

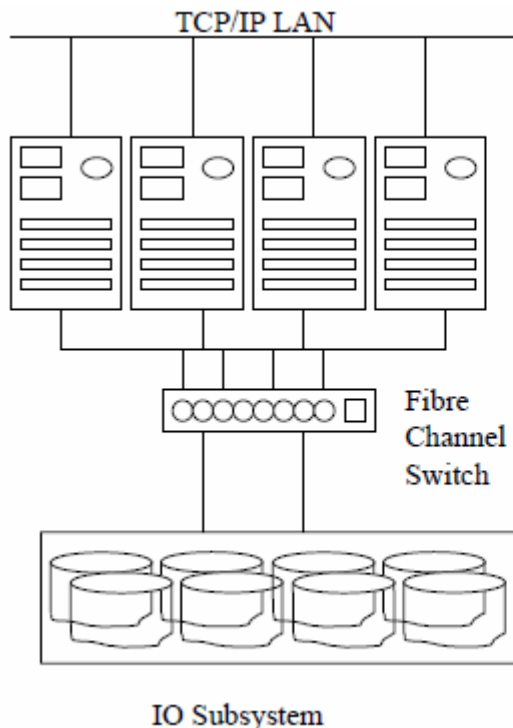


SAN and NAS Solutions - Introduction, Topology, and Terminology

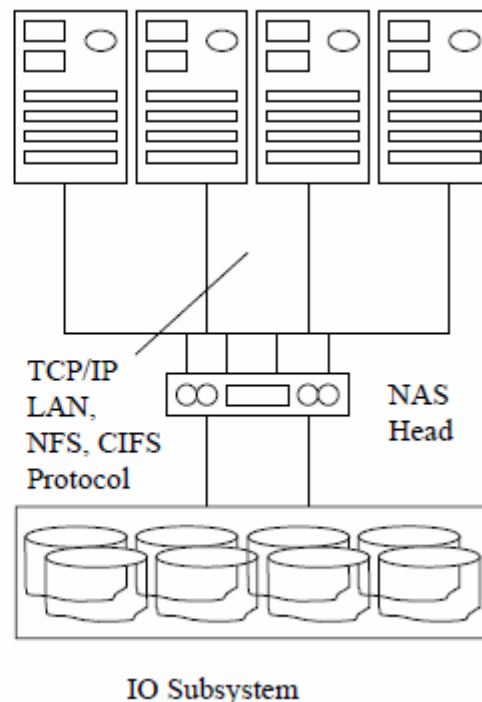
Introduction

At a first glance, SAN and NAS solutions seem almost identical, and as a matter of fact, many times either solution may be applicable in any given environment. In general, NAS and SAN solutions utilize RAID systems that are connected to a network. However, there are *significant differences* between SAN & NAS solutions, which do have a profound impact on how the actual data is being accessed and utilized.

SAN Topology



NAS Topology



The Wires being used:

- NAS solutions utilize TCP/IP based networks, such as Ethernet, FDDI, or ATM
- SAN solutions use Fibre Channel connections

The Protocols being used:

- NAS solutions use TCP/IP and NFS/CIFS/HTTP based networks
- SAN solutions utilizes Fibre Channel encapsulated SCSI setups



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NAS Terminology

- The NAS head represents the part of the NAS solution required for the clients to connect to the IO subsystem. Behind the NAS head, hundreds or thousands of GB of available IO storage may exist, but the clients have to access the IO space via the NAS head. A NAS head is also called a NAS Gateway (a system), which serves as the actual control function of a NAS
- NFS (Network File System) is one of the communications protocols usually supported by NAS heads (for the communication with the network clients); particular in UNIX or Linux based solutions.
- The CIFS (Common Internet File System) protocol is primarily responsible for file sharing and communication with Windows (and Linux-based Samba) servers, and represents another commonly supported protocol for most NAS heads. Most Windows clients utilize CIFS to communicate with the NAS head. Both, NFS and CIFS utilize TCP/IP as the underlying communication facility.



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SAN Terminology

- A SAN solution can be described as a network of storage disks. In large environments, a SAN connects multiple server systems to a centralized pool of disk storage. Compared to managing hundreds of servers (each with its own disk subsystem), SAN's simplify system administration tasks. By treating all the company's storage as a single resource, disk maintenance and backups are easier to schedule and control.
- SAN solutions provide high-speed disk access capabilities. The SAN network allows data transfers among server systems and IO subsystems at the same (high peripheral channel) speeds, as if the IO subsystems were directly attached to the serve systems. The Fibre Channel technology is the driving force behind SAN's
- A centralized SAN connects multiple server systems to a collection of disks, whereas a distributed SAN typically uses one or more Fibre Channel or SCSI switches to connect the nodes from several buildings or campuses. For longer distances, SAN traffic may be transferred across ATM or SONET fabrics
- SAN over IP. Another valuable SAN option is an IP storage based solution, which enables data transfers via IP over fast Gigabit Ethernet (locally) or via the Internet (remotely).



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Table 1: Additional SAN & NAS Differences

SAN AND NAS DISTINCTIONS	
NAS	SAN
Machine that connects to a LAN (or is interconnected to a LAN via a WAN) can utilize NFS,CIFS or HTTP protocol to connect to a NAS	Server class devices that are equipped with SCSI Fibre Channel adapters connect to a SAN.
A NAS identifies the data by file name and byte offset, transfers file data or metadata, and handles security, user authentication, file locking	A SAN addresses the data by logical block numbers, and transfers the data in (raw) disk blocks
A NAS allows greater sharing of information, especially among different operating systems	File Sharing is operating system dependent, and may not exist for all operating systems that are being used
File system is managed by the NAS head unit	The SAN servers manage the file system

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