DATA STORAGE AND RETRIEVAL SYSTEM ABSTRACT

by

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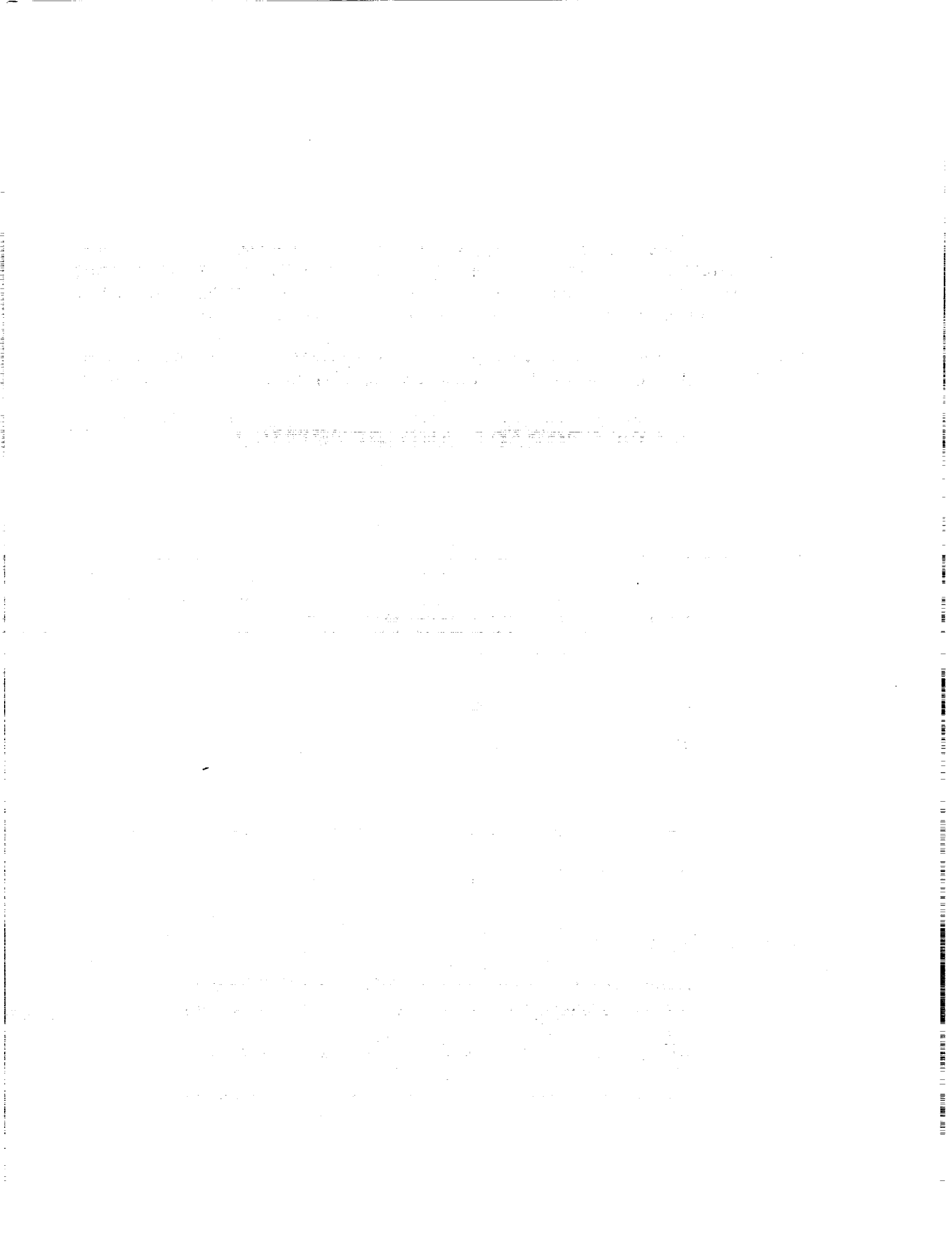


DATA STORAGE AND RETRIEVAL SYSTEM ABSTRACT

The STX mass storage system design is intended for environments requiring high speed access to large volumes of data (terabyte and greater). Prior to commitment to a product design plan, STX conducted an exhaustive study of the commercially available off-the-shelf hardware and software. STX also conducted research into the area of emerging technologies in networks and storage media so that the our design could easily accommodate new interfaces and peripherals as they came on the market.

