

# Storage Area Networks and You

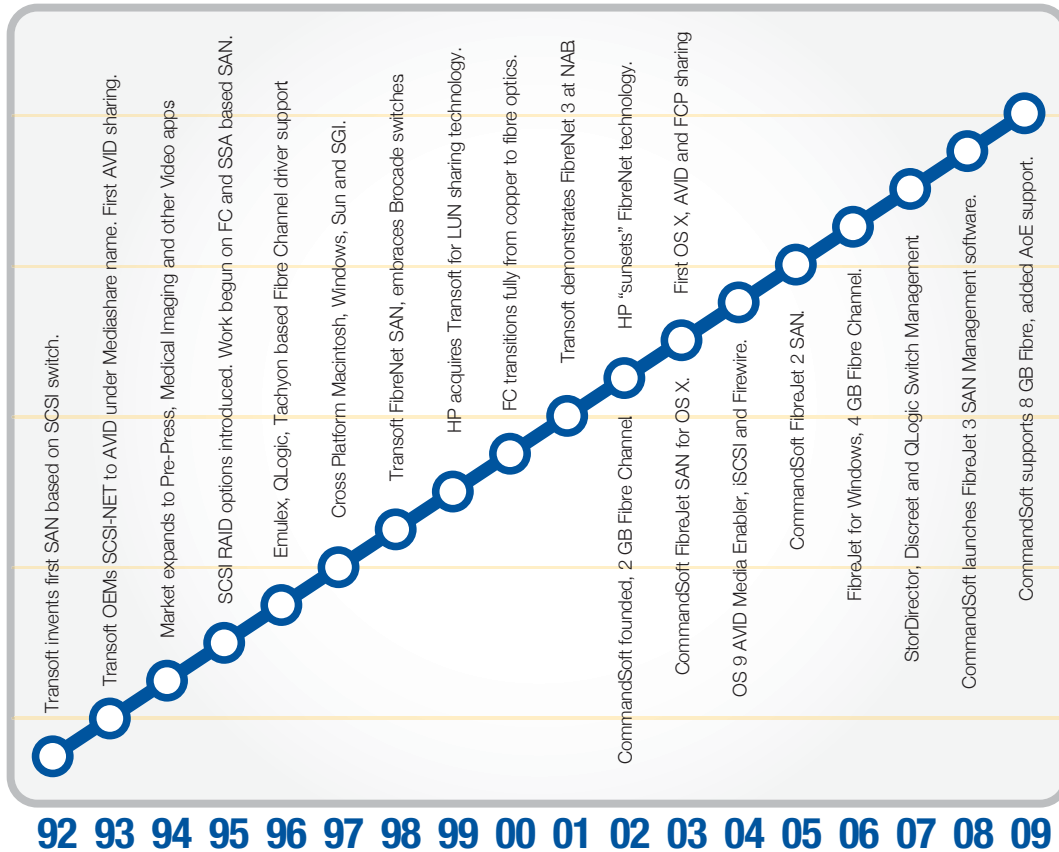


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# CommandSoft SAN Development Timeline

