Open Systems SAN Inst. Checklist

Overview

This guide can server as a "master template" to plan for multi-product SANs, but will also refer to other documents to complete the process. For instance, rather than provide a detailed discussion of the SAN Data Gateway, this document will refer you to the SAN Data Gateway Cookbook on Techdocs. Also, this paper is not a replacement for reading the various Service or Planning Manuals provided with the products.

This document will focus SAN issues, those that almost all SAN installations encounter regardless of product makeup, and then go into some product specific issues as well.

Related Documents

Following are some documents that will be of use (besides normal product documentation.)

- SAPR Guides for specific products such as the ESS SAPR Guide.
- Sample SAN Configurations for Open systems disk on Techdocs
- Redbooks: (at http://www.redbooks.ibm.com search on "Storage" and "Area")
  - ❖Introduction to Storage Area Network (SAN) SG24-5470
  - ❖Designing an IBM Storage Area Network, SG24-5758
  - ❖Storage Area Networks: Tape Future in Fabrics , SG24-5474
  - ❖Planning and Implementing an IBM SAN , SG24-6116-00
- SAN Data Gateway Cookbook on Techdocs website (w3.ibm.com/support/techdocs)
- SAN Sales Checklist also on Techdocs website

Common SAN Issues

1. Has the combination of hardware and software been verified to be supported by IBM? If not has the customer been informed of what is not supported?

It is quite possible for any given combination of products to not be supported. This is a constantly changing issue and must be closely scrutinized. It is best to start with the support matrix for the various storage boxes, such as the ESS or 3590s, and then proceed from there.
The exact websites could change over time, but in general, a support page is found by going to the specific product page on the web, and then looking for a link to "Supported Servers" or "Connectivity" to get to the appropriate page(s).

A full list of supported servers for the Enterprise Storage Server (ESS) is at
http://www.storage.ibm.com/hardsoft/products/ess/supserver.htm

The support page for the FAStT200 is at
Http://www.storage.ibm.com/hardsoft/products/fast200/supserver.htm

The support page for the 3590 tape drive use
Http://www.storage.ibm.com/hardsoft/tape/3590/3590opn.html

The support page for 3584 tape is at
Http://www.storage.ibm.com/hardsoft/tape/3584/3584opn.html

The support page for 3583 tape is at
Http://www.storage.ibm.com/hardsoft/tape/3583/3583opn.html

Thesupport page for 2109 Fibre Channel Switches is at
http://www.storage.ibm.com/ibmsan/products/2109/supserver.htm

The support page for the 2032-064 (McDATA ED-6064) is at
Http://www.storage.ibm.com/ibmsan/products/2032/prod_data/supserver-064.html

The support page for the 2032-001 (McDATA ED-5000) is at
Http://www.storage.ibm.com/ibmsan/products/2032/prod_data/supserver-001.html

The support page for 2031-016 and 032 (McDATA ES-3016 and ES-3032) is at
Http://www.storage.ibm.com/ibmsan/products/2032/prod_data/supserver-016.html

The support page for the 2031-L00 (McDATA ES-1000) is at
Http://www.storage.ibm.com/ibmsan/products/2032/prod_data/supserver-l00.html

The support page for the 2042 (INRANGE FC/9000) is at
Http://www.storage.ibm.com/ibmsan/products/directors/prod_data/supserver-042.html

For support pages for the 2108 - G07 and R03 SAN Data Gateways, there are multiple pages reachable from http://www.storage.ibm.com/hardsoft/products/sangateway/supserver.htm

For the support page for the 7140-160 go to the following URL:
http://www.storage.ibm.com/hardsoft/products/san160/160_support_matrix.html

Depending on the configuration, it may be difficult to determine whether everything is supported or not. It may be necessary to consult Techline, ATS, ViewBlue or other resources to be sure. The next four questions refer to specific areas where support is a significant risk.

