

Simplified SAN Deployment and Management for Small and Medium-sized Businesses

Technical white paper

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Executive summary

As small and medium businesses (SMBs) continue to invest in their operations, they need to grow their IT infrastructure to keep pace with business objectives while staying ahead of the competition. Utilizing email for example, as the primary tool for data and file sharing as well as customer resource management (CRM) is simply not a practical long-term strategy. Expanding SMB IT capabilities to include Web-enabled CRM database solutions, SharePoint file access, and other such applications can greatly improve SMB competitiveness by using information to take advantage of business opportunities. However, many SMB customers have limited access to IT resources making it difficult to deal with the complexity associated with upgrading their storage SAN infrastructure to support various data and file sharing applications. Until now, complexity of IT has limited many SMB customers' ability to innovate the way they do business and remain competitive. HP understands SMB's IT challenges; it's now easy for SMBs to order, implement, and manage an entire SAN, with the introduction of the HP P2000 G3 FC MSA Dual Controller Small Business SAN Starter Kit.

HP has taken the pain out of growing the IT infrastructure for SMB customers by providing a powerful, scalable, and easy-to-manage storage networking solution such as the HP P2000 G3 FC DC SMB SAN Starter Kit. Storage management in a SAN environment has never been easier thanks to this new solution. The kit includes everything needed, except disk drives, in a single part number for easy ordering—included in one part number is the HP P2000 G3 MSA FC Dual Controller LFF Modular Smart Array System, two HP SN6000 Stackable 8 Gb Fibre Channel Switches, four HP 81Q Fibre Channel Host Bus Adapters and all the rail kits, Fibre Channel cables, and optics required to build a high-performance, high-availability 8 Gbps Fibre Channel SAN.

The HP P2000 G3 FC DC SMB SAN Starter Kit also includes HP's innovative SAN Connection Manager (SCM) enterprise software and is the primary component which simplifies how an administrator manages the storage network and provisions the P2000 G3 storage—in just a few mouse clicks. Available only from HP, SCM enterprise software provides customers with a single-pane-of-glass application that uses a wizard-based graphical interface to manage all aspects of SAN. This capability includes managing HBAs, zoning the SAN fabric, and provisioning and mapping the storage resources to the servers. HP SCM is an extremely useful tool to free up an IT administrator's time and is ideal for SMB IT environments with limited resources.

The details that follow show how the entire process of deploying and managing a storage network is simplified with this innovative SMB solution from HP. It shows how SCM enterprise software consolidates many of the tasks and reduces the number of applications required to deploy, configure, and manage a highly scalable, secure, and affordable storage network.

New Simplified SAN and Storage Management

Storage Administrators are called "SAN or Storage Experts" for a reason. Deploying, managing, and maintaining traditional Fibre Channel SANs is a very specialized "art" that requires significant experience in understanding Fibre Channel protocol, zoning concepts, and SAN best practices. Similarly, the "Storage Experts" have many of the same challenges when it comes to provisioning storage resources and allocating those resources to the server systems that utilize them.

In many smaller companies, there are none of these "experts" available and thus deploying state-of-the-art storage and storage networks has been out of the realm of IT possibilities. That is of course, until now. With the HP P2000 G3 FC DC SMB SAN Starter Kit, HP changed SAN complexity to SAN simplicity with an SMB solution that takes significant complexity out of deploying and managing a state-of-the-art storage network, which is easy to order and provides a scalable yet affordable solution for small and mid-sized customers.

The HP P2000 G3 FC DC SMB SAN Starter Kit (HP part number AP847A) includes all the components listed in Table 1. All the software and infrastructure components, excluding disk drives the customer needs to build, configure, deploy, and manage a SAN that can scale up to 192 TB is provided in one kit. The only additional component required by the customer is to order the quantity and size of disk drives to be installed in the disk array. Customers can choose disk capacities from 300 GB to 2 TB per disk.

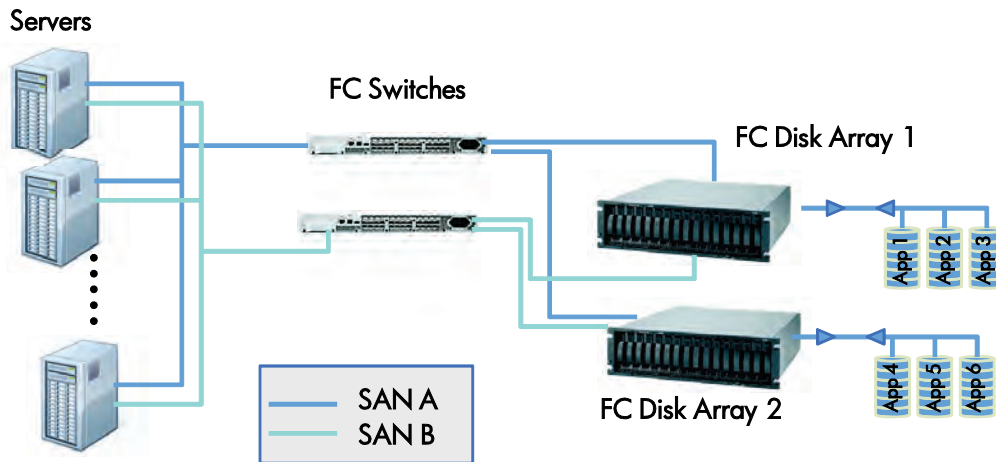
Table 1: Component List for AP874A HP P2000 G3 FC DC SMB SAN Starter Kit

