



The GSX 3000 NetStorage Control Node



Testing Template

This document will be used to describe, from a technical perspective, the elements that were included as part of the IBM TotalStorage Proven testing. It is intended to give an overall picture of the technical elements of the configuration, with a brief description of the results of the testing including any specific highlights of the interoperability results.

High-level architecture/description, include a list of products that meet the compatibility requirements (“Approved Product(s)”) as well as a list of the IBM storage products with which the Approved Products meet the compatibility requirements (“Qualified IBM Storage Products”):

Architecture Description

The GSX 3000 NetStorage Control Node offers a suite of Global Data Services that enable IBM’s SAN File System (SFS) to be deployed across geography while ensuring global data consistency, high availability, and local SAN performance to shared data. The GSX 3000 is a storage network appliance that resides between some or all data paths between heterogeneous servers and storage. When deployed in conjunction with SFS, a cluster of GSX 3000 NetStorage Control Nodes localize access to globally coherent data, while ensuring high availability and a significant reduction in WAN traffic.

In a multi-site deployment, each server can access shared data through a local NetStorage Control Node as opposed to traversing the WAN. The GSX 3000 then interacts with other nodes in a multi-site cluster in order to maintain global data consistency. The result is shared storage access with local I/O performance across thousands of miles. In addition, the GSX 3000 enables fully active, geographically distributed, meta-data server and site fail-over and fail-back, providing Continuation of Operations (COOP).

YottaYotta's TotalStorage Proven tests qualify the following products:

Approved Product(s):

YottaYotta GSX 3000 NetStorage Control Node

Qualified IBM Storage Products:

IBM p650 pSeries servers

IBM SAN Volume Controller

IBM TotalStorage DS4500

IBM TotalStorage DS4300

IBM SAN File System

Testing Scenario

The configuration used for TotalStorage Proven certification represents a typical two-site deployment, with each site using IBM p650 servers, and IBM SAN and back-end storage products.

Site 1 performs the role of a main data center, with the following configuration: IBM TotalStorage DS4500, IBM SAN Volume Controller for storage virtualization, two GSX 3000 NetStorage Control Nodes for enhanced performance and redundancy, and the meta data cluster for the IBM SAN File System. Site 2 represents a satellite site, with only a single GSX 3000 NetStorage Control Node and IBM TotalStorage DS4300. Each site has one IBM p650 server, which acts as the SAN File System client host.

The GSX 3000s were connected to a McData Eclipse 1620 FC/IP gateway for the long-haul storage network (using the iFCP protocol to map Fibre Channel onto IP).

To simulate a coast-to-coast configuration where the two sites are located at opposite ends of the North American continent, a WAN simulator (Dell 1550 dummy net) was used to introduce a separation of 3,000 miles (25 millisecond delay, 50 ms round trip) between sites. Although the physical wiring and the equipment is capable of Gigabit Ethernet speeds, the McData storage gateways were configured to restrict throughput to OC12 (622 Mbps) link speeds.

Two volumes, each 100 GB in size, are presented to the hosts through the GSX 3000. These two volumes are both YottaYotta Distributed RAID1 (DR1¹) volumes, with a local RAID at each site. These volumes (depending on the test) are used as block devices or volumes at the user storage pool for the IBM SAN File System.

¹ YottaYotta Distributed RAID1: A distributed RAID encompasses one or more mirrors across one or more GSX 3000 NetStorage Control Nodes. These mirrors can span thousands of miles if required.