2. Is the customer using IBM hubs - either 2103s or 3534s?

IBM Fibre Channel hubs - the 2103 and 3534 - cannot really be used as hubs in any but the simplest configurations (for instance, with Netfinity supported configurations). In general, an IBM hub can only be used as a repeater - referred to as “distance extension only” - and thus can only have two of its ports in use at a time.

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3. Is (Subsystem Device Driver) SDD being used?

The IBM Subsystem Device Driver is not supported in conjunction with some other products. This is a rapidly changing issue and should be investigated thoroughly. As of 10/01/2001 SDD cannot be used through a SAN Data Gateway (SDG), through a 7139/40, nor is it usable in conjunction with TSNM.

While it is now announced that SDD can be used with HACMP (concurrent or non-concurrent), or with Microsoft Cluster Service (MSCS), there are other clustering environments where it is still not supported. SDD specifics can be found from the ESS supported server page listed above. SDD is supported for use with the ESS only. (SDD support for VSS is for native SCSI attach only.)

4. Are there any other pieces of software that could lead to an unsupported situation?

Various other software options can affect whether a situation is supported or not. Any third-party file or volume managers (e.g. Veritas) may or may not be supported. Any additions or changes to normal driver stacks can be an issue.

5. Is the customer at required software, firmware, and microcode levels?

All devices in a SAN will have some kind of code that is updated periodically, and support statements are only for specific levels of this code. Host operating systems, drivers, firmware for adapters and sometimes applications or other components need to be at specific levels to be supported. Even new machines can sometimes ship with older code and provision must be made to handle this as well.

6. Is a migration plan agreed to by the customer in place to bring all components to needed level?

Code upgrades are often disruptive, and plans for outages are required. Whatever the plan is, it must be reviewed and agreed to by the customer. While this may not be an issue in initial stages when just testing the SAN. Once there is a decision to expand into production this is a very important consideration.

Typically, code upgrades to SAN components such as switches or gateways do not require a long outage. Upgrades to storage devices and servers can take longer, especially if a problem is encountered after the upgrade.

7. Are inter-switch links (ISLs) used in the configuration?

Interconnecting Fibre Channel switches together can have support and performance implications. Vendors typically do not support connection to another vendor's switch. This is even true when connecting switches that are manufactured by the same vendor but not sold by the same vendor. For instance, if a Brocade switch from EMC is connected to a Brocade switch from IBM (a 2109), *neither* IBM nor EMC is willing to support this. This is changing based on work done by the SAN Solutions Forum in SNIA, but care should be taken that you are sure of support before doing this.

Also, vendors have limits to how many switches can be in one fabric, and how many hops can exist between them. IBM usually uses the same limitations as the original makers of the devices, but in many cases will restrict it even further. This is true of SANs using RS/6000s, and very often when new products come out, initially they are supported in "non-cascaded" (no ISLs) configurations only.

Finally, ISLs can represent a bottleneck through which a lot of traffic from disparate endpoints must flow. Care must be taken to ensure that bandwidth requirements can be met by the ISLs in the configuration.

8. Does the customer have a portable PC with Direct attach capability and appropriate RS-232 cable and adapters?

Most SAN devices have an RS-232 port for initial setup, and as a backup should there be a problem with the IP/Ethernet network. Devices are different with regard to using 9 or 25 pin interfaces, male or female interfaces, and whether a straight-through cable is required or a null modem (sometimes integrated into a cable called a cross-over cable or null modem cable). Usually, a straight-through cable with a separate null modem plus a handful of adapters will address whatever the machine requires.

Also, the PC must use Hyperterminal or some similar terminal emulator. Settings are typically 8 bits per byte, 1 stop bit, no parity, and either hardware-based or no flow control. (If in doubt use no flow control. Connection speeds are different for each device, some using 9600 bps, some using 19,200 bps, some allowing you to change the speed from the default of 9600 or 19,200.