Components Included in AP847A	HP Component Part Number	Qty
HP P2000 G3 MSA FC Dual Controller LFF Modular Smart Array System	AP845A	1
HP 81Q PCIe FC HBA Single Port	AK344A	4
HP SN6000 Stackable FC Switch	BK780A	2
HP 8 Gbps Short Wave FC SFP+	AJ718A	12
5M Fibre Cables	AJ836A	8
Rack Mount Rail kit for Switch	445670-002	2

Eliminating the complexity

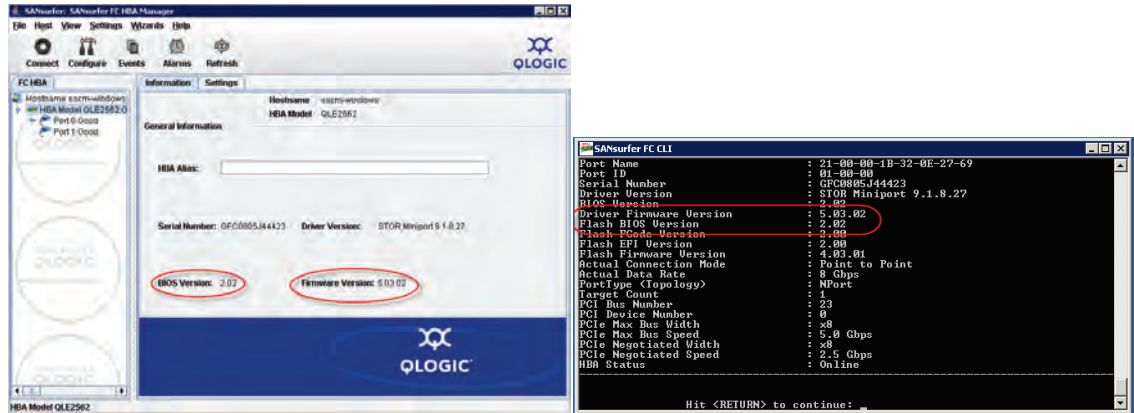
In traditional Fibre Channel SAN and storage deployments, experts need to be engaged who understand server disk management applications, storage networking applications, and administration, as well as storage experts who understand the storage management and provisioning applications. Figure 1 depicts a simple SAN configuration.

Figure 1: Basic Redundant Fibre Channel SAN



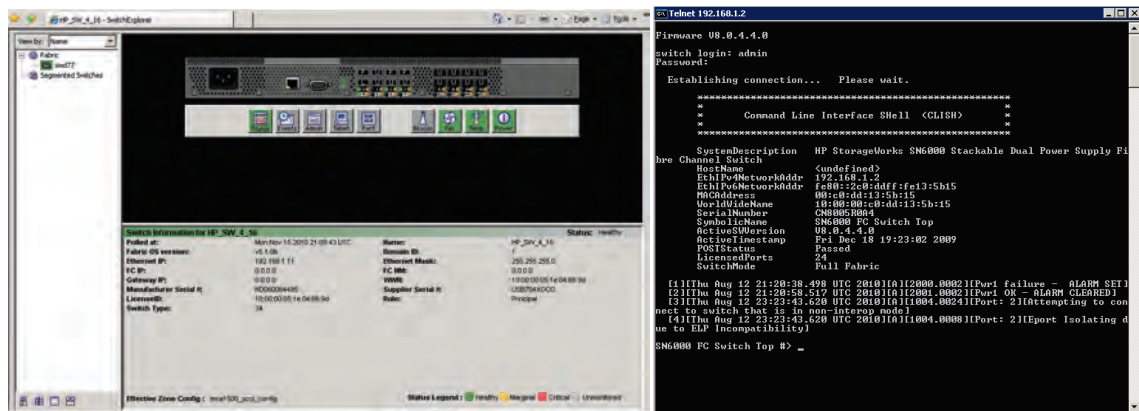
In a typical SAN, server administrators must manage the Server to SAN connection by configuring a Fibre Channel host bus adapter (HBA) using HBA management software or a command line interface (CLI) application provided by the HBA manufacturer. Examples of these types of applications are shown in Figure 2.

Figure 2: Examples of HBA Management Applications



Similarly, a storage network administrator must manage the Fibre Channel SAN switch environment. This is required to properly configure, or zone, the Fibre Channel fabric so that only the required devices are enabled to communicate with one another. For example, referring back to Figure 1, let's assume Disk Array 1 is dedicated to one server for Microsoft® Exchange. The administrator would want to block access to disk array 1 from the other servers. This task is performed with zoning in the Fibre Channel SAN through the Fibre Channel switch. The storage network administrator accomplishes this by running a GUI or CLI based switch management application. Examples of these applications are shown in Figure 3.

Figure 3: Examples of FC Switch Zoning Applications



Finally, the storage administrator must manage the storage subsystem. Like the HBAs and the Fibre Channel switches, this task is performed with a GUI or CLI based utility that is provided by the storage vendor. In most RAID-based systems today, the steps required include creating virtual disk pool and then creating volumes within the virtual pool. These volumes are then presented to the server as a disk storage device and the server is accessed to initialize and format that disk resource for use by the resident server applications.