## A Legacy of Innovation and Working Together



## Why Choose CommandSoft Solutions?

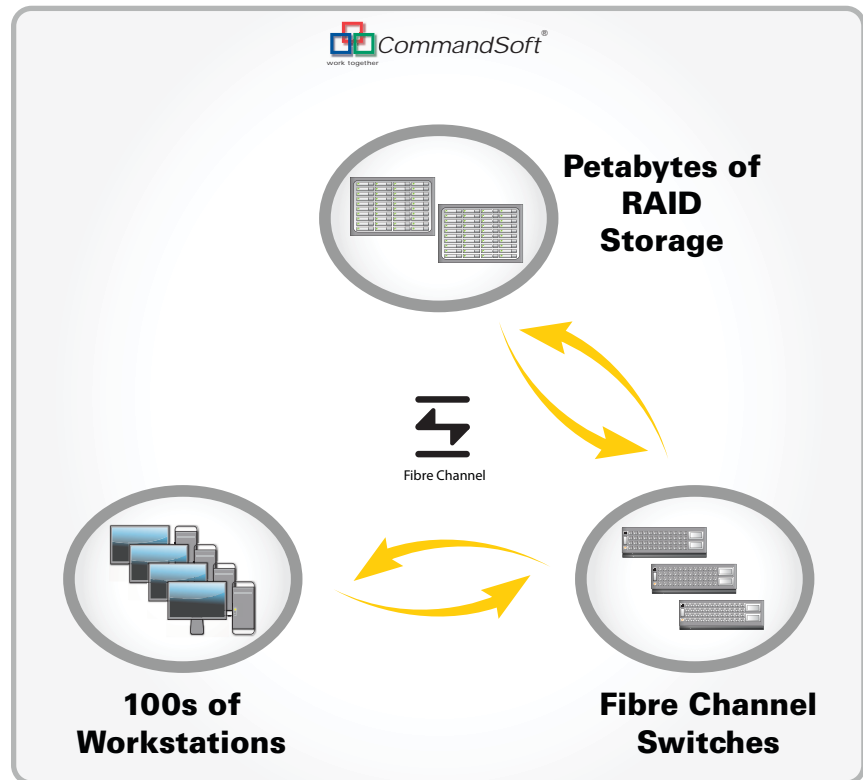
The people at CommandSoft have been building, selling and supporting SAN solutions since before the term SAN was even coined. The year was 1992, and the first solution was a SCSI switch allowing multiple workstations to share SCSI storage at the same time. Invented in Santa Barbara, California (a location for Flying A Studios, one of the largest West Coast film studios before the rise of Hollywood and playground for cinema icon, Charlie Chaplin), the 21st century film/video technology for the digital age was born with the new release of the product known as SCSI-Net. Seven patents later and nearly a decade into the new millennium, we find key technology pioneers working at CommandSoft, Inc. always on the leading edge, keeping customers previous, current and future shared storage investments protected as we continue leading innovation while also constantly adding support for new technologies in this rapidly changing market. Why buy CommandSoft? Experience, know-how, price/performance, features and support. Do the math and do your organization a favor. Go with the leader - CommandSoft.

**Jim Wolff**

Founder and CEO  **CommandSoft**<sup>®</sup>  
work together

## Bigger SANs doing more real work than the competition

Whether your SAN needs are large or small, CommandSoft's FibreJet blows the competition away. Our people invented the SAN and have been innovating longer than anyone else. CommandSoft customers worldwide are doing extraordinary levels of work the competition just can't match.



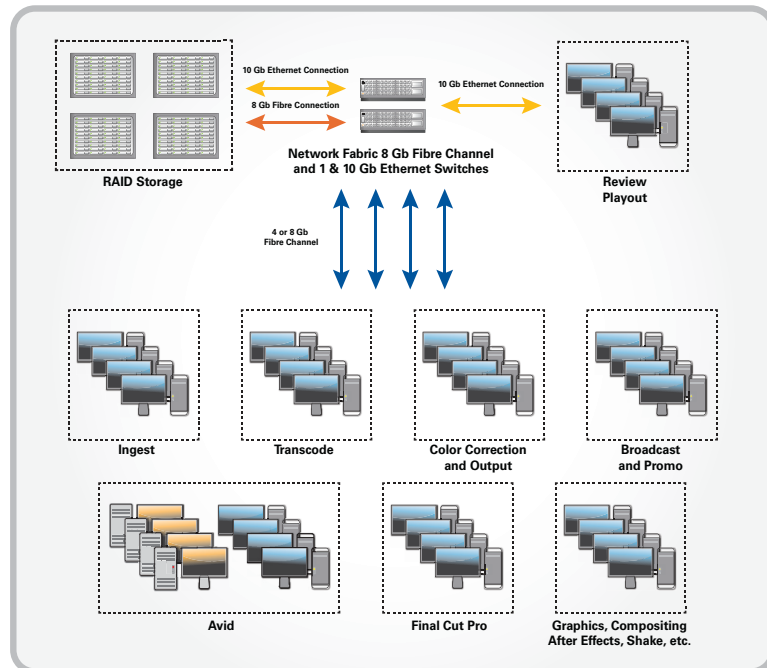
Work together is not just a nifty notion. CommandSoft's Open Systems approach has always bred loyalty among customers as it leverages their past and future investments. We don't tie you down to any one trick pony proprietary solution that locks you in and limits your options. As a result customers benefit from rapidly changing technology advances while preserving their key legacy investments.