9. Has the customer reserved IP addresses and Ethernet ports (on an Ethernet hub or switch) for all manageable devices?

SAN devices come with Ethernet ports for management. IP addresses are assigned to these ports either through a control panel or through a terminal or PC connected to an RS-232 port (see above). These Ethernet ports must be connected either to the customer's Ethernet/IP network, or in some cases, may be in a separate network accessed only by special management PCs running the Server portion of a Client-Server management application. (In this case the Server PC has two Ethernet ports, one connected tothe normal LAN for Client machines to reach it, and one on a separate LAN to talk to the devices themselves.) Device configuration, code upgrades, and SNMP management are all done using IP addresses on the Ethernet ports. In large networks, even if you are not going through a Server PC to get to the devices, it is advisable to put all of the Ethernet ports on SAN devices in a separate IP subnet(s), using a router for access from other networks. This way, the various SAN devices do not waste cycles responding to all of the broadcasts in other parts of the network. In addition, by going through a router to get to the devices, some security is available to control who can get to the devices (via router configuration.)

10. Is there sufficient space and power outlets for all of the devices?

While this is an obvious consideration, it can easily be overlooked while dealing with all the other complex issues a SAN entails. Every device will require space (typically on a rack), and access to a power outlet.

11. Do you have all the Fibre Channel cables needed?

Most customers will have a lot of 62.5 micron cables used with their LAN. SAN devices typically require 50 micron cables and thus new cables will need to be ordered with the appropriate lengths and terminators. Single-mode cables used in LANs can be used for single- mode links in SANs. 50 micron multimode fiber is only supported for distances up to 500 meters. For distances longer than that single-mode fiber must be used, and the appropriate device port must be ordered (either single-mode GBIC or card depending on the device.) Cables must match the ports/adapters they are plugged into.

12. What are the customer's SAN skills?

Many forms of education are available. It is very risky to attempt to just "go blind" into your first SAN installation. IGS services can cover installation - and can even provide skills transfer as part of the installation - but one way or another it is imperative that the customer have skilled personnel managing the SAN.

13. What kind of security is required for managing the SAN components?

Some platforms (e.g. 2109, 2031) allow browser access to their products, and provide userids and passwords which are stored in the device itself. Others (e.g. 2032, 2042, 2108) have a client/server application such that userids and passwords are stored *on the server machine itself*. This means that if a "rogue employee" installed their own copy of the management software on a PC that had IP access to the devices, they could use the default passwords to get administrator access to the devices. This can be solved with totally separate LANs and physical security, or with separate subnets and logical security through a router.

This issue needs to be addressed early in any installation.

14. Who will have administrative authority with the management software?

Userids with administrative authority can not only change anything in the particular device, but can typically also add and delete users, or reset their passwords. There is always a default admin password that is a security exposure if left unchanged. On the other hand, if you forget the admin password, there is often, at best, a disruptive procedure to go through to get back to ground zero.

Some products allow you to have multiple admin userids, and it is advisable to do this so as to have some backup. In other cases you may only have one, and it is best to have some mechanism other than memory to avoid dealing with a forgotten admin password.

15. Is there a functional test plan?

This need not be sophisticated, or even formal, but some sense of what will be tried first, then what next, and so on, is very important. There is a natural tendency to just hook everything together, turn

everything on, and then see what works and what doesn't. The result is a very confusing collage of symptoms that can be very difficult to sort through.

Customers should have a plan that involves connecting one server HBA to one switch to one storage port first, just to get that much working, and then gradually add more devices to build up the SAN. A few guidelines and recommendations:

Bring all servers and devices up to proper code levels before connecting to the SAN.
Single-path configs should be tested prior to testing multipath functions.
Single-server configs should be tested prior to testing clustered configs.
Single switch configs should be tested prior to testing cascaded SANs.
Remember that soft zoning only takes effect when a server "rescans" the SAN. When in doubt or having trouble reboot the server to force it to reconfigure with the new zone.
Don't forget to test failover mechanisms.