Achieving High Performance Backup
on OES NetWare® and OES Linux

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Agenda

Achieving High performance Backup in OES NetWare & OES Linux

- Overview
- Understanding backup performance
- Methods to finetune performance
- Troubleshooting tips
- Future

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Storage Management Services (SMS)

Provides a single consistent backup infrastructure

- File systems and Applications
  - One solution for all needs
- Common experience across platforms (NW, Linux)
  - Reduced learning curve
- Similar experience across services
  - Ease of administration
  - Performance optimizations will aid all services

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Whats new in SMS?

SMS features

- Support for NSS and VFS file systems on Linux
- Support for Linux only and mixed node clusters
- NetWare emulation mode on Linux
- Format compatibility and seamless interoperability with NetWare
- Ability to handle rich NSS meta-data on Linux
- Scalable performance model

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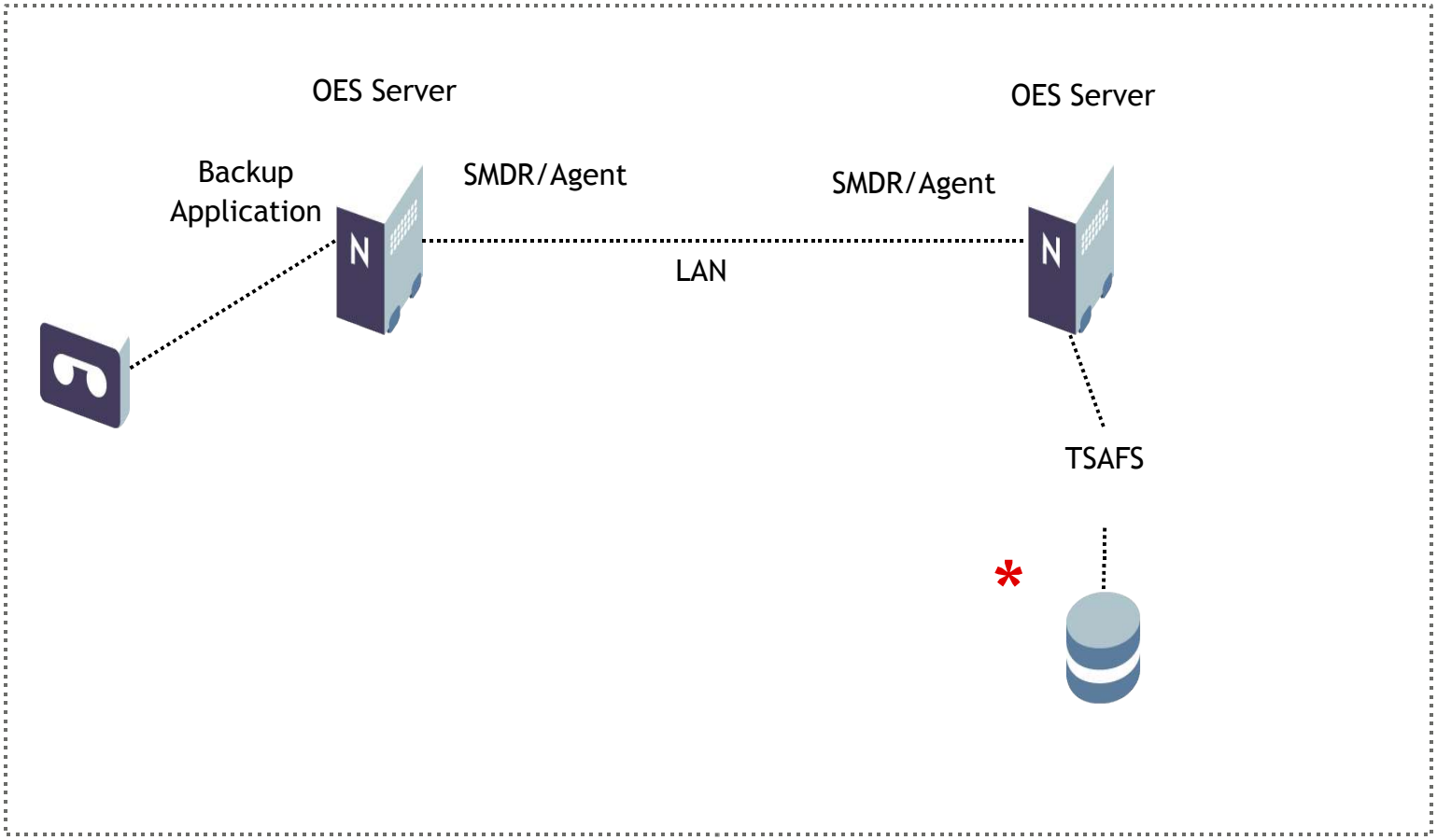
Backup data flow



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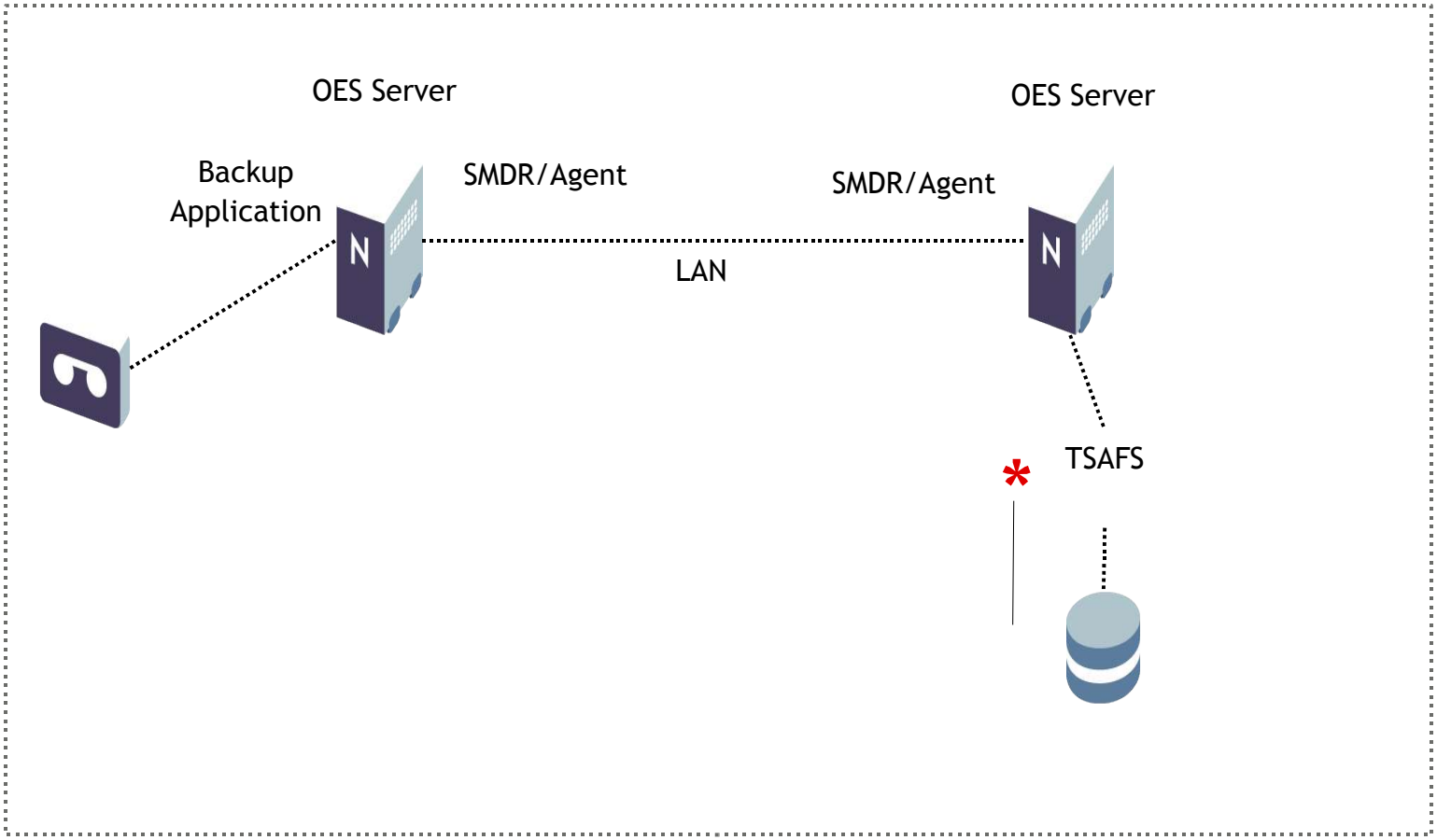