Despite an occasional competitor's claims to the contrary, history shows the truth. CommandSoft is the SAN innovator and was first to market with support of many new technologies and features, such as AVID and FCP project sharing, workflow centric project and asset management, data life-cycle management and migration, RAID support and advanced sharing.

Take the time and look at the facts yourself. FibreJet simply can't be beat when it comes to Architecture, Scalability, Price/Performance, Wide-ranging Application Support, Heterogeneous Platform Support, Sharing, RAID, Fibre Channel, iSCSI, AoE Infrastructure Support and even FireWire SAN support. Check the facts, then give us a call at 1-800-447-0144 and become a proud member of our exclusive FibreJet club of customers and start getting more done faster and cheaper.

## Why Sharing Storage is a good thing

Storage and Workstations consolidated into a Storage Area Network (SAN) offer many gains in production workflows, reduced cost of ownership, increased utilization of valuable storage and media assets and reduction of management tasks.



The ability to share pools of storage on demand to any workstation streamlines production workflows for collaborative projects. SAN architecture offers the highest performance yet at a lower cost. Underutilized and wasted storage capacity is a thing of the past. Higher availability and easy, virtually unlimited scalability all amount to less down time and lower costs in meeting the expanding demands of your business.

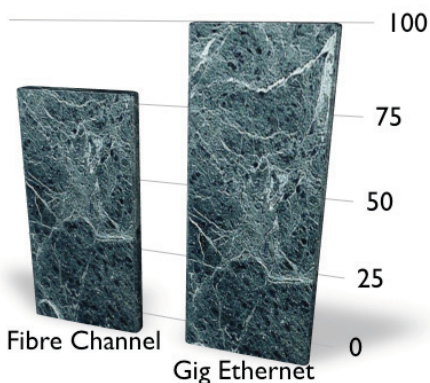
Centralizing content media and improving the visibility of on-going progress with multiple editors increases collaboration and enables easier distribution to the right people when needed. Project life cycles are completed quicker and with better results.

A primary workflow advantage to centralized storage is that ingested or created content is available to anyone that needs it, as opposed to stand-alone edit suites, which must duplicate and transport required material.

FibreJet's heritage can be traced back to the major achievement in 1992 of being the first SAN solution to share AVID. In 2005 with the release of FibreJet 2.0, FibreJet was the first SAN solution to fully support Apple's Final Cut Pro projects. This feature maximizes the concept of sharing to its ultimate collaborative benefit.

FibreJet has always been workflow specific and has evolved a set of mature features for managing edit workstations, users, projects, and configuration profiles. This helps editors and administrators get their work done faster, optimizing the project life cycle and giving the ultimate in control when accessing all your media assets.

■ HD SAN Solution true cost



## Price / Performance analysis guidelines

When evaluating a shared storage solution, it is important to compare some major metrics when making the price / performance buying decision.

The first question to keep in mind: what are your requirements today and what is your road map for expanding in the future? The answer must be considered in terms of the total number and types of media streams that your solution must sustain while serving your day-to-day needs. Choosing a solution that fails to meet these expectations can result in editors complaining about dropped frames or, even worse, complaining they are unable to work at all in your target resolutions. Choosing a solution that does not readily scale to your future requirements means you'll be failing to leverage today's investment on future opportunities.

Once you define your media stream requirements, Command-Soft's professionals can help you to match those requirements to real world solutions. They'll help you to choose hardware that will serve your needs today while also designing in whatever extra head-room you may wish to discuss for safety.