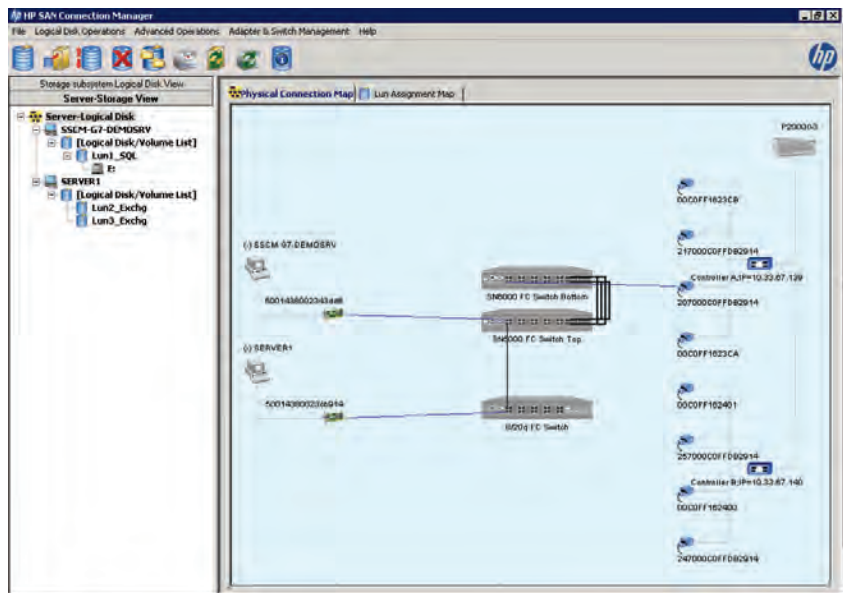
While the benefits of implementing Fibre Channel SANs can, among other things, improve access to data, data security, reduce backup windows, and improve overall system reliability compared to alternatives such as direct attached or iSCSI storage, the setup and management is far from trivial. As we have shown, the traditional approach to managing storage requires administrators to execute multiple steps with multiple applications involved. Understanding of HBAs, switches, storage and operating system tools and applications is required and typically not an undertaking that many SMB, with limited IT resources can deal with effectively.

HP SAN Connection Manager Enterprise Software: Single pane-of-glass SAN Management

Included in the HP P2000 G3 FC DC SMB SAN Starter Kit are two HP SN6000 Stackable 8 Gb FC Switches. The SN6000 switches are a component of HP's H-series Fibre Channel switch family and all H-series switches include HP SAN Connection Manager enterprise software. SCM is exclusive to HP and provides a single pane-of-glass management console for managing all aspects of the storage network—managing HBAs, zoning and mapping the Fibre Channel fabric and provisioning HP storage.

SCM enables a single administrator to manage all aspects of the storage network from a single console. A single interface through SCM greatly simplifies the number of applications and steps requiring execution to configure and setup the SAN as well as provision storage and present volumes to application servers. SCM is fully integrated with HP MSA/P2000 as well as the P6000/EVA families of disk arrays. SCM is also fully integrated with Microsoft Virtual Disk Services (VDS), which enables SCM to be used to initialize and format disk resources for Windows® Server environments. Finally, for customers who are using HP BladeSystem servers and HP Virtual Connect or FlexFabric interconnects, SCM is integrated with Virtual Connect Enterprise Manager, providing an end-to-end view of the entire storage networking environment, even in a virtual server and server blade environment. A sample topology map is shown in Figure 4.

Figure 4: SCM Topology Map



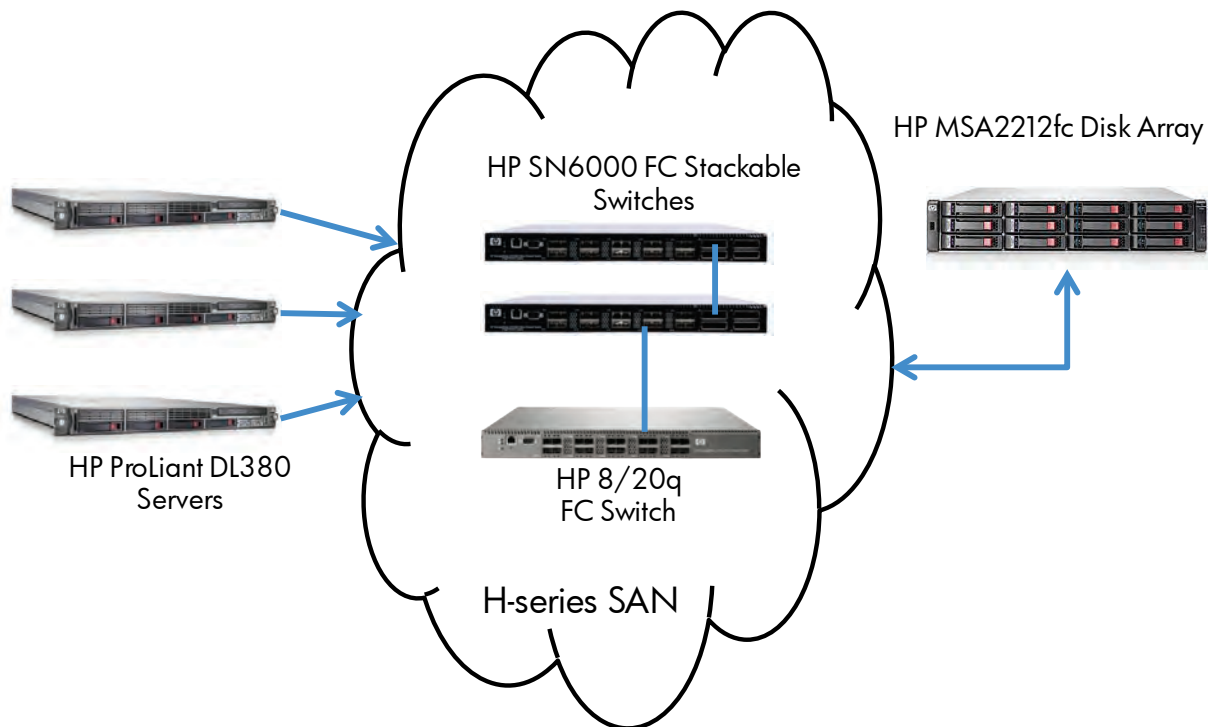
SCM allows the administrator to perform any of the following operations in the SAN environment, all from a single console:

- Topology display of all elements in the SAN including all HP branded Fibre Channel HBAs and Mezzanine Cards, H-series switches, MSA/P2000 and EVA disk arrays
- Update HBA firmware and BIOS files (HP branded QLogic HBAs only)
- FC switch management, zoning, mapping and monitoring
- MSA/P2000 and P6000/EVA disk array provisioning
- Windows-based server partitioning and formatting

Test configuration for comparing the approaches

In order to describe the differences between the traditional SAN management approach (requiring administrators to manage all elements within the SAN using discrete and different applications) and SCM, a simple storage network is depicted in Figure 5.

Figure 5: Storage Network test setup



The traditional SAN management steps to create one LUN for each server in the SAN are listed in Table 2 and the non-traditional SAN management steps using SCM enterprise software are listed in Table 3. Table 2 and Table 3 summarize the applications used and the number of steps required.

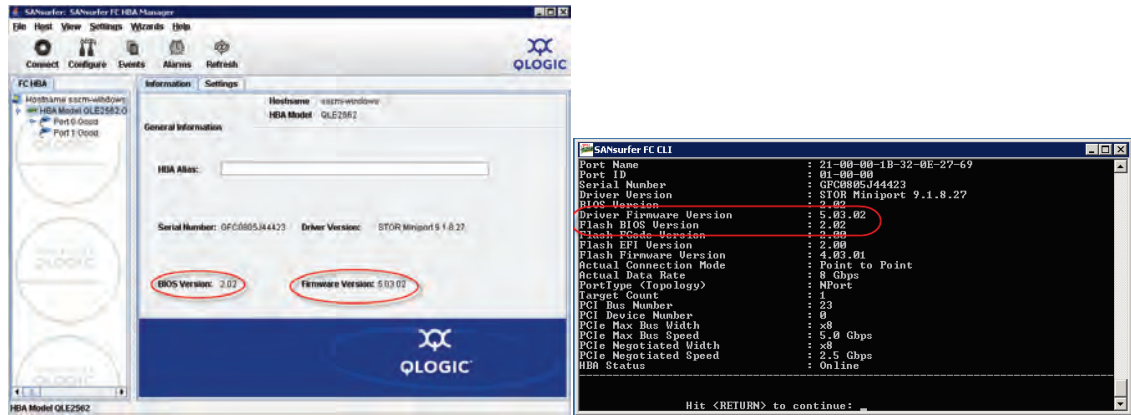
Table 2: Traditional SAN setup, configuration and management

Application/Step	Task	# of Times Applied	Comment
Install and connect SAN components			
0/1	Install HBAs in Servers, Rack mount disk arrays & switches, install cabling and power on all devices	N/A	
Configure HBAs			
1/1	Launch HBA management utility and verify/upgrade HBA firmware	3	Check compatibility guide with FC Array and ensure HBA firmware and BIOS levels are supported. If not, upgrade firmware and/or BIOS.
1/2	Reboot servers to ensure drivers loaded properly	3	
Initialize Disk Array			
2/1	Setup disk array IP address	1	Use CLI to set IP address.
3/1	Setup disk array system information	1	Use Web browser GUI to setup user accounts and system information.
Provision Disks			
3/2	Create vdisk(s)	3	Using SMU GUI menu via Web browser.
3/3	Assign spare(s)	3	Use menu to define global or static spares to assign to vdisk(s).
3/4	Create volumes	3	USE SMU menu to create volumes. Each volume must be created independently.
Zone Fabric			
4/1	Launch Fibre Channel Switch Management Utility	3	Launch CLI
4/2	Set FC switch(es) IP address	3	Use CLI for each switch in fabric to set IP address.
4/3	Create Zones for Fibre Channel fabric	3	Identify WWN for each element in the SAN and create appropriate zones to allow secure communication between devices as appropriate.
Launch Disk Management Utility on Server			
5/1	Initialize/mount volume	3	Use native Server O/S disk management tools or commands.
5/2	Format	3	Use native Server O/S disk management tools or commands.
Total		32	

With traditional SAN management, administrators must run five different applications and execute HBA and disk management tasks on each server in the SAN independently. The result is 32 different operations that need to occur, all with multiple mouse clicks involved. The following figures show the screenshots of the applications involved.