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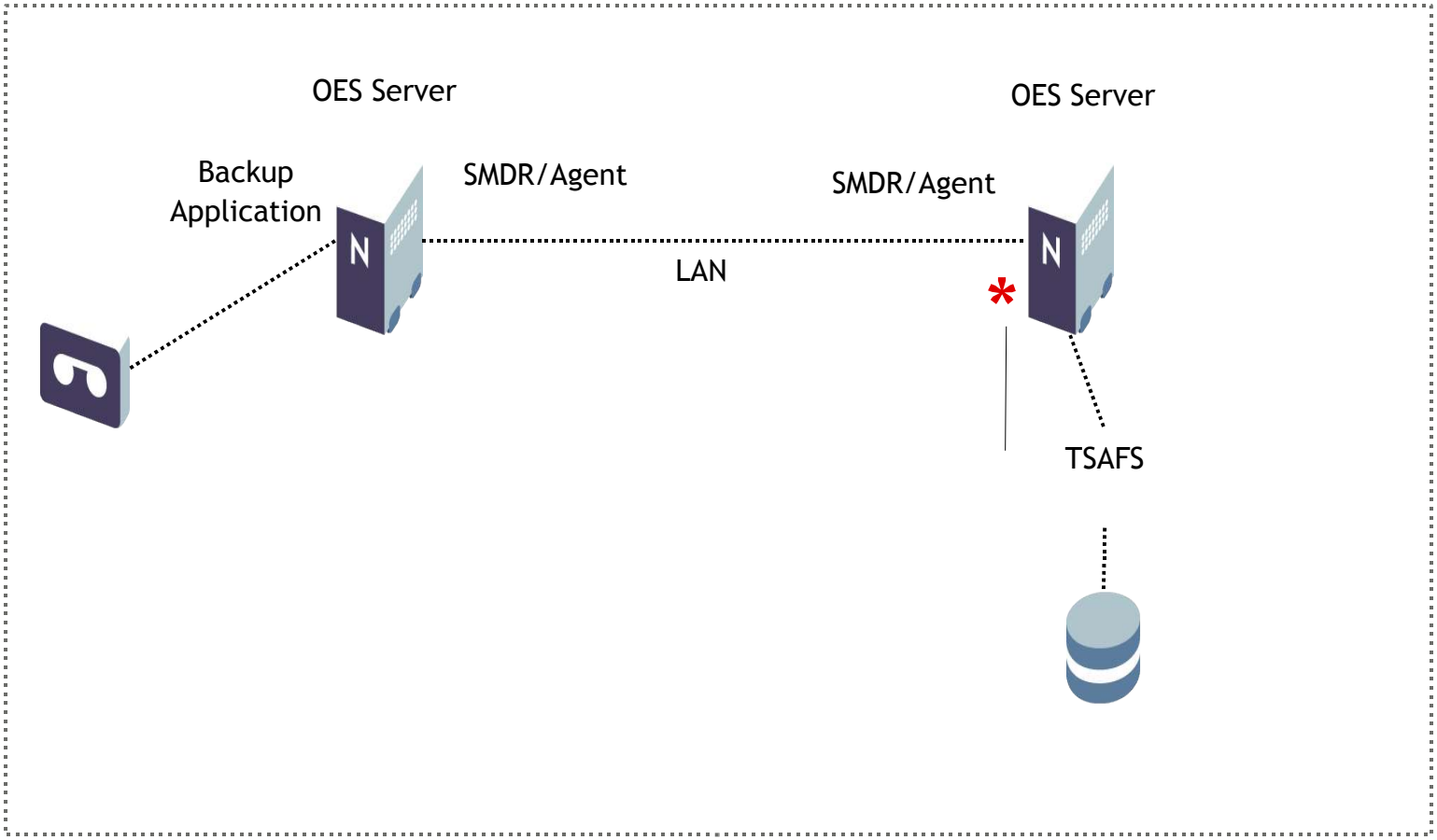

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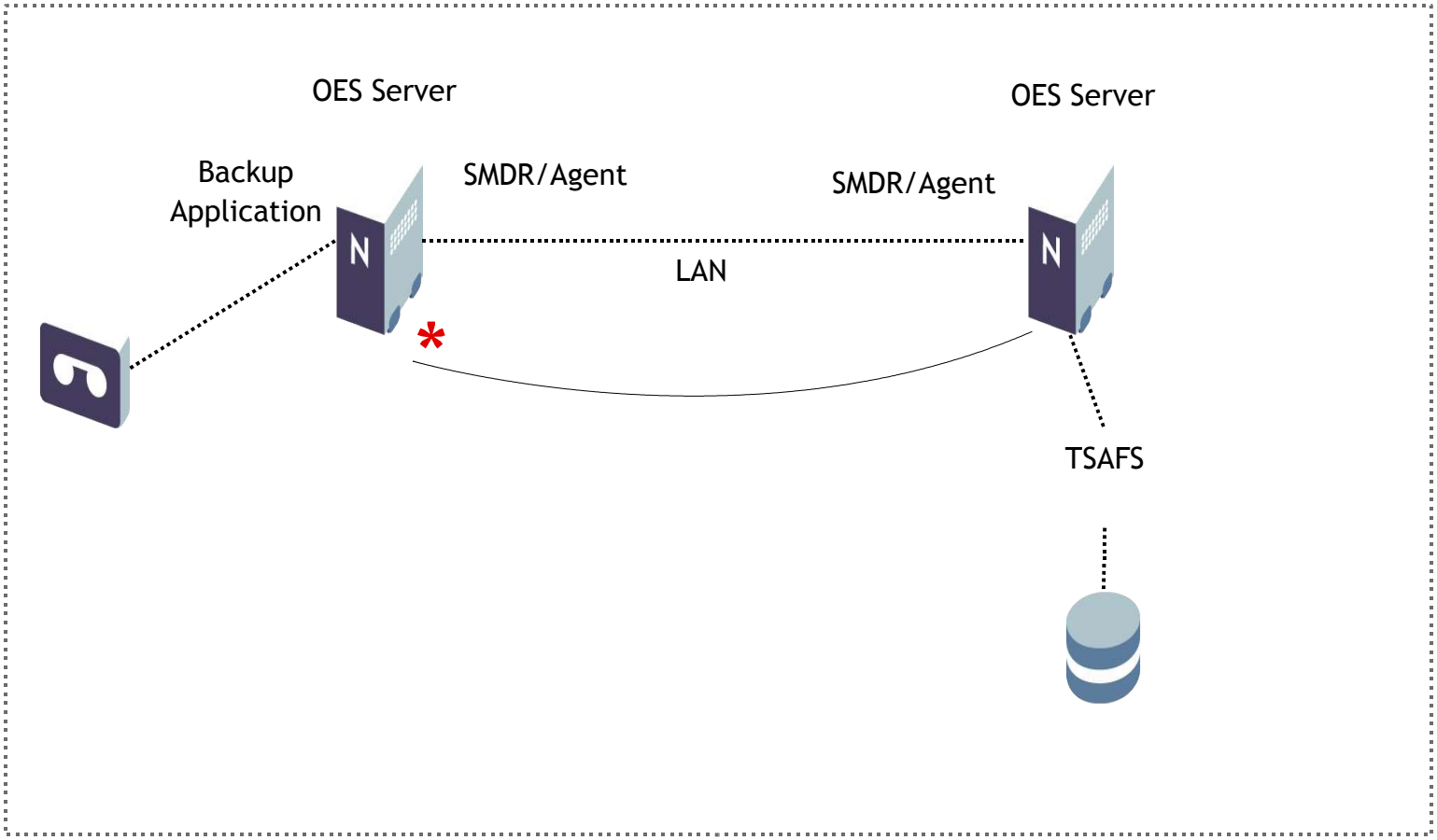