Be wary of benchmarks or "lab" condition performance information from competitors. Make whomever you discuss your requirements with back them up with guarantees of meeting your expectations in writing. If this makes them even slightly nervous, you should be too!

Consider this example of just some of the pitfalls about which you should be aware when discussing your bandwidth requirements and your total cost for a shared storage solution. Unfortunately, some less scrupulous SAN/storage vendors might represent on a broad level that their GigE solutions should be able to stream 4 uncompressed SD streams in Final Cut Pro and they'll go further by claiming a cost advantage because GigE is built into most workstations already. In fact, certain popular 8-bit and 10-bit uncompressed SD media formats require bandwidth of about 25 MB/s, so 4 of these streams would require 100 MB/s, which also happens to be over the theoretical bandwidth limit for GigE transmission.

How can those vendors make this representation? Perhaps they benchmarked using a different, nonstandard form of uncompressed SD? This is why it's critical to be sure that you are talking on the exact terms when discussing your application's bandwidth needs. Better still, define your bandwidth needs in terms of megabytes-per-second (MB/sec) performance so there can be no confusion in terminology.

It is important to determine exactly how many simultaneous streams of the type in question (SD in this case) can actually be supported by the proposed shared storage solution. You also need to know what kind of limitations the proposed storage has regarding the number of simultaneous workstation connections it can support. The question might be framed as follows: "We know we need four 25 MB/sec uncompressed SD streams to each of the 8 workstations in our facility. How will the shared storage solution be configured to handle this?"

Continuing with our example, if we determine during our bandwidth discussion that you have some concerns about a near-term need to some HD streams, we'll likely find that the GigE storage solution requires the addition of expensive 10 GigE infrastructure and workstation hardware along with more storage boxes to increase the spindle count.

Following our example to its conclusion we will very likely discover that the bottom line price / performance reality is that our example vendor's "low cost" GigE-based SAN actually ends up costing us more than an equivalent Fibre Channel based solution, totally invalidating the notion that it is cheaper to go with GigE instead of Fibre Channel.

What's the lesson here? Specify your bandwidth needs and verify that terms used in discussions are mutually understood with regard to sustained throughput, stream count and workstation population requirements. Get your prospective SAN storage vendors to provide performance promises in writing along with firm, clearly quoted pricing. This is the only way to honestly compare one shared storage solution against another in a meaningful way.

## The myth of File-Level vs. Volume-Level workflow sharing

You may have been told not to use a Volume-Level locking solution or that File-Level Locking is somehow better for "your" workflow. This is a myth easily proven false by simply taking a little time to do your homework.

### Workflow sharing steps

Ingest  
 Edit  
 Render consolidate  
 Share Project, Bins, Media  
 Graphics  
 Output

*All these things are accomplished by Volume-Level and File-level solutions. The Fact is, there are more Volume-Level SANs in use.*

Today in the real world there are a lot more Volume-Level SANs supporting digital post workflows than there are File-Level SANs. File-Level SANs are managed differently. With the addition of each new project, File-Level SANs require additional access management that must be put in place and maintained. This access management essentially achieves the same results you get automatically with Volume-Level locking solutions except, with Volume-Level SANs, you don't have the ongoing additional access management tasks that File-Level SANs require to protect multiple users from writing over each other's work and destroying files they should not be accessing.

Why do we keep hearing this myth then? And why listen to us? The myth persists because there are simply too many unscrupulous storage vendors in the world today. Fortunately, you can trust us because CommandSoft's CEO and founder, Jim Wolff, is the inventor of US Patent #6,044,367 Distributed I/O Store (as well as 6 other patents governing SAN technology). This particular patent covers File-Level SAN file systems and the concept of third party transfer. CommandSoft knows SANs!

The history of file-level locking is a long and troublesome story. That story begins with the idea:

"Wouldn't it be great if I could have multiple people writing to the same file system just like I can when multiple people mount a file system shared out by a file system server?"

As this problem was first solved on SANs it was mired in problems with performance, scalability, and devastating file system corruption, creating constant interruptions of service to all SAN users.