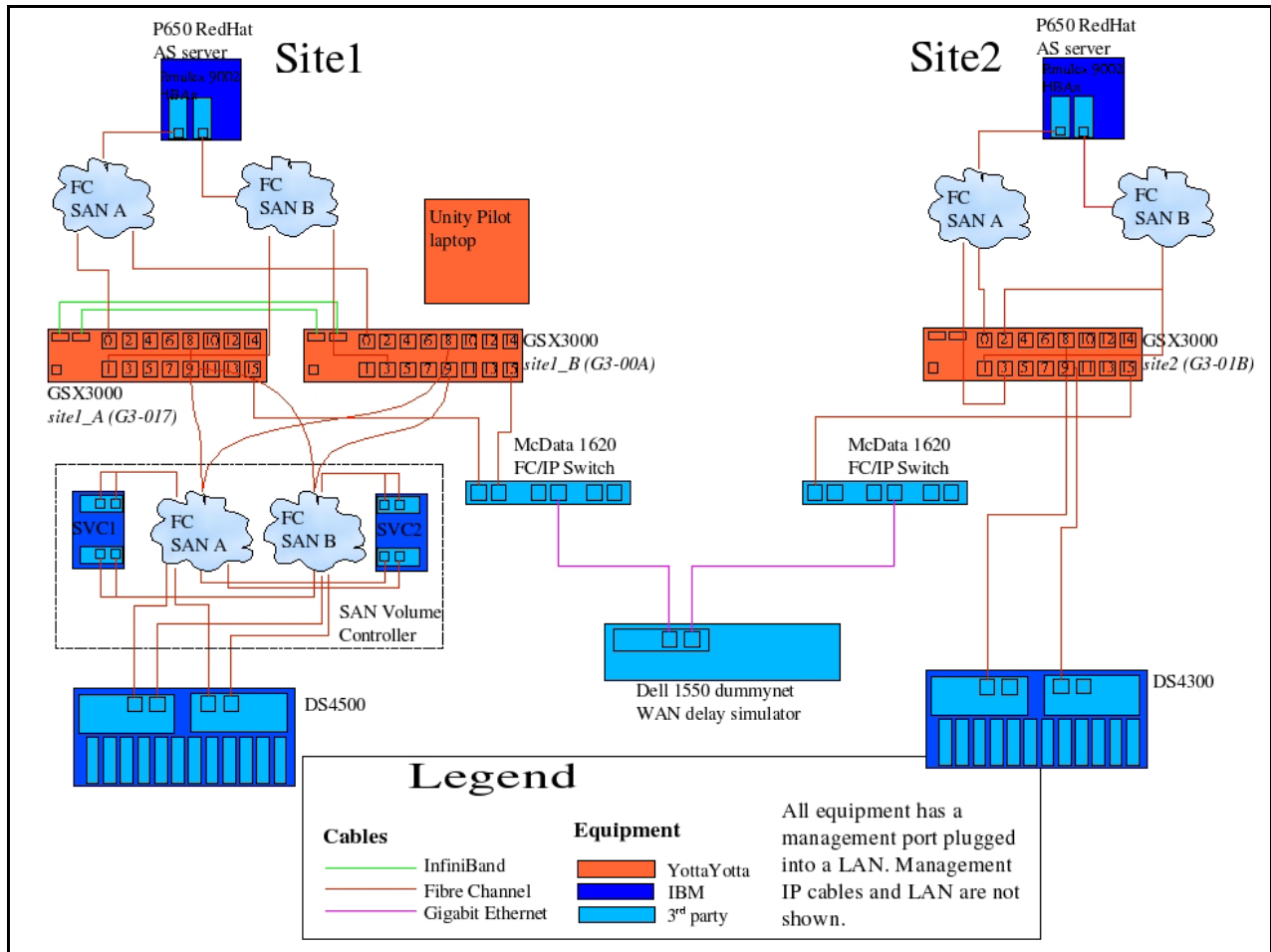


Figure 1: Storage Wiring Diagram.