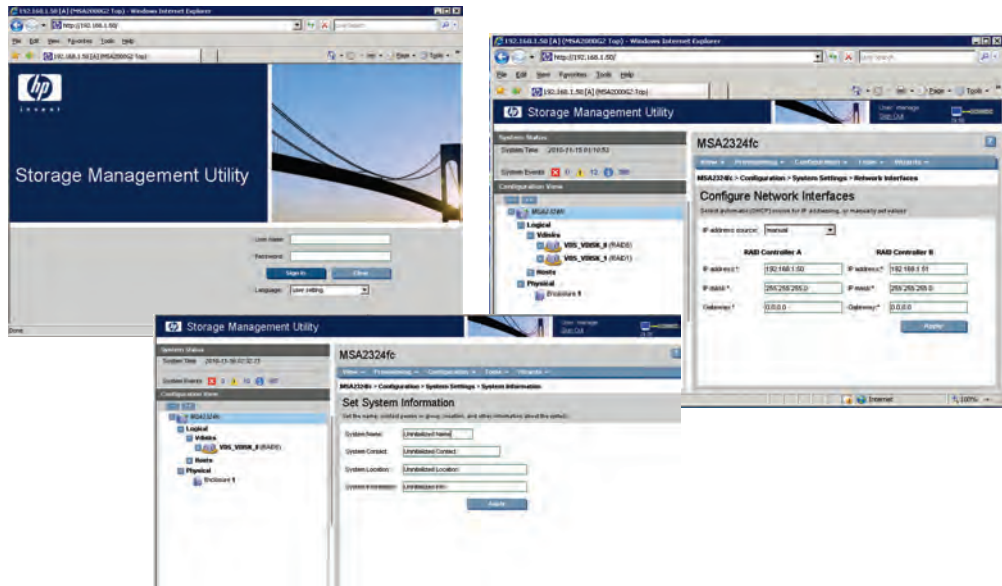
The first step after physical installation is validating the HBAs firmware and BIOS. These files must be updated using vendor specific GUI or CLI applications as shown in figure 6.

Figure 6: HBA Management Utilities



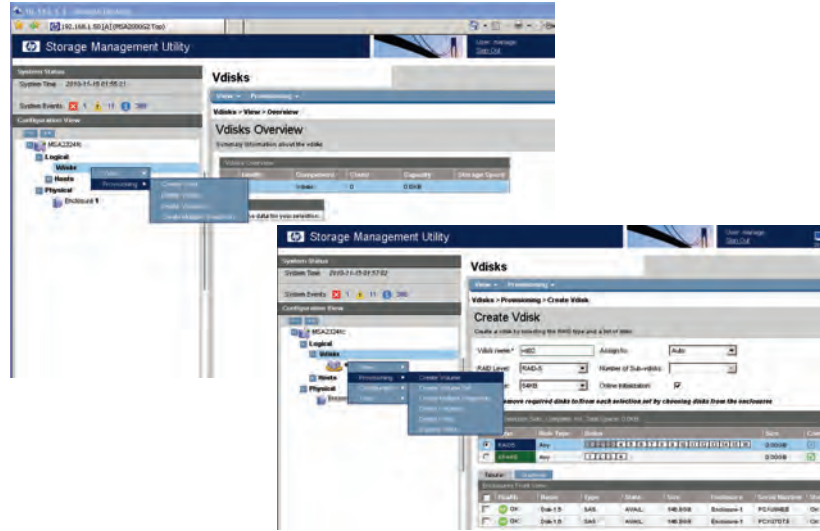
The second step is initializing the MSA/P2000 storage array. This involves launching the Storage Management Utility (SMU) that is provided by HP and providing the system with an IP address and system name information. These screens are shown in Figure 7.

Figure 7: Initializing Disk Array and Setting IP Address



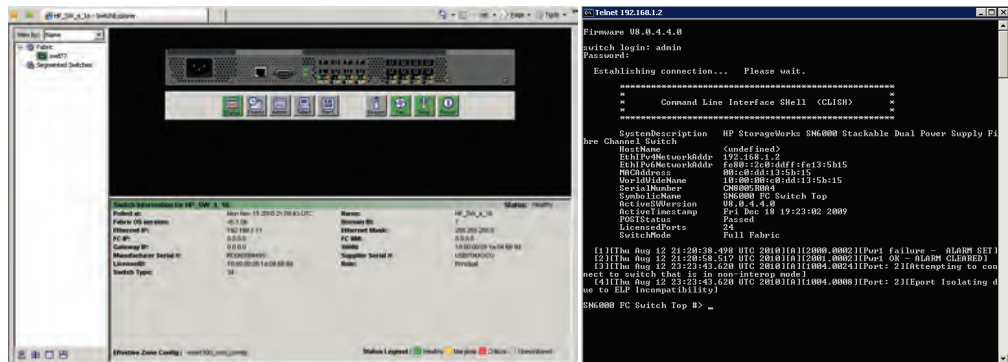
The next step is to create the virtual disk or vdisk and then create volumes. A single vdisk can contain one or more volumes. It is the volume that is presented to the server operating system for access. Each vdisk and volume is created in separate steps. Figure 8 shows a few of the configuration screens for this process.

Figure 8: Disk Provisioning—vdisks and Volume Creation



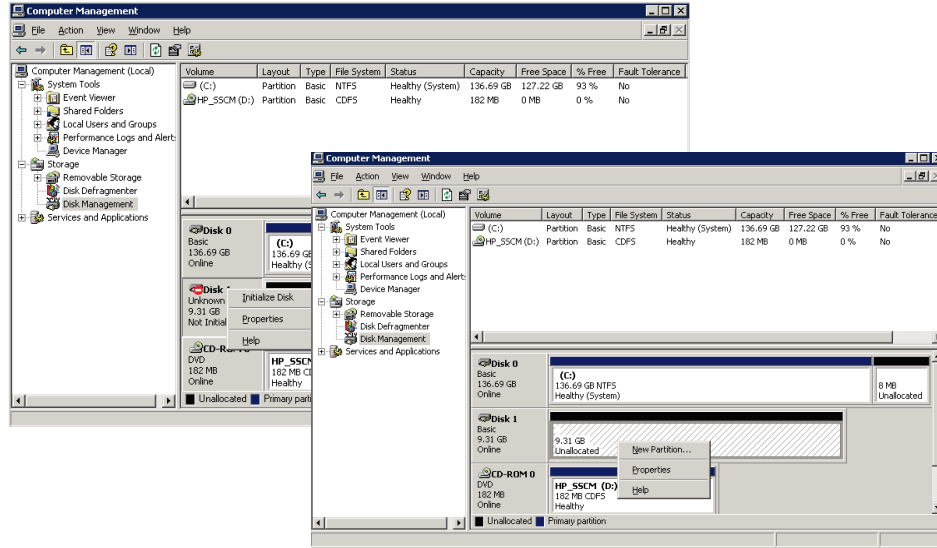
In order for the volumes to be accessible to the server through the Fibre Channel fabric, zoning must be created. This requires the administrator to know all the World Wide Name (WWN) IDs for each element in the fabric and map them appropriately using either GUI or CLI interfaces provided by the switch vendor. Examples of these applications are in figure 9.