Because some of these SANs used proprietary file systems, they were plagued with metadata corruption often resulting in catastrophic loss of all their SAN data. It was not uncommon to hear about these horror stories in the early days of AVID Unity or Apple's Xsan.

These early systems also struggled with single points of failure because they required a metadata controller to traffic all I/O on the SAN. This requirement also limited scalability early on as the metadata traffic travelled over much slower Ethernet networks and they required tremendous processor and memory resources at the time.

As years went on some of these problems were eased as computers and networks became faster and more systems were based on standard file systems (rather than proprietary file systems) that could be repaired more reliably.

One problem immediately apparent with using SANs for media editing and sharing storage within applications such as AVID and Final Cut Pro was that those applications were not originally designed with multiple users sharing the same assets at the same time. As a result, the makers of those File-Level locking solutions began developing "hacks" to get around these problems.

As it turns out, when you have multiple writers to the same file system at the same time you run into issues of coordination where often editors will move or delete important media assets that others are relying upon. Another issue arises when multiple editors open the same project for editing at the same time. In those cases, whomever saves their file last will overwrite anything the other editors have been doing. (This is an old Xsan 'gotcha'.)

As a result of these issues, the File-Level locking vendors have developed over the course of years, complicated management intensive workarounds to these common problems. Although they all use different names for these activities they all come down to a need to set up artificial permissions and access barriers for different users and differing projects so that the File-Level locking ability on which they stake their claim to fame doesn't damage all of your work.

The result? It's quite ironic, but in the end, they artificially enforce what a Volume-Level locking solution automatically does for you already – protect multiple writers from destroying or overwriting each others work.

Some terms to watch out for are “bin-locking”, “project-locking”, “media-spaces”, “access control”, “rules based management” and “read-only enforcement”. Don't be fooled! Although marketed as value-added features, they are in reality just various vendors' responses to the massive management layer necessary to get their File-Level locking solutions to even function in a truly shared-storage environment. Each of those “features” simply serves to prevent things such as your projects, bins and media assets from accidentally getting deleted! Once set up, they provide a GUI interface to change the “read-only” access from one editor to another – sounds eerily similar to a single-writer at a time Volume-Level locking solution, doesn't it? That's because it essentially ends up that way after those vendors force their customers to go to all that extra work to set up and maintain their File-Level SANs.

In the end, it is much less work during the project life cycle to use a well designed workflow with Volume-Level locking solution as opposed to using a File-Level locking solution where you always fear something will get overwritten or destroyed by accident if those responsible for managing the SAN aren't diligent enough to set everything up correctly for the next project.

## **The fallacy of unlimited seat licensing vs. per seat licensing**

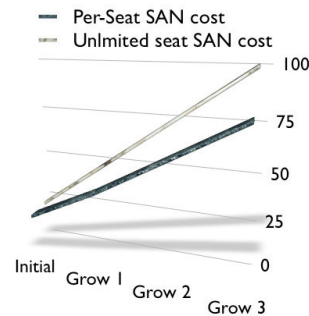
Another common misconception is the idea that a customer might buy a SAN solution which has no limit to the number of workstation “seats” that can be connected and this is therefore a better value.

The fact is quite the contrary when you actually get a system quote and review your true total cost of ownership. The reason for this is actually quite simple – one of those “Why didn't we realize that to start with?” kind of things once you see it.

Software and hardware manufacturers make money from their intellectual property by charging an amount they think they can get from the market for their products by setting a value for their ideas.

When a SAN vendor sells a solution, specifically some combination of storage and the software to manage it, and then claims that there is no per-seat license fee, and that you may therefore connect as many workstations as you want to that system, that may be true enough on the surface, but it isn't the "whole truth". The part that they invariably fail to mention is that any given storage array will only ever get so much performance out of the quantity of disk spindles within that array. At some point, as you add new clients to those SANs, the overall bandwidth would have to be shared with so many users that you discover the only way to maintain desired performance levels is to ADD MORE OF THEIR STORAGE.