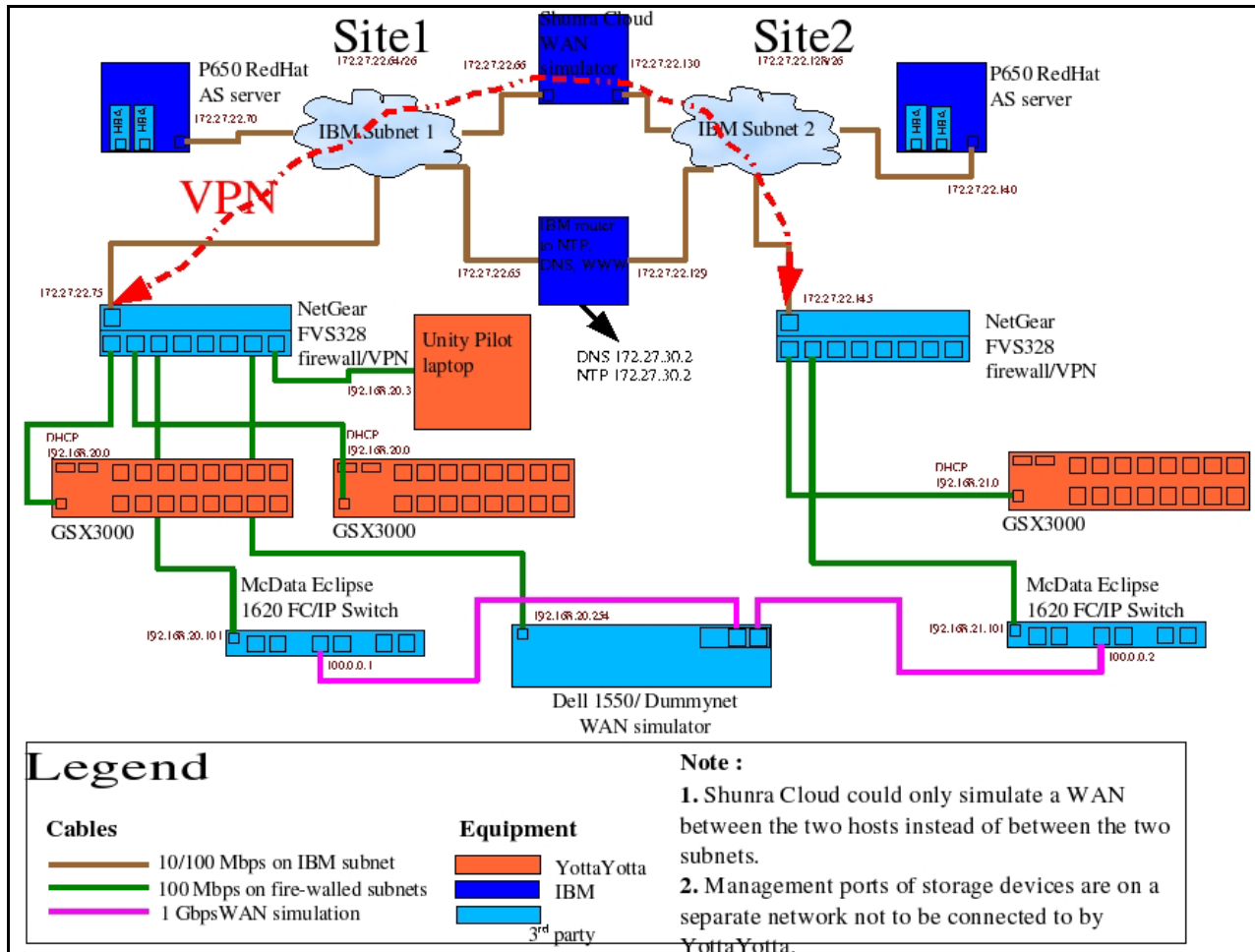


Figure 2: IP Wiring Diagram.

Testing Level Achieved

The comprehensive test level has been achieved, which represents a thorough compatibility test focusing on high availability and performance tests.

Test Focus

The main focus of the tests executed in the IBM TotalStorage Proven Program was to verify high availability of the entire configuration. This entails confirming interoperability between the GSX 3000 NetStorage Control Nodes and the IBM TotalStorage products when faced with various failures. It also includes interoperability between the server platform, HBA, fabric and the GSX 3000.

The advantages of deploying YottaYotta in a two site configuration include immediate global availability of recently written data. This is accomplished via the GSX 3000's globally coherent, redundant multi-site cache pool. In addition, there is a significant performance benefit when the GSX 3000 is introduced in geographic deployments.

Product Versions used in the TSP Testing

YottaYotta NetStorage Control Node

- GSX 3000 NetStorage Control Node
Firmware version 1.10
UNITY Pilot Server version 16.15 (Management)

IBM Servers

IBM pSeries 650 (Qty 2)

Operating systems: RedHat AS 3 release 3, AIX 5.3

Host Bus Adapter (HBA) : IBM FC 6228

- Firmware levels: fcs1-391101 and fcs0-382101 on p65001 and 382101 for both on p65002
- Driver levels: devices.pci.df1000f7 5.3.0.21
devices.pci.df1000f9 5.3.0.0
devices.pci.df1000fa 5.3.0.10

Network Interface Card (NIC) : 10/100 Mbps Ethernet PCI Adapter II

- Firmware levels: SCU015
- Driver levels: devices.pci.1410ff01-5. 3.0.10

Storage Products

- IBM DS4500 – 1742
Version 900
Disks : 56 36G 15K RPM drives, microcode level 06.10.06.00
- IBM DS4300 – 1742
Version 1RU
Disks : 28 36G 15K RPM drives, microcode level 05.34.04.00
- IBM SAN File System
Version 2.2.1.13
- IBM SAN Volume Controller
Microcode level 2.1.0.3 (build 2.20.0505260000)

Switches

- IBM 2109
Version F32
Microcode level v4.1.2f
- IBM 2109
Version F16
Microcode level v3.1.2a

Test summary

The tests for the TotalStorage Proven Program have been executed at IBM's Innovation Center, in Waltham, MA, from June 22 2005 to July 12 2005.

The two site configuration simulated a real life scenario in which a customer has two locations (a main data center and satellite site) separated by 3,000 miles. The simulation was achieved by installing completely separate subnets for both IP on the front-end and Fibre Channel (or Fibre Channel over IP) on the back-end.

On the front-end, two separate IP subnets were deployed through a Shunra Cloud latency simulator. On the back-end, WWN zoning ensured no Fibre Channel devices from one site could directly communicate with devices from the other site. The McData Eclipse 1620 gateways were the only link to the other site. A Dell 1650 server running FreeBSD and the dummynet software package provided WAN latency simulation.

Tests calling for active I/O used iozone, dd, and datatest (a tool developed by YottaYotta) as data generators, creating loads that used the WAN link at throughput rates of 45 MB/s.

Some tests used RedHat AS 3 release 3 as the server OS, other tests (mainly tests using IBM SAN File System) used AIX 5.3.

Conclusion

The initial testing with IBM TotalStorage DS4500, DS4300, SFS and YottaYotta demonstrated impressive performance for geographically distributed deployments. In addition, the combination of IBM TotalStorage products, SFS and YottaYotta also provided significant high availability benefits.

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