All the selected system elements were brought together in a demo suite sponsored jointly by STX and ALLIANT where the system elements were evaluated based on actual operation using a client-server mirror image configuration. Testing was conducted to assess the various component overheads and results were compared against vendor data claims.

The resultant system, while adequate to meet our capacity requirements, fell short of transfer speed expectations. A product team lead by STX was assembled and chartered with solving the bottleneck issues. Optimization efforts yielded a 60% improvement in throughput performance.

The ALLIANT computer platform provided the I/O flexibility needed to accommodate a multitude of peripheral interfaces including:

- Up to twelve 25MB/s VME I/O channels
- Up to five HiPPI I/O full duplex channels
- IPI-2, SCSI, SMD and RAID disk array support
- Standard networking software support for TCP/IP, NFS, FTP.
- Open architecture based on standard RISC processors
- V.4/POSIX-based operating system (Concentrix)

Standard 1 Terabyte System:

- Alliant SRM-1 computer with approximately 100 GBytes of user online storage (capable of expansion to over 1 TeraByte) in the maximum strategy arrays and one point-to-point link for a Cray supercomputer using the UltraNet link to provide up to 50 MBits/s transfer and a STK 4400 ACS with one LSM and a 2-controller CAS with eight transports (four transports for

archiving and four transports for backup to provide a backup transport for each function).

This configuration distributes I/O over four VME data paths with each bus providing a sustainable transfer rate of 40 MBytes to memory and 24 MBytes from memory. Three VME chassis are used to provide four data paths by subdividing one chassis into two paths, yielding a total of 29 device slots. The described configuration uses 14 slots, leaving 15 space slots that can be used for a mix of additional disk arrays, network interfaces or archival read/write stations.

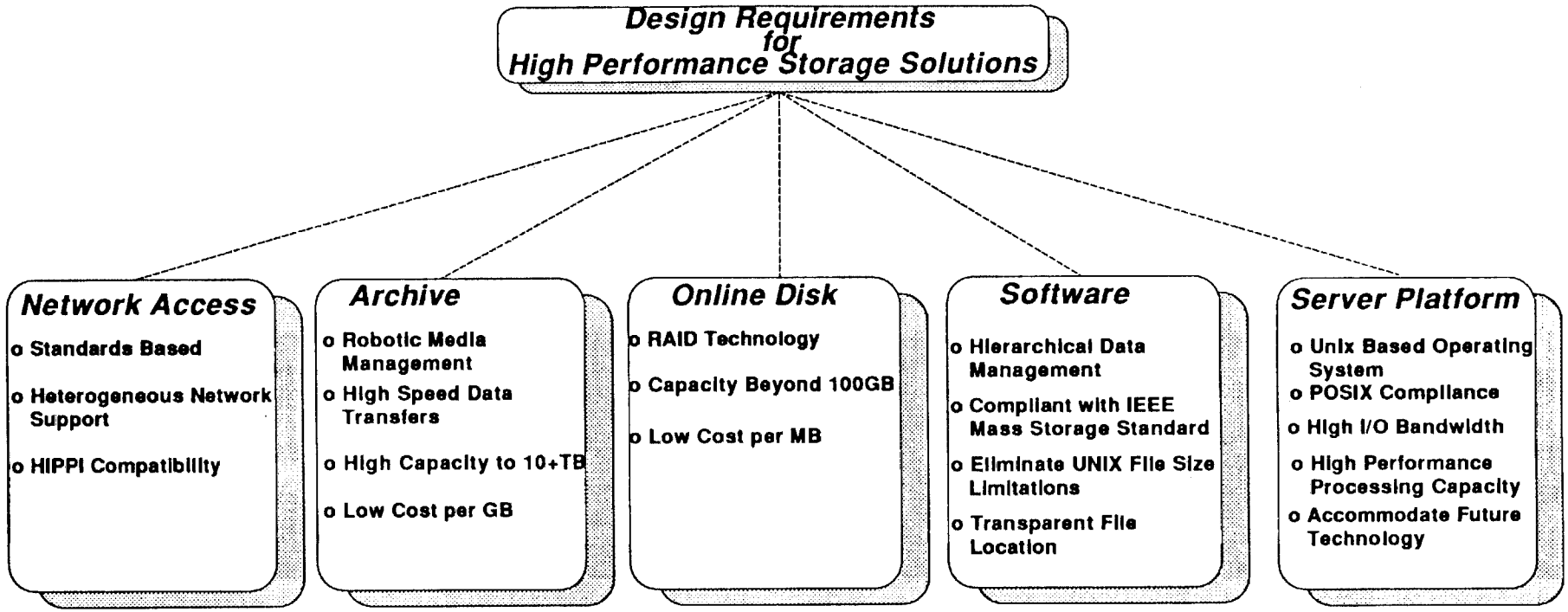
Aside from performance requirements, the companies surveyed many candidate users to determine other features and benefits that would be valuable to an end-user. The most common concern was that a system put in place today still be viable in 5 years. Our product team then turned its attention to growth path issues to ensure that newer, higher speed network architectures could be accommodated and that new storage technologies could be added as they became available.