Figure 9: SAN Fabric Zoning through Switch Management Utilities



Once the volumes are created and the zoning is completed, the servers can see the storage resources available to them. From here, the administrator launches the disk management utility for the respective operating system. For UNIX® or Linux environments this is the mount and format procedures. For Windows, the administrator uses Microsoft Disk Manager. Examples of the disk manager screens are shown in figure 10.

Figure 10: Server-based Disk Management for Initialization and Formatting



Once the formatting process is completed, the disk array resources are now available for use by applications on the server. Five different applications and 32 different steps are required to create the three LUNs and partition a disk for each of the servers in our SAN using the traditional method.

The same operations are repeated this time using SCM as the main management platform. The administrator must login to the Disk Array to set the IP address; however, all other steps are executed from the SCM management console. One exception is initializing and mounting disk resources in non-Windows servers. The mount operation must be conducted with the native O/S disk management utilities, in the same manner as a traditional SAN environment. Table 3 below summarizes the steps for setting up the test SAN and allocating disk resources to each server.

Table 3: SAN Setup and Configuration with SCM enterprise software

Application/Step	Task	# of Times Applied	Comment
Install and connect SAN components			
0/1	Install HBAs in Servers, Rack mount Disk Array & Switch, install cabling and power on all devices	N/A	
Initialize Disk Array			
1/1	Install and Launch Storage Management Utility to Setup IP address, User Accounts	1	Launch with CLI initially to set IP address.
Install SCM			
2/1	Install on each server in the SAN	3	One server must be a Windows Server to act as the management console for SCM.
2/2	Reboot servers to ensure drivers and other agent files are functional.	3	

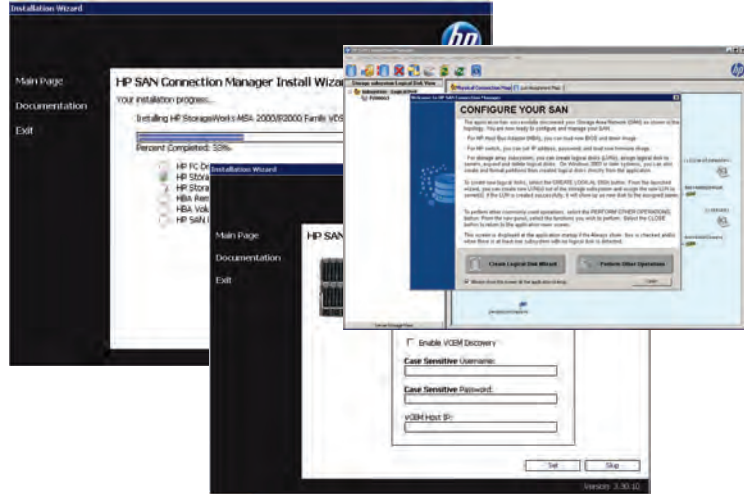
Application/Step	Task	# of Times Applied	Comment
Initialize and Zone Fabric, and Provision & Map LUNs			
2/3	Launch SCM	1	
2/4	Set IP address(es) for FC Switch(es)	1	Performed with SCM initialization process
2/5	Set system properties for Disk Array	1	Performed with SCM initialization process
2/6	Set default HBA Zoning	1	Performed with SCM initialization process
2/7	Launch Create LUN wizard	1	Create LUN Wizard in SCM allows administrator to perform the following tasks: <ul style="list-style-type: none"> • Creates vdisk • Creates volume • Zones fabric • Presents volume to server Note—Activity queue menu allows for multiple vdisk and LUNs to be created and assigned to multiple servers in a single operation.
2/8	Partitions and format drives (Windows Servers only)	1	SCM is integrated with Microsoft Virtual Disk Services and can perform these “Disk Manager” functions without having to log into another server and run the disk manager application.
Launch Disk Management Utility on Non-Windows Server			
3/1	Initialize/mount volume (non-Windows Servers only)	1	Use native Server O/S disk management tools or commands.
3/2	Format	1	Use native Server O/S disk management tools or commands.
Total		15	

Using the SCM management approach, administrators need only to launch the disk array management utility to set the IP address and then all other actions can be executed from the SCM management console. Only three applications and 15 steps are executed, which is a 40 percent reduction in the number of applications required and 50 percent reduction in the number of discrete steps. The overall management and the time required to setup and manage the entire SAN environment is significantly simplified. Included in the process is the verification of HBA firmware and BIOS settings, fabric zoning, LUN creation (vdisk and volume creation), disk partitioning and formatting in a Windows server environment. All of these actions are executed from a single user interface. The following figures 11–15 show a few of the SCM screens used to accomplish these tasks.