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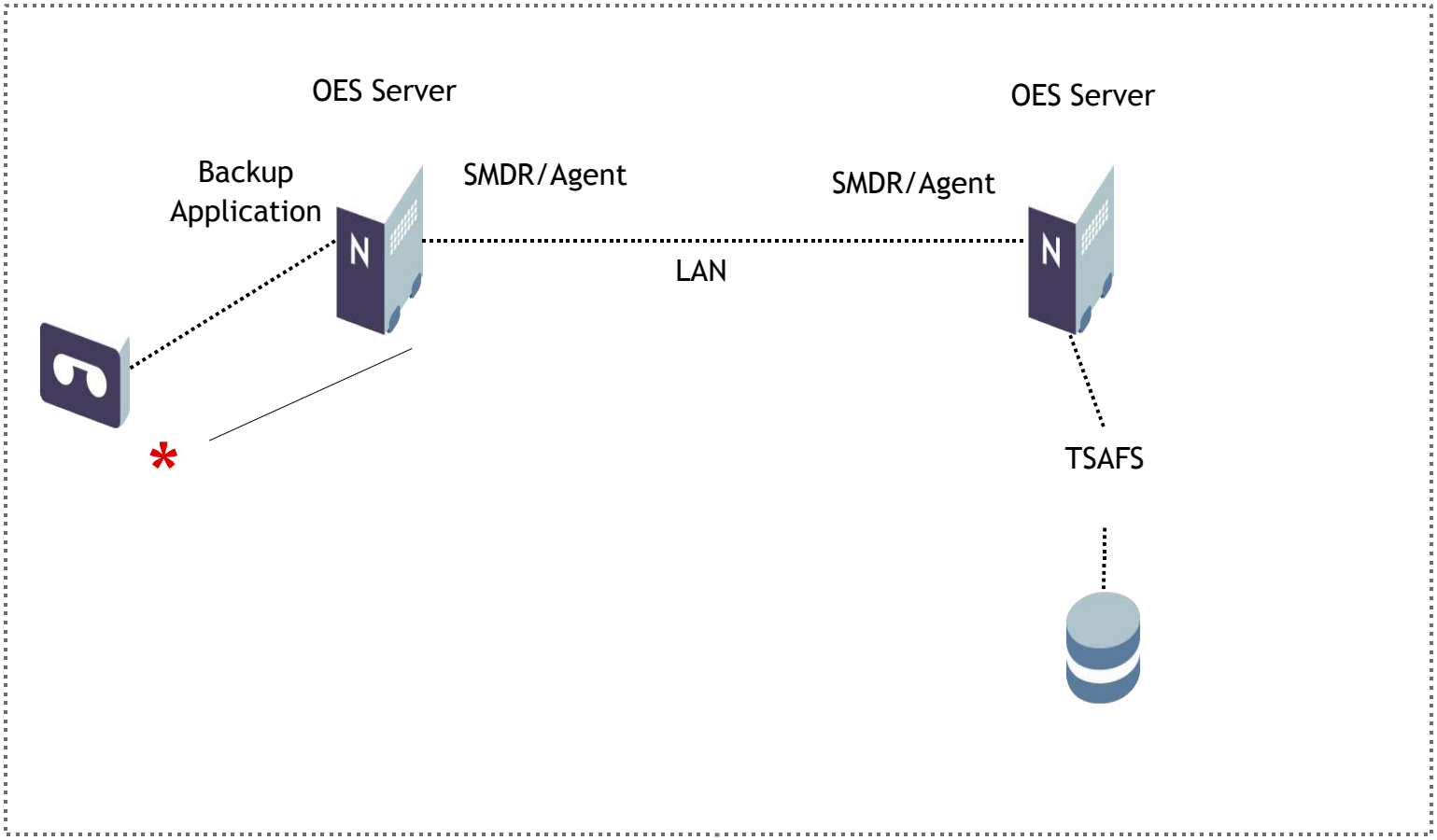

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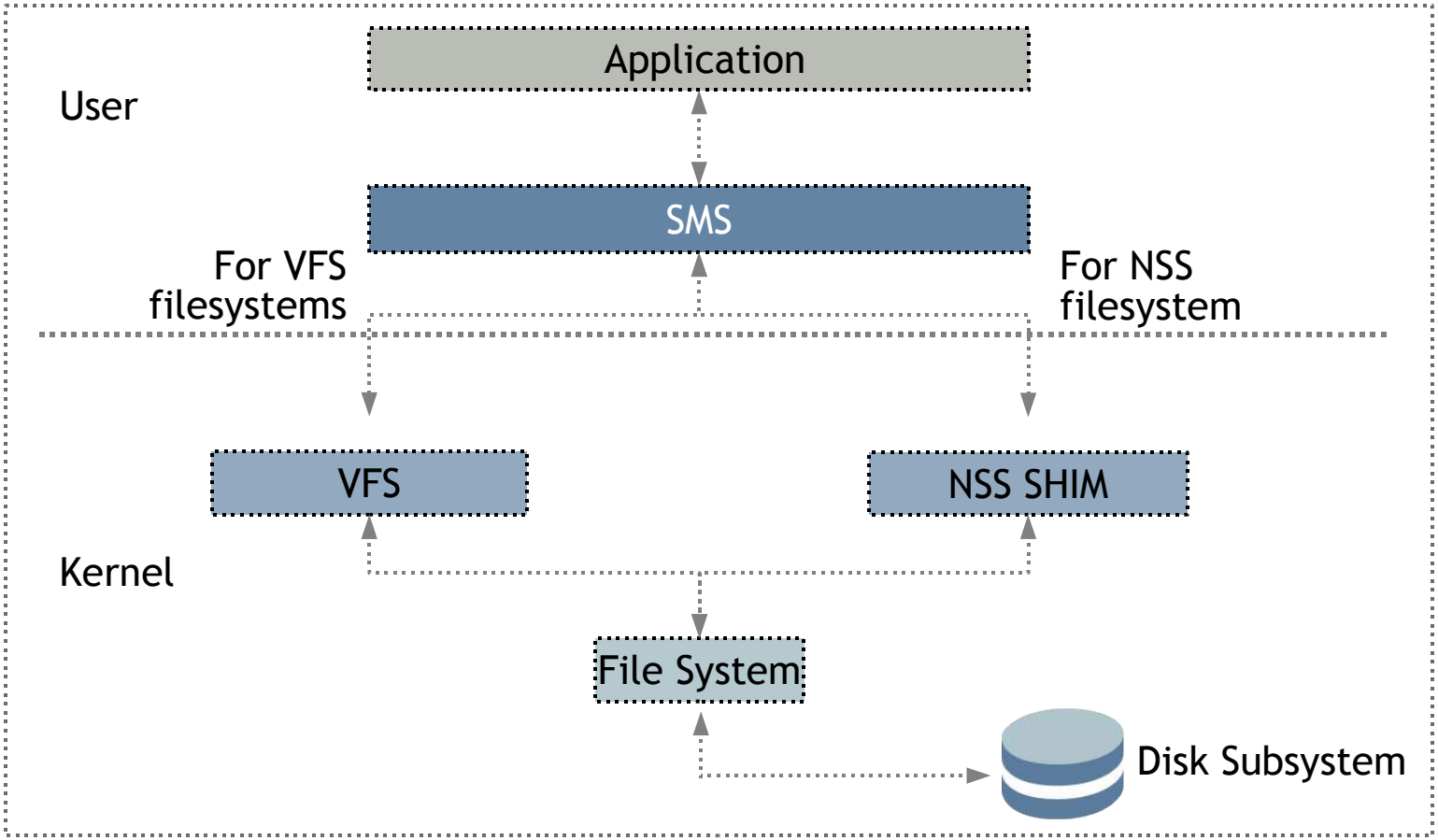
OES Linux backup



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Performance introduction

Rules of Thumb

- Understand components that impact performance
- Eliminate one component at a time
- Try and eliminate broader sub systems first
  - For e.g., target the disk or the network first
- Use appropriate tools (DPMETERM, TSATEST, etc) for each layer