And guess what – when you have exceeded the bandwidth available out of the storage from those vendors their answer is to sell you another storage box which they will again assure you can be connected to an "unlimited" number of "free" seats.



Here's the real kicker: To monetize their intellectual property those vendors have priced their storage options in a way that "hides" the cost of their intellectual property within the price of their storage hardware. You pay that "hidden" cost EVERY TIME YOU BUY THEIR STORAGE! So you are actually paying for those "unlimited" "free" seats whenever you need to add more storage capacity, whether you need to add more workstation clients or not.

Those vendors' customers quickly realize that their solution actually costs much more than an equivalent FibreJet solution priced per seat for the SAN management software license.

It's simply because CommandSoft's per seat model allows you to pay just once and only once for the SAN management software intellectual property component. As a benefit, with the FibreJet solution you also get UNLIMITED ability to attach as much storage bandwidth and network bandwidth as you might need forever. When you find you need to add capacity, you can easily do so and you always have the option of buying industry standard off-the-shelf storage hardware that doesn't force you to pay for the SAN intellectual property over and over again.

A better way to think about CommandSoft's per seat pricing model is to think of it as the "unlimited additional storage capacity and bandwidth" model. In comparison, the "unlimited seat" model claimed by others should be considered the "pay hidden intellectual property costs again and again" model.

## **Powerful AVID, Pro Tools, and Final Cut Pro Project sharing without the management nightmare**

CommandSoft's FibreJet solutions have always provided complete shared-storage collaboration for multiple editors on projects using AVID, Pro Tools, Final Cut Pro and countless other applications. In fact, FibreJet solutions work with more applications than do file-level locking solutions of any brand.

FibreJet provides the full benefit of centralized storage, and project, bin, and media sharing using Open Standards, and non-proprietary technology. What's better is that you get this best media sharing without any of the complicated management tasks necessary in file-level locking solutions. File level locking solutions that have pages and pages of instructions on how to setup and maintain correct access and rules for groups of read-only accessed media. All this additional management so that configured assets do not accidentally get deleted, renamed, or moved. File level solutions try to sell you that this somehow makes you more secure and then they finish off this so called shared write access with an interface allowing the passing of Write permission to a single user at a time.

With FibreJet's Volume-Level locking solution you get an elegantly simple, easy-to-use interface allowing the passing of write permissions for any volume to another user without all of that complex, difficult to configure management nonsense required by File-Level products. With FibreJet, you get a correctly setup workflow to protect media assets automatically from being deleted or overwritten, while allowing editors to fully collaborate and truly share the media assets and projects at the same time.

With FibreJet, ingest operations, edits, render consolidations, graphics creations and manipulations, transcoding jobs, and outputting jobs can all be scaled to whatever levels necessary to get projects done on time and within budget. That's why FibreJet has the world's largest media production SANs in operation today.

## Estimating stream count, Workstation, and storage requirements

An estimate must be constructed which accounts for the typical maximum needs for today and in the future of each workstation that will exist in the SAN. Once you have estimated the anticipated bandwidth each workstation will utilize in terms of resolutions and stream counts and/or rendering and graphics production jobs, you must then account for potential future workstations you may wish to eventually add to the SAN.

Given these estimate numbers, an appropriate storage system provision and fabric bandwidth can be designed into the SAN, directly resulting in a range of costs to achieve the different levels of desired performance and functionality. Think of it as a sort of road-map of your current workflow and your future growth.

CommandSoft is an Open Systems provider, meaning our FibreJet SAN technology is designed to work with the widest range of storage and SAN configurations possible using standard, off-the-shelf third party components, including 1Gb, 2Gb, 4Gb & 8 Gb Fibre Channel, GigE & 10 GigE Ethernet NAS, iSCSI, and AoE (ATA-over-Ethernet) based storage systems.

CommandSoft's turnkey solutions are designed to offer plug-and-play "SAN-in-a-box" convenience and functionality. Below is a chart showing some likely CommandStor configurations (from CommandSoft's lineup of pre-configured storage offerings) as they relate to number and type of stream counts you should expect to be supported based on the number of spindles in each storage box as it relates to the resolution of the video being used.