All components including the software are modular in design and can be reconfigured as needs and system uses change. Users can begin with a small system and add modules as needed in the field. Most add-ons can be accomplished seamlessly without revision, recompilation or re-linking of software.

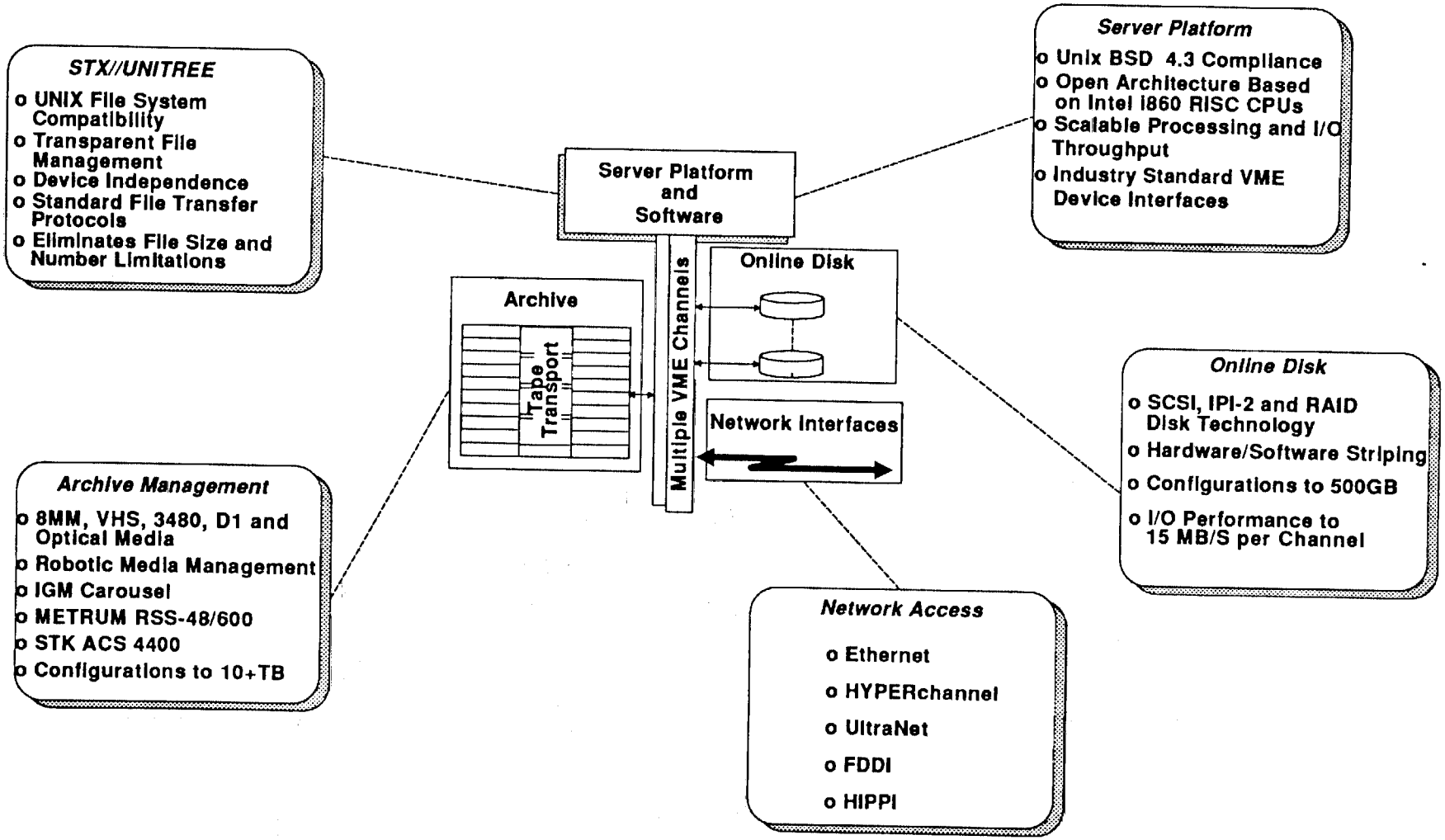
Since the software is device-dependent only at the lowest layer, new interfaces and peripherals can be easily accommodated.