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Factors influencing backup performance

- Storage sub-system configuration
- File System (NSS) and Networking
- Backup infrastructure (SMS)
- Backup applications
- Tape sub-system configuration

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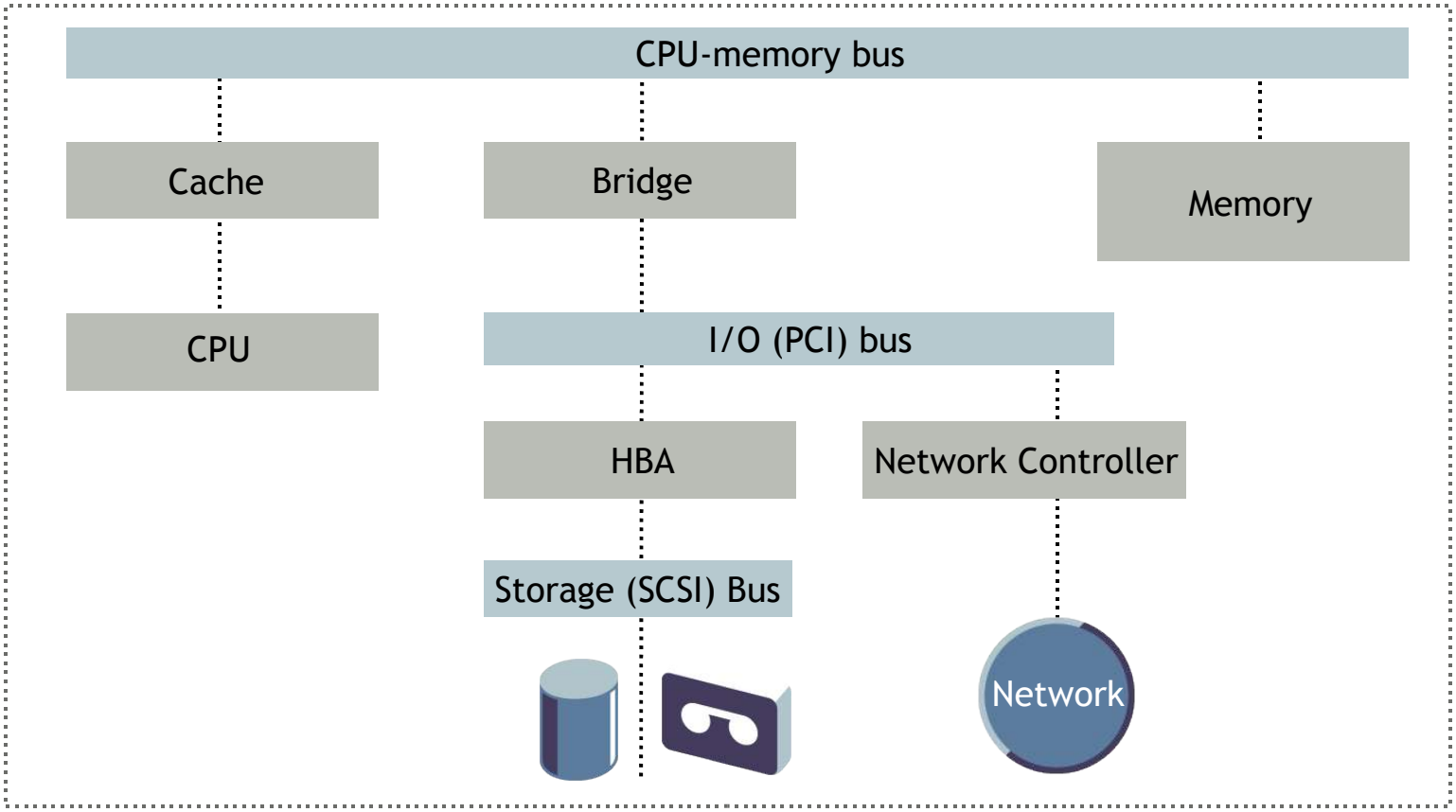
Performance opportunities in hardware



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Suggestions on exploiting bandwidth

Create parallel I/O paths for high performance

- Load balance peer-to-peer PCI buses
  - Distribute your storage and network controllers
- Use multiple channels per HBA and stripe across them

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Suggestions on exploiting bandwidth

- Create parallel I/O paths for high performance
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  - Use multiple channels per HBA and stripe across them
- Use technology to suit performance needs
  - 1Gbps networks are becoming common, 4Gbps cards are out in the market, 10Gbps is close to reality
  - Use dedicated backup networks for higher performance

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- Mix and match with care
  - Do not use Ultra 320 disks with an Ultra 160 SCSI controller
  - Performance is limited by the lowest bandwidth component in your data pipe

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- Mix and match with care
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  - Performance is limited by the lowest bandwidth component in your data pipe
- *Design your storage configuration for high availability as well*

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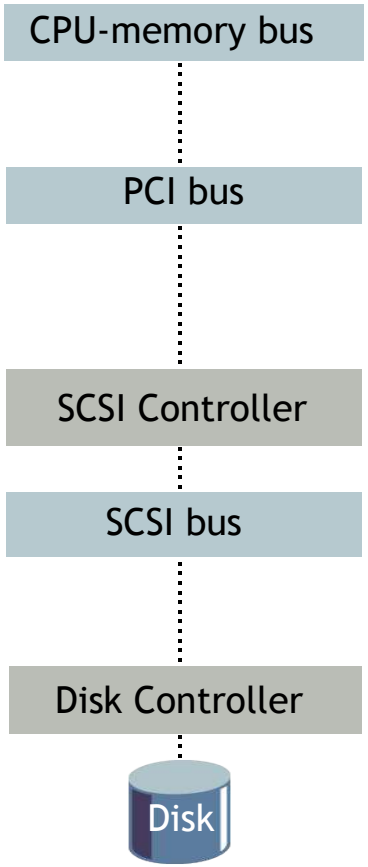
Available storage stack bandwidth



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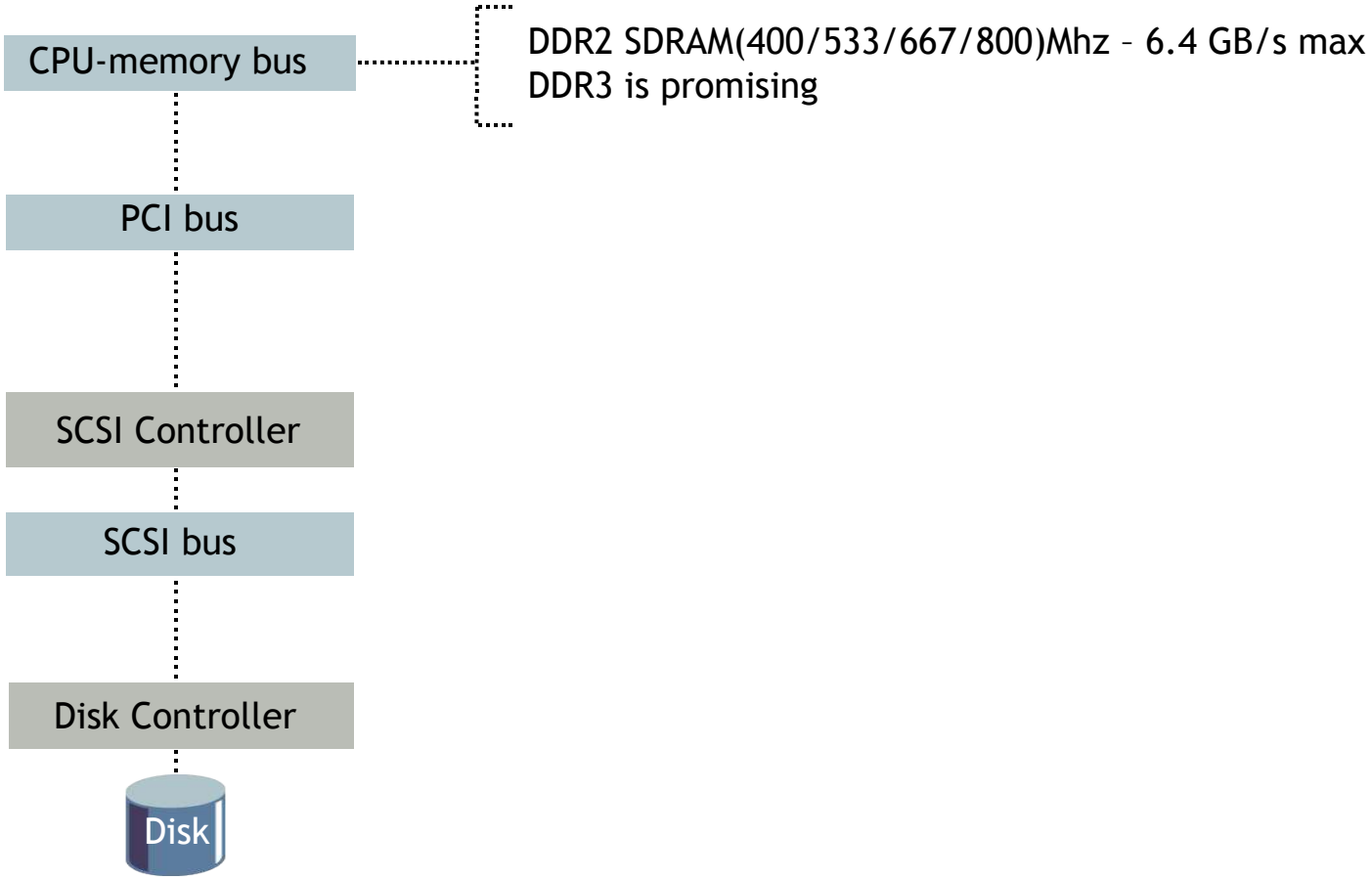