The following chart is based on a sampling of stream counts supported as listed in the vertical column and the number of spindles available in each storage box as represented in the horizontal column headers (FC8 equals 8 spindles; FC16 equals 16 spindles and so forth), as your CommandSoft SAN consultants might recommend them.

<b>Stream Count</b>	<b>FC8</b>	<b>FC16</b>	<b>FC24</b>	<b>FC40</b>
AVCHD	8	25	30	40
DV25/HDV	8	25	30	40
DVCPRO	6	20	24	35
DVCPRO HD	5	16	20	25
SD 8 bit	4	12	16	26
SD 10 bit	3	10	14	24
PRORES HQ220	3	8	12	22
DNx220	3	8	12	22
8 bit HD 720p	1	2	4	7
10 bit HD 720p	1	2	4	6
8 bit HD 1080p	1	2	4	6
10 bit HD 1080p	0	2	4	4
2K	0	1	2	4

## **Project, profile and protection management**

FibreJet supports the widest range of professional workflows in the industry. Here are some of FibreJet's volume-level workflow environments for various shared media collaboration environments where FibreJet deployed volume-level SAN solutions are working successfully today.

FUNimation  
 Skywalker Sound  
 University of Notre Dame  
 Lansing Community College  
 Indiana University  
 Minnesota Public Radio  
 Sony Pictures Entertainment  
 ANIXE TV GmbH & Co KG  
 44 Blue Productions  
 Pluto Post

## **Integrated storage data migration and expansion engine**

Large SANs must manage multiple priorities and many on-going projects. FibreJet offers critical tools to manage the storage assets efficiently during the various project life cycles. With FibreJet, your storage system can easily adapt to changing needs. As projects are completed, new projects come online, and existing projects change, FibreJet offers tools to reconfigure and recycle storage on the fly. Besides integrated project management, FibreJet also contains a powerful data migration engine that helps manage large volumes of media assets. Need more storage for a project? No problem! With FibreJet, you can simply assign more storage or grow an existing volume in certain cases. The choice is yours.

## **Advanced RAID options**

CommandSoft's CommandStor storage offerings include the latest in data protection and RAID technology. CommandSoft not only supports RAID-0, RAID-1, and RAID-5, it also now offers advanced RAID-6 protection against multiple drive failures.

## **Connect via 2Gb, 4Gb & 8Gb Fibre Channel, GigE & 10 GigE, iSCSI or AoE**

Since CommandSoft's FibreJet solution has always been based on open standards and not tied to any propriety SAN technology. It is transport independent meaning it is not tied to one technology. If your FibreJet SAN starts out with an iSCSI or AoE technology, and later needs to include Fibre Channel, that's no problem. FibreJet allows mixed Fibre Channel and GigE technologies to coexist in one SAN.

## **Products and Services**

CommandSoft is your one-stop source for SAN management software development, SAN design and SAN deployment. We provide high-quality services to a broad range of companies; high-technology companies, IT departments of corporations, post production businesses of all types, from major studios to independent production companies, educational institutions, government offices at all levels and others.

We combine over a decade of experience in SAN management software development with customers in the US and around the world. With a team of well-trained software professionals, a mature development process, specialized services and an excellent infrastructure, we ensure that you derive the best value for your money.

At CommandSoft our design and development team works to create superior SAN solutions with a wide array of functionality. Whether you need a single seat solution or an unlimited seat solution, our experienced sales professionals and our world class customer support engineers can help you plan, build and maintain your company's storage solutions through genuinely enterprise standard software initiatives and with industry proven enterprise hardware solutions.

CommandSoft provides solutions to help you better manage your projects whether they are located on the same site or at multiple locations. CommandSoft's FibreJet SAN management software is a truly multi-platform application that allows you to create workflow solutions in mixed operating system environments and across multiple SANs. Allowing an unlimited number of people to work together in a secure work environment on multiple levels all simultaneously. Keeping it simple and working together.