The first step after connecting all the hardware is to launch the HP Storage Management Utility (SMU) and setup the MSA/P2000 array with an IP address. This step is the only prerequisite prior to using the SCM software.

Step 2 is to load SCM on each server and launch it from the management server. SCM requires at least one Windows server to be a management station. On all other servers, SCM is loaded so that the proper drivers, multipath, and other agents are properly installed allowing for full SAN management and visibility. Figure 11 shows a few views of the installation screens.

Figure 11: SCM Installation



After SCM is installed on each server, it is launched from the Management Station and the administrator can then update the HBA firmware and BIOS, zone the fabric and provision the HP storage. All tasks are accomplished from SCM. Utilizing an easy to use wizard (Figure 12) or drop down menus (Figure 13), the administrator does not require other applications to completely configure the SAN.

Figure 12: Easy-to-use Wizards for HBA, Switch, and Storage Management

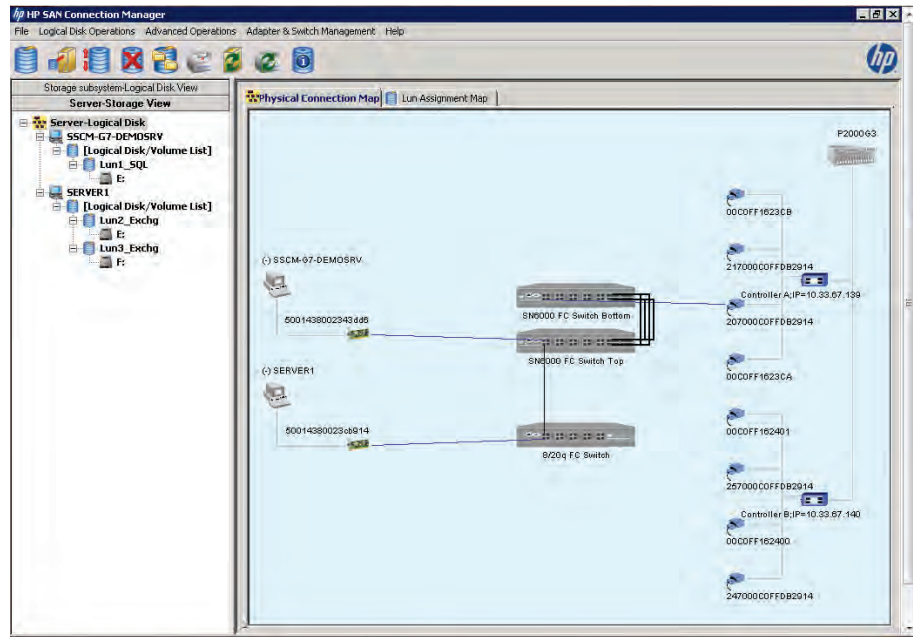
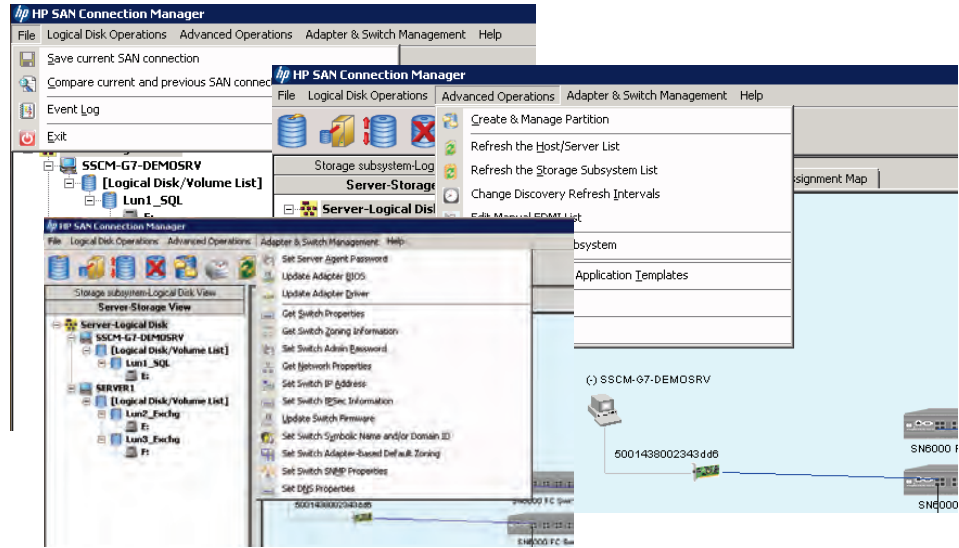
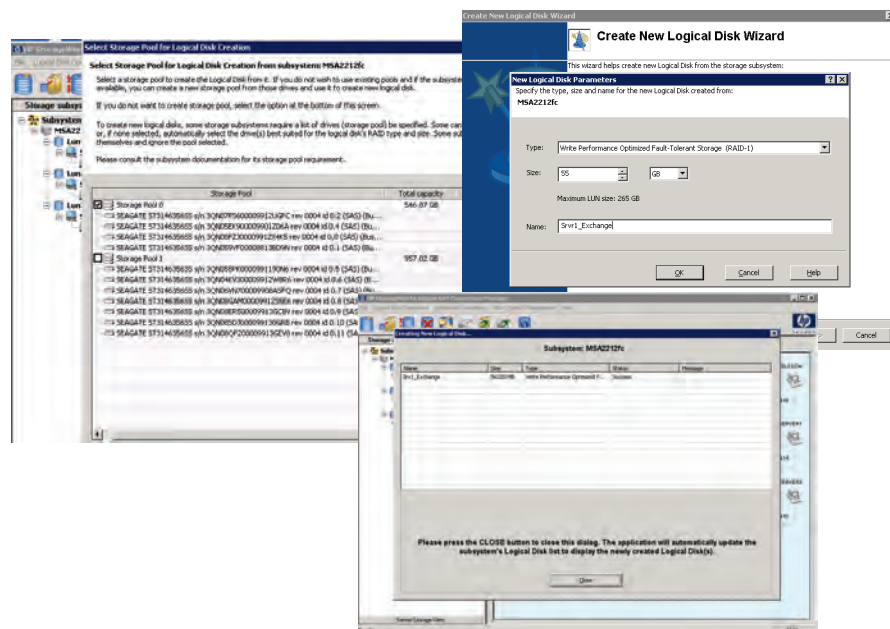