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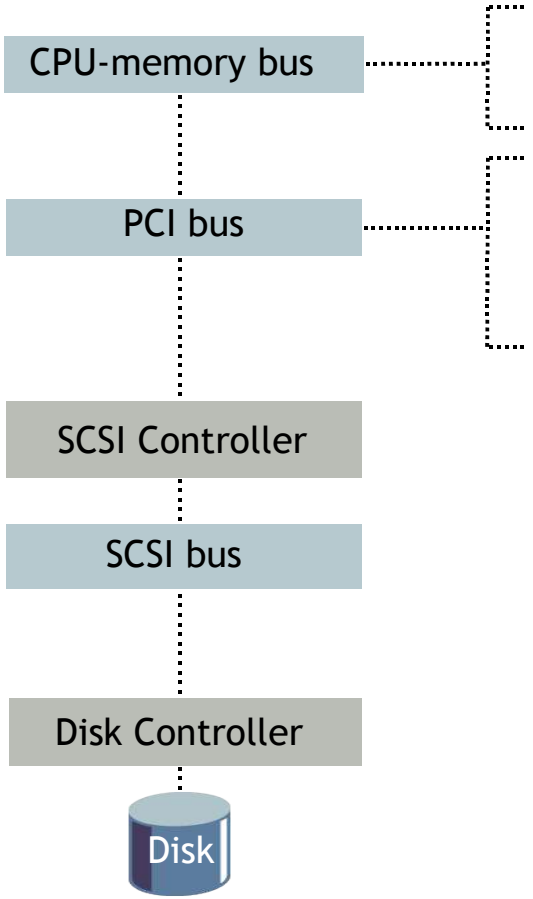

DDR2 SDRAM(400/533/667/800)Mhz – 6.4 GB/s max
DDR3 is promising

PCI Classic (32/64)bit (33/66)MHz – (126 to 512)MB/s
PCI-X 1.0 64bit (66/100/133)MHz – over 1GB/s max
PCI-X 2.0 64bit (266/533)MHz – 4.3GB/s max

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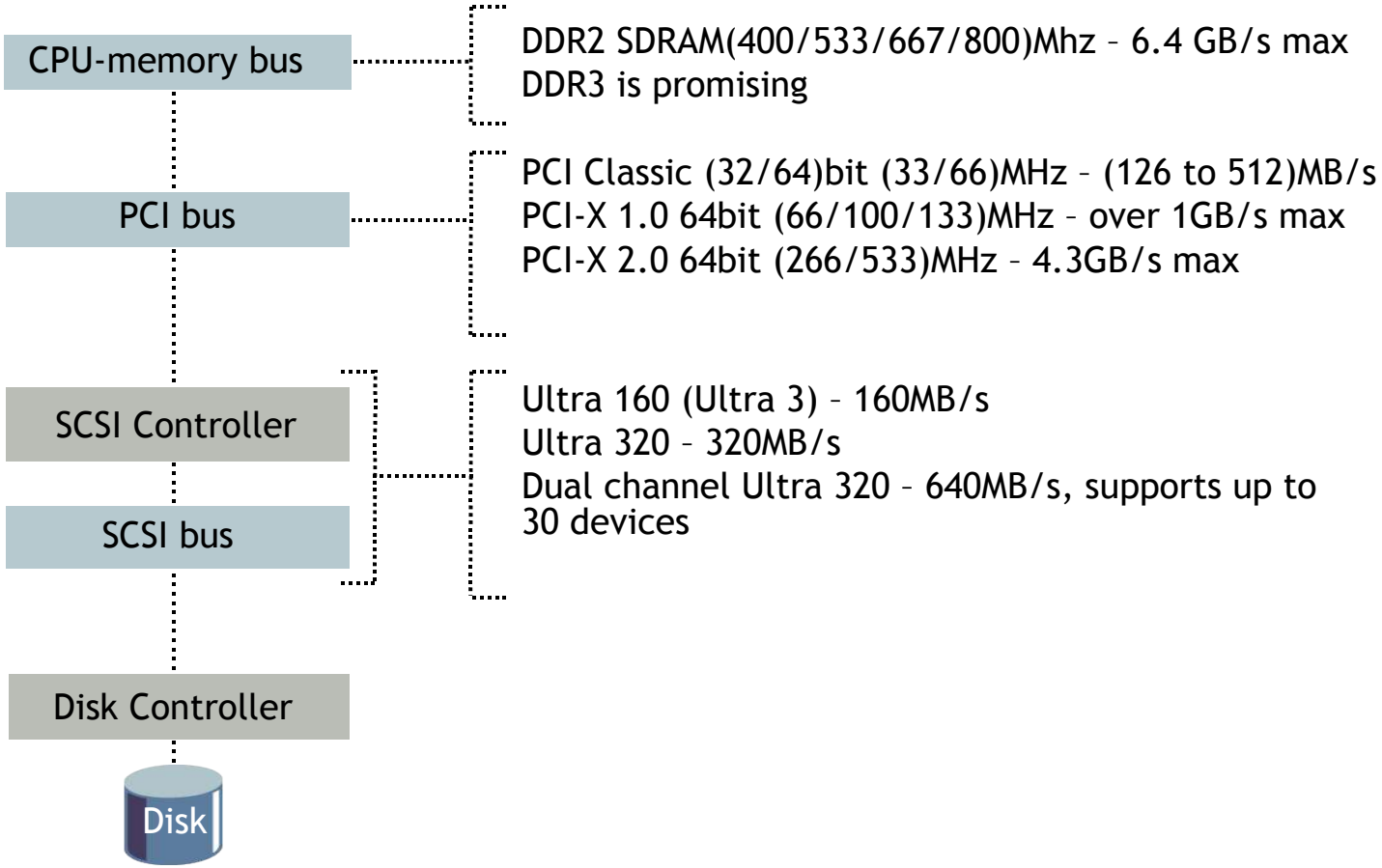