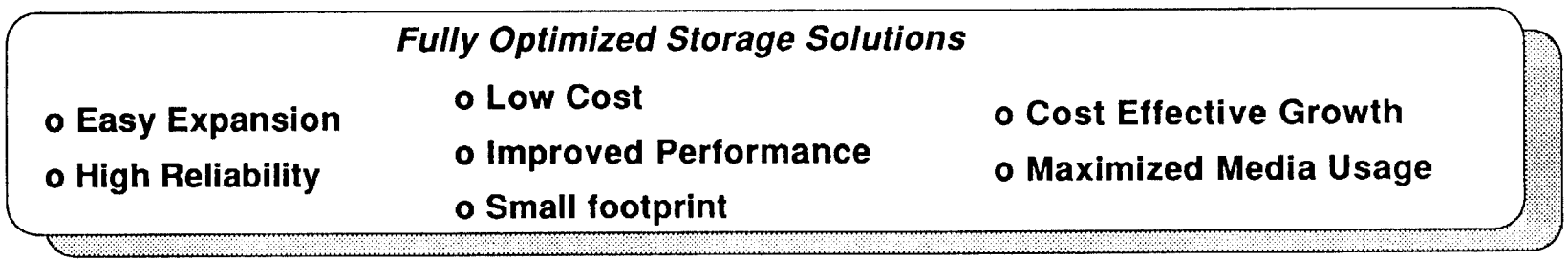
Ongoing development is focused on:

- Implementation of HiPPI capability
- Selection and interface of D-1, D-2 tape systems
- Interface to Metrum RSS-600
- Interface to SUMMUS//MAGNUS tape jukebox


Design Requirements
for
High Performance Storage Solutions
Network Access
o Standards Based
o Heterogeneous Network Support
o HIPPI Compatibility
Archive
o Robotic Media Management
o High Speed Data Transfers
o High Capacity to 10+TB
o Low Cost per GB
Online Disk
o RAID Technology
o Capacity Beyond 100GB
o Low Cost per MB
Software
o Hierarchical Data Management
o Compliant with IEEE Mass Storage Standard
o Eliminate UNIX File Size Limitations
o Transparent File Location
Server Platform
o Unix Based Operating System
o POSIX Compliance
o High I/O Bandwidth
o High Performance Processing Capacity
o Accommodate Future Technology

STX//Storage Solutions
High Performance File Management Systems




Fully Optimized Storage Solutions
o Easy Expansion
o High Reliability
o Low Cost
o Improved Performance
o Small footprint
o Cost Effective Growth
o Maximized Media Usage