Figure 13: Easy-to-access pull-down menus



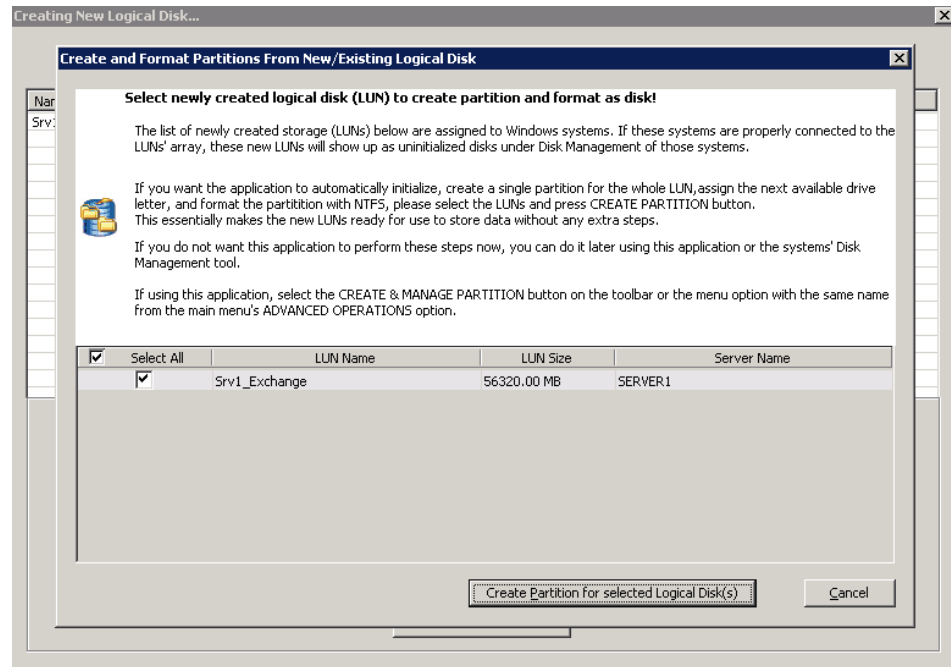
A significant SCM attribute is its ability to provision the HP P2000/MSA and P6000/EVA storage. SCM enterprise software combines and simplifies many of the steps required to create and allocate storage resources for access by the servers. Within this process, SCM is automating all the elements relating to vdisk and volume creation as well as zoning. With the simple to use Logical Disk Creation wizard, the administrator can also use SCM enterprise software to create multiple LUNs at the same time and assign each to different servers in a single process. Figure 14 shows the LUN creation process of storage pools being created on the array as well as the size of the LUN and being assigned to the server.

Figure 14: SCM Logical Disk Creation



As mentioned before, SCM is integrated with Microsoft Virtual Disk Services. This enables the administrator to partition the newly created logical disk for use with any server running the Windows Server operating system. This screen is shown in Figure 15. SCM eliminates the need to log on to each Windows server and run the Disk Manager application, saving the administrator significant deployment time.

Figure 15: SCM and Microsoft VDS Integration



The last and final step that is required is to launch the disk management application for any non-Windows servers in the SAN. In the test setup, all servers were Windows-based so this step was not required. The entire process using SCM required only two applications (three if non-Windows servers were in the SAN) and 15 steps. This is a 50 percent reduction in the number of tasks the administrator needs to perform, which saves significant time and reduces the possibility for errors to occur. Using SCM replaces at least three different applications from the traditional deployment approach and is truly a proof point for HP's Converged Infrastructure.

Summary

For the SMB, the benefits of a flexible SAN that is easy to deploy, scalable and affordable is a high priority for the business. Small and mid-size businesses will enjoy the benefits of deploying high-performance, highly scalable, and secure Fibre Channel SAN infrastructure without having to hire a "SAN Expert". Ordering, deploying, and managing a Fibre Channel SAN is simple with HP P2000 G3 FC Dual Controller SMB SAN Starter Kit. With the inclusion of H-series Fibre Channel switches and HP SAN Connection Manager enterprise software, the number of applications and steps needed are greatly reduced when compared to traditional approaches as we have shown. SCM enterprise software reduces the number of steps required to deploy and manage the SAN by 50 percent and reduces the number of applications required by at least 40 percent. Customers can start small, supporting just a few servers accessing 1-2 TB of disk storage, and then scale up to as much as 192 TB supporting over 100 connections to the SAN with this solution. And the entire SAN can be setup and deployed in under 30 minutes with SCM. There simply is no better solution on the market today that provides busy storage administrators with the tools to reduce SAN configuration by 40 percent or greater.



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