#### Products

FibreJet SAN Management Software

CommandStor Turnkey SANs (small to large SANs)

#### Services

Custom SAN Design for your workflow

SAN Site Management

## **Strategy and technology consultancy**

CommandSoft begins every business consultation with an effort to get a thorough understanding of your business. We define the equipment you should engage with our software for a recommended plan of action that you should follow; a plan that will help you transform your ideas and enterprises into future secure business and proven workflow environments. We start with years of extensive research and SAN management experience that gives us a clear understanding of the marketplace we serve; an understanding of your needs and the products and services you will use to deliver your finished product. Based on this, we define an optimum SAN management plan for you.

After this, CommandSoft assists you in grounding all these thoughts into technical realities. We work with you and our team of industry professionals to formulate a complete plan of how you can best achieve your workflow objectives so that you can provide successful service to your customers through sound, effective and proven management of your data assets.

## **Onsite consultancy**

Many companies, both domestic and multinational, work in partnership with CommandSoft to staff their technical positions. CommandSoft provides reliable and productive computer / IT consultants on a “per project” basis. We can provide the required manpower and resources which allow your company to effectively implement high quality technical solutions, while contributing to your company’s growth and securing your long term competitive advantage. Over the past six years, CommandSoft’s clients and associates have had tremendous satisfaction with our efficient and timely services.

It’s not news that the ever-increasing demand for data storage has changed the way business is being conducted all over the world. Whatever the enterprise may be and wherever it may be, businesses large and small are turning to SANs to improve their ability to manage data, share information, and work collaboratively to better their bottom lines. In this redefined data storage model and newly emerging business scenario it is important that you find the right solution necessary to enable your business to compete effectively. This is what we do.

CommandSoft provides enterprise-wide SAN solutions to organizations worldwide. Whether you need a SAN for data rich applications, a SAN solution for collaborative computing, or simply a SAN solution for more effectively working together, our team of skilled professionals will provide you with the perfect solution that fits your needs. Our FibreJet products have been developed keeping in mind the growing need for cross platform and true multi-platform compatibility with an increasingly demanding compatibility with multiple applications running in a shared environment. This is nowhere more evident than in the Audio/Video production and postproduction industry.

## **Any workflow, any time, worldwide customer examples**

Customers worldwide have transformed their production facilities with the advanced and time proven FibreJet SAN technology.

FibreJet is ingenuity that just plain works. Here at Command-Soft we have always been innovators with unmatched industry experience, expertise and passion. We continue to be committed to pushing boundaries so your work knows no limits. Our goal is to create unique products that enhance the collaborative multi-function environment you work in and enhance every aspect of your entire workflow process.

FibreJet products have been at the technical core of the music you listen to, the games you play, the shows you watch and the movies you've seen for more than a decade. FibreJet solutions are used to produce everything from books on your iPod to full track scoring for major motion pictures and virtually everything in between. FibreJet customers have always been the leaders in their field of creativity, ranging in size from the individual freelance engineer to some of the worlds largest multinational media powerhouses. Here are just a few of our customers.

## FibreJet Customers

1 Giant Leap  
Beantown Prod. LA  
FUNimation  
Focus on the Family  
Joe Media  
Walt Disney Company  
Nick Davis Productions  
Primerica  
Sony Pictures Entertainment  
Tallahassee Community College  
Viewpoint Creative  
44 Blue Productions  
Bose  
Habitat for Humanity  
Home Depot  
Louisiana Media Services  
Media Underground  
Oxygen Media  
Skywalker Sound  
Splice Inc.  
Troublemaker Studios  
Pie Town  
ANIXE TV GmbH & Co KG  
Eurotroll Multimedia AB  
Hollywood Motion Picture Museum  
Indiana University  
Manatee Bay Post  
Midnight Media  
Pluto Post  
Sonic Magic  
Steam Motion and Sound  
University of Denver  
Academy of Art University  
Arlington Public Schools  
AT&T  
Berklee College of Music  
Cornell University  
HBO  
University of Notre Dame  
US Army  
Verizon  
Toyota Motors  
NYC TV  
Showtime