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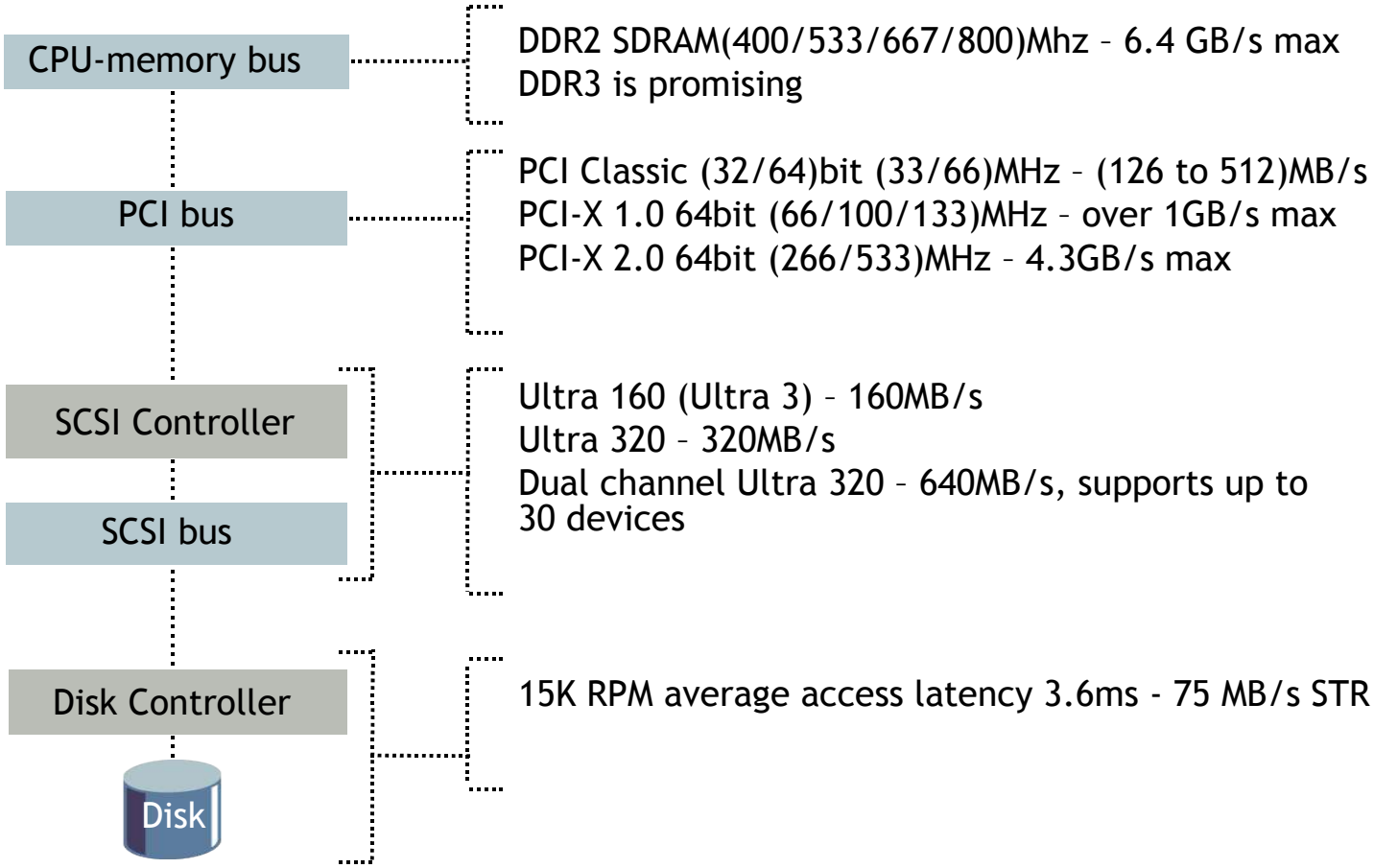

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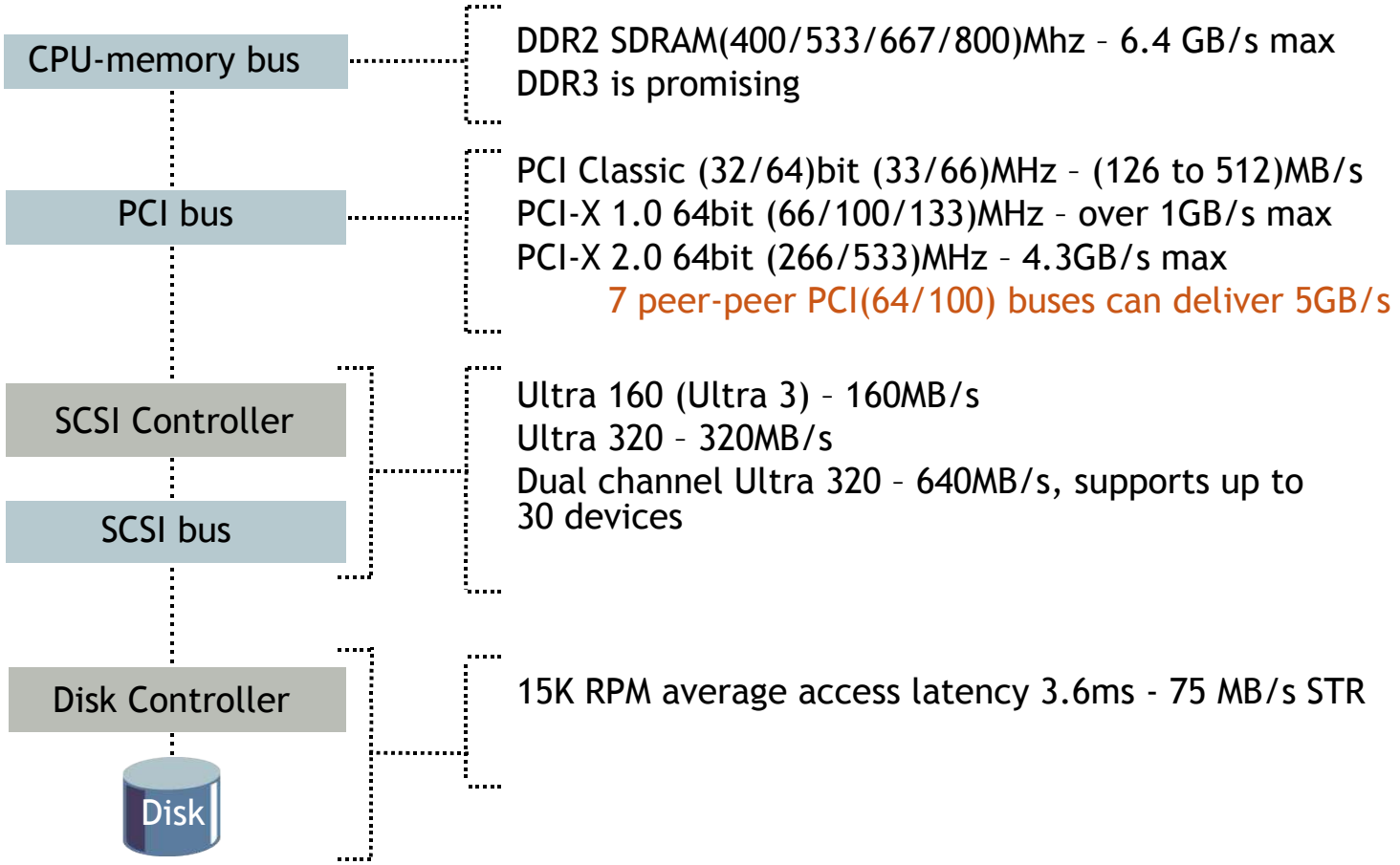

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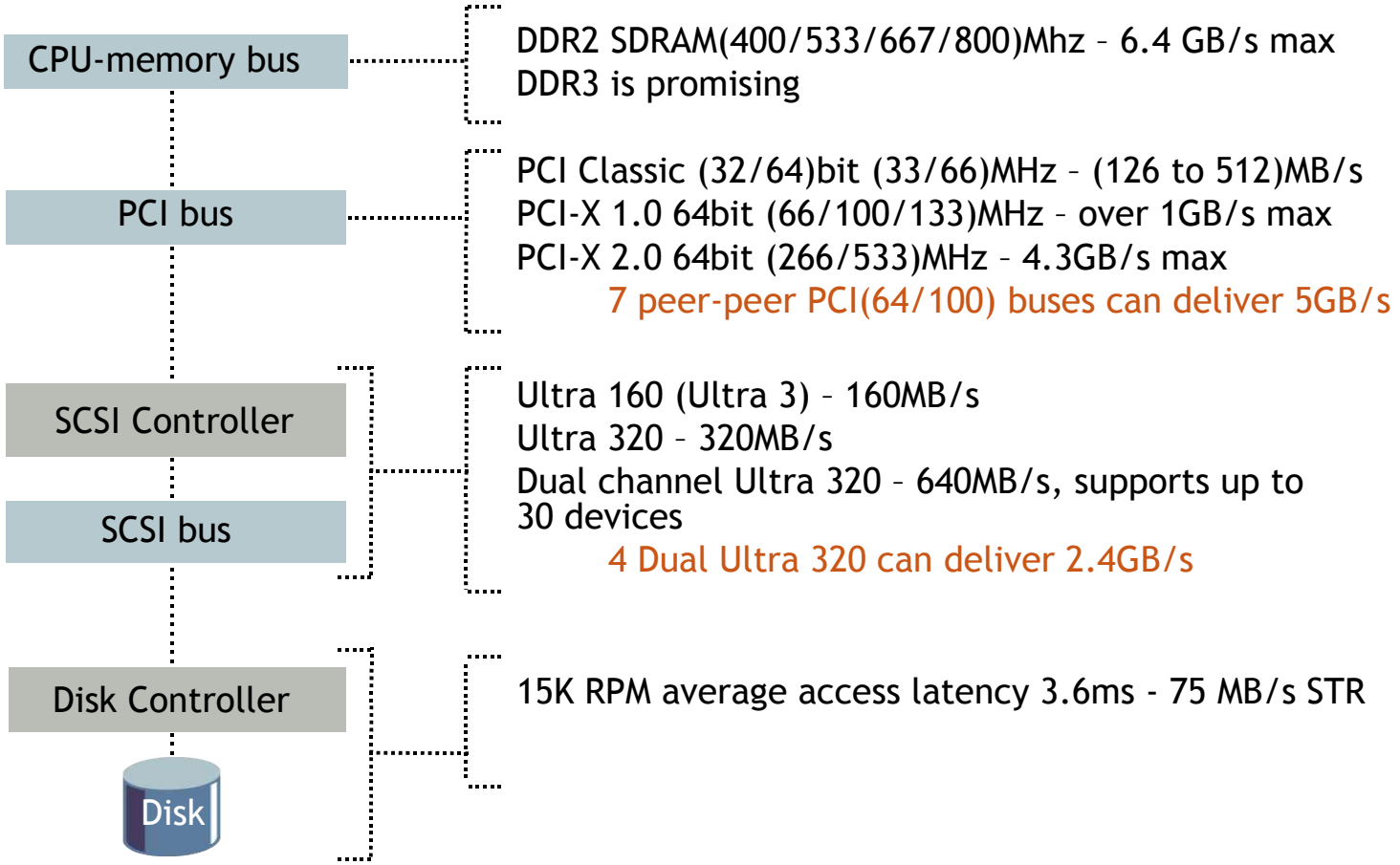

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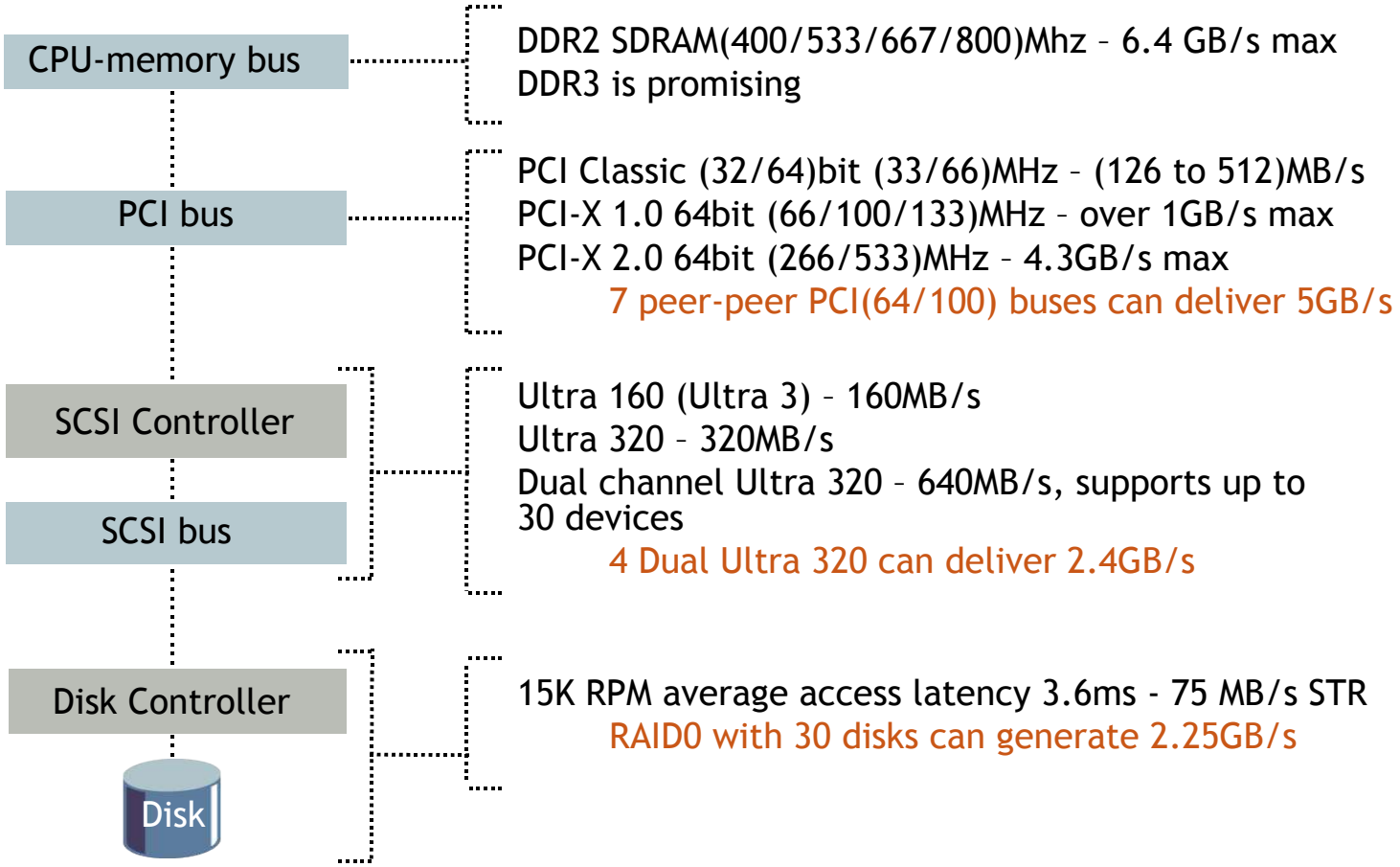

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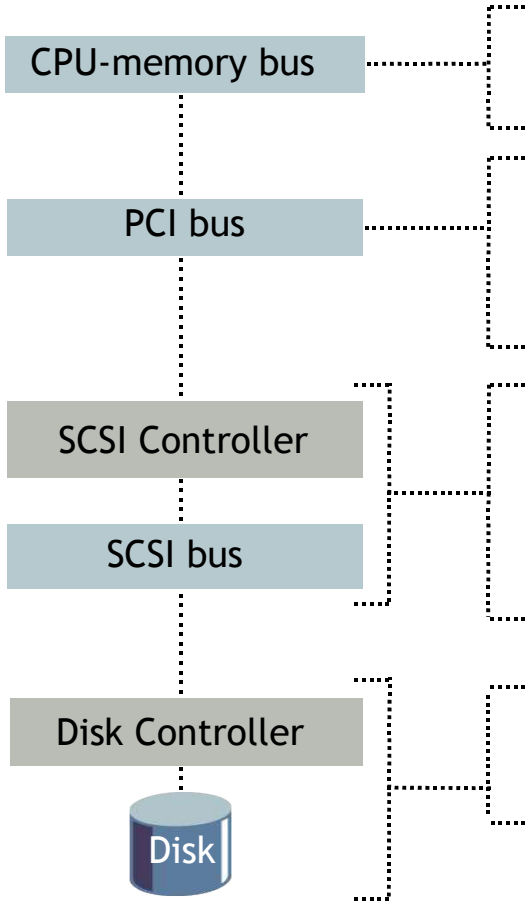

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DDR3 is promising

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PCI-X 1.0 64bit (66/100/133)MHz – over 1GB/s max
PCI-X 2.0 64bit (266/533)MHz – 4.3GB/s max
7 peer-peer PCI(64/100) buses can deliver 5GB/s

Ultra 160 (Ultra 3) – 160MB/s
Ultra 320 – 320MB/s
Dual channel Ultra 320 – 640MB/s, supports up to 30 devices
4 Dual Ultra 320 can deliver 2.4GB/s

15K RPM average access latency 3.6ms - 75 MB/s STR
RAID0 with 30 disks can generate 2.25GB/s

Technology is rapidly moving, PCI Express/Serial Attached SCSI (SAS) are also promising

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File system (NSS) and Networking

NSS and backups

- Tuning file system for typical access is important
- NSS specific tuning parameters

  ReadAheadBlks

  CacheBalance

Networking parameters

- Effect of Nagle algorithm on backup performance
- TCP receive buffer sizes
- Use NETMON, packet capture tools for analysis

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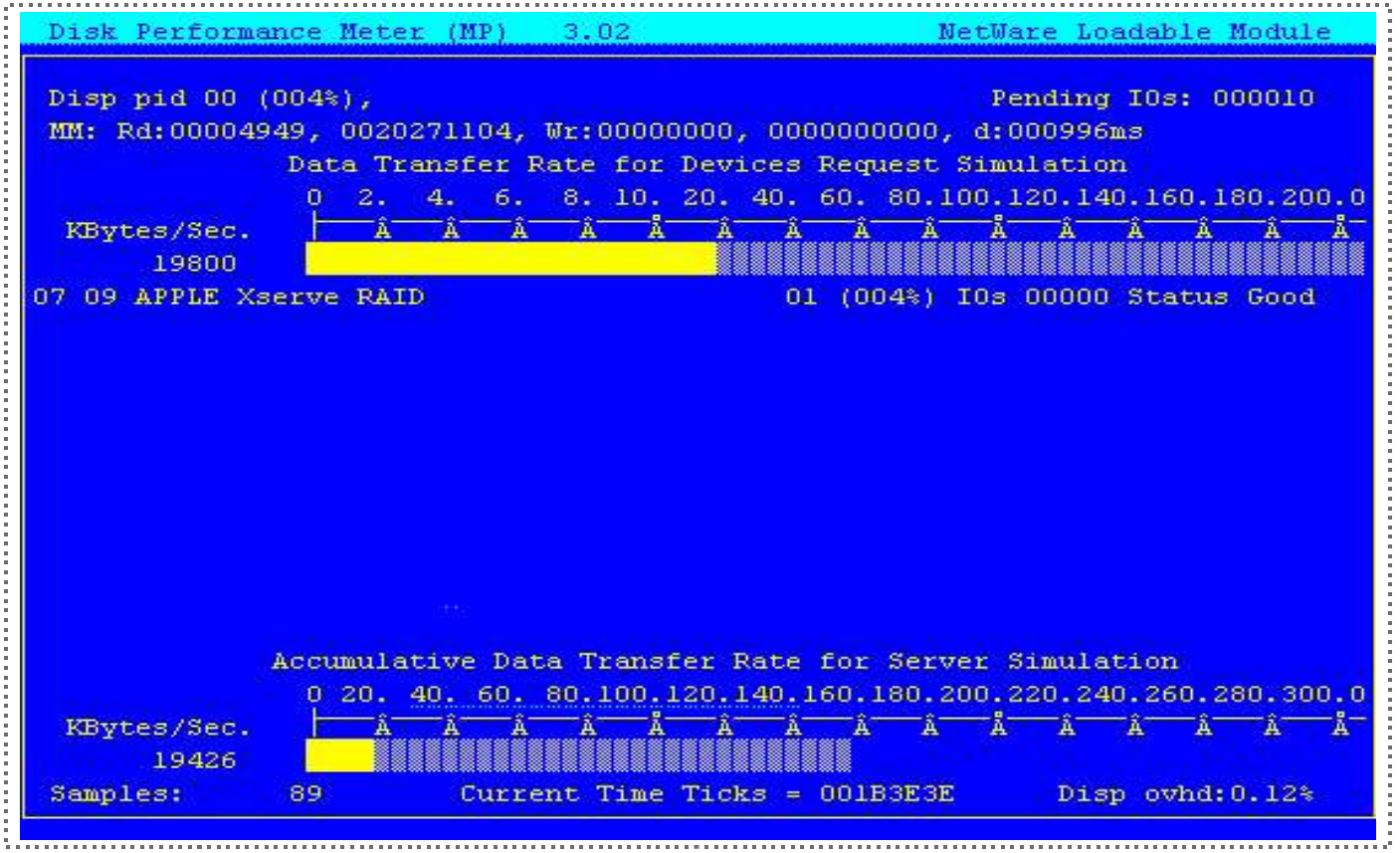
Assessing disk performance



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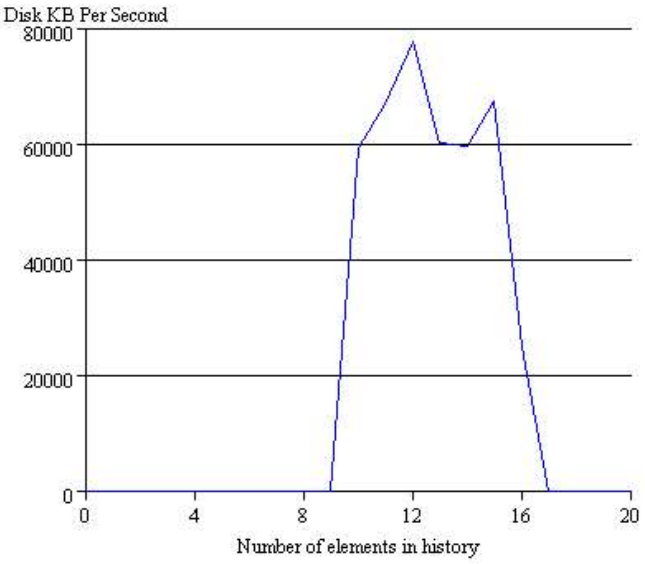

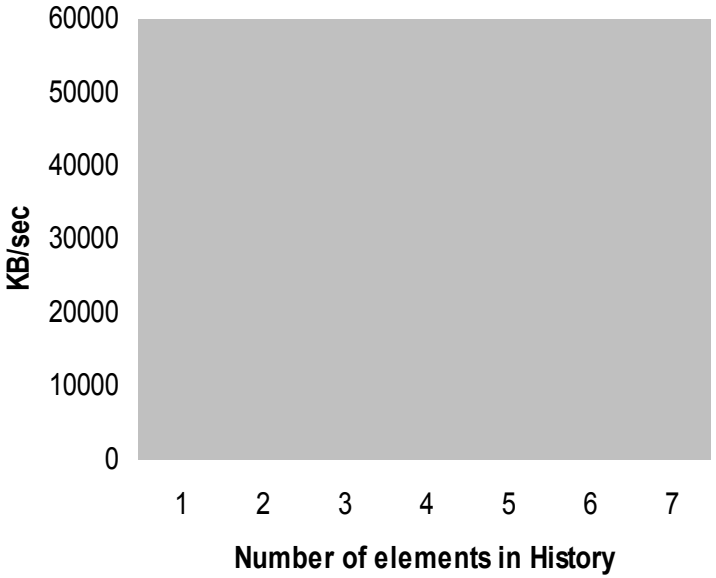

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Fine Tuning SMS

Technology

- Multi-threaded read ahead mechanism
- Enables multiple pending disk I/Os

Optimization hints

- Larger backup scope improves performance
- Cache invalidation effects
- Tuning parameters and sweet spots
- Incremental backup performance

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