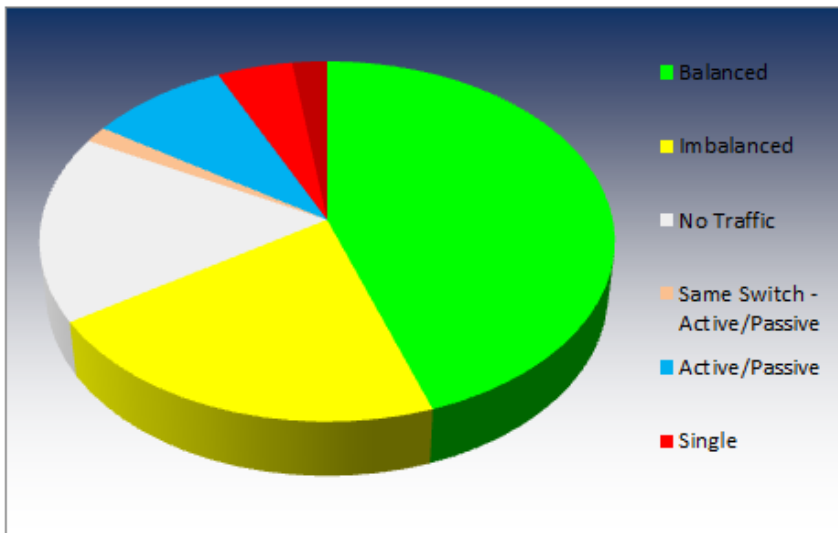
IT Manager

MOBILE DATA SOLUTIONS CASE STUDY



traffic to either redundant HBA. 10% of the servers were configured as Active/Passive. 5% of the HBAs were found not to have a peer HBA that could be identified. Often half, if not more, of the cost of the infrastructure is in place to eliminate single points of failure and reduce risk. Environments that aren't properly configured can lose all of the advantages of a redundant environment while still incurring the full cost both in terms of hardware and administrative overhead. Additionally, unbalanced configurations can cause one fabric to handle more than its share of the workload and increase the likelihood of congestion. VI recommended that the environment should be reviewed to ensure that all servers are performing per their configuration and that the HBAs that don't have a peer don't require redundancy or actually have peers, but the nicknames didn't match. The imbalanced HBAs should be checked to ensure they are all zoned to the same storage array or are behaving as expected.

Summary	# Ports	% of Environment
Total	273	100
Balanced	122	44.7%
Imbalanced	58	21.2%
No Traffic	46	16.8%
Same Switch - Active/Passive	4	1.5%
Active/Passive	24	8.8%
Single	13	4.8%
No Nickname	6	2.2%



Multipath Balancing Report Graph

Inconsistent port alias naming

During the multipath verification process it was identified that there are different naming schemes for port aliases in use on the SAN. While the environment is small, these sorts of naming inconsistencies can be a mild nuisance. However, as the environment grows these issues can lead to operational errors due to misunderstanding the role of a specific port. VI recommended that a naming scheme policy be implemented immediately. Ports whose

MOBILE DATA SOLUTIONS CASE STUDY



names do not adhere to the policy should be renamed for clarity.

Connectivity - Events and Errors

There were a small number of CRC errors identified. Servers and applications were being forced to retransmit data affecting overall performance and health of the environment. VI recommended that the links experiencing CRCs should have the SFPs and cables examined for issues and replaced as needed.

Port Number	Attached Port WWN	Attached Device Type	Channel	Probe Name	Attached Port Name	CRC Errors
329	27704505331EA3EQQ	Switch	Ch 2	GSW-PSF	y20115551rt5e0ff	179
1784	80000044C4901782	Server	Ch 2	GSW-PSF	yhiiio6_m2_p1_a	7
1252	3401440051E03X728	Switch	Ch 2	GSW-PSF	p20145051a55b718	3
610	1 0 2 2 4 3 C 9 8 2 4 1 B C	Server	Ch 2	GSW-PSF	qarttxkkl01p_2_a	2
2533	50145611E03B8DD	Switch	Ch 2	GSW-PSF	r50165051e03b8gt	1
1244	501E200151E5E4R49	Switch	Ch 2	GSW-PSF	r0122251e5e4d49	1

Connectivity and Errors - Physical Layer Errors: CRC Errors

Connectivity – Flapping Ports

Four ports were identified as “flapping”. These ports showed continuous Loss of Sync (LOS) / Loss of Signal (LOSIG) events, roughly 1 LOS event every 5 minutes per port for the duration of the analysis period. This sort of continual resetting at a minimum requires switch resources to deal with and in extreme cases can impact the stability of the switch and fabric. VI recommended that these ports should be unplugged from the SAN or disabled, noting that there was no valid communication over these ports since VirtualWisdom was implemented, and so whatever is plugged into these ports serves no business purpose.

Capacity Planning - Under Utilization and Pockets of Congestion

The analysis revealed that the SAN was underutilized. This is a very common finding in SANs across the globe. Historically, without sufficient visibility, companies have opted to over-provision with a goal of avoiding problems and due to the lack of necessary information to fully utilize the environment. There were a small number of specific hosts, ISLs, and array ports in the environment that occasionally exceeded 50% utilization, however, the remaining were underutilized.

For instance, approximately 28% of the storage ports accounted for 84% of the storage read traffic SAN. Based on this information, it is best to consolidate storage ports. At the bare minimum, this information allows a storage administrator to select *quiet* storage ports for future allocations, thus helping spread the load on the storage ports more evenly.

Infrastructure was not being utilized to the fullest extent. While at the same time that the majority of the environment goes underutilized, portions of it are congested

MOBILE DATA SOLUTIONS CASE STUDY



thereby not delivering the performance that the environment could provide if the load were more evenly distributed. VI recommended that SAN I/O bandwidth should be integrated into the capacity planning and storage provisioning processes. Simply by selecting and zoning to the least utilized ports when provisioning, new storage the environment can grow in balance and be fully utilized.

Lessons Learned

When asked what he would recommend to new VirtualWisdom customers, the IT Manager offered this suggestion: "As your storage infrastructure grows, be sure to rely on VW to ensure proper health and configuration, such as device naming, load balancing, port errors, etc., as it is much easier to correct issues at the outset than after a device is already put into service. In addition, dedicate time for your engineers to learn how to effectively use the Virtual Wisdom software, as the reporting interface is very powerful and therefore potentially complex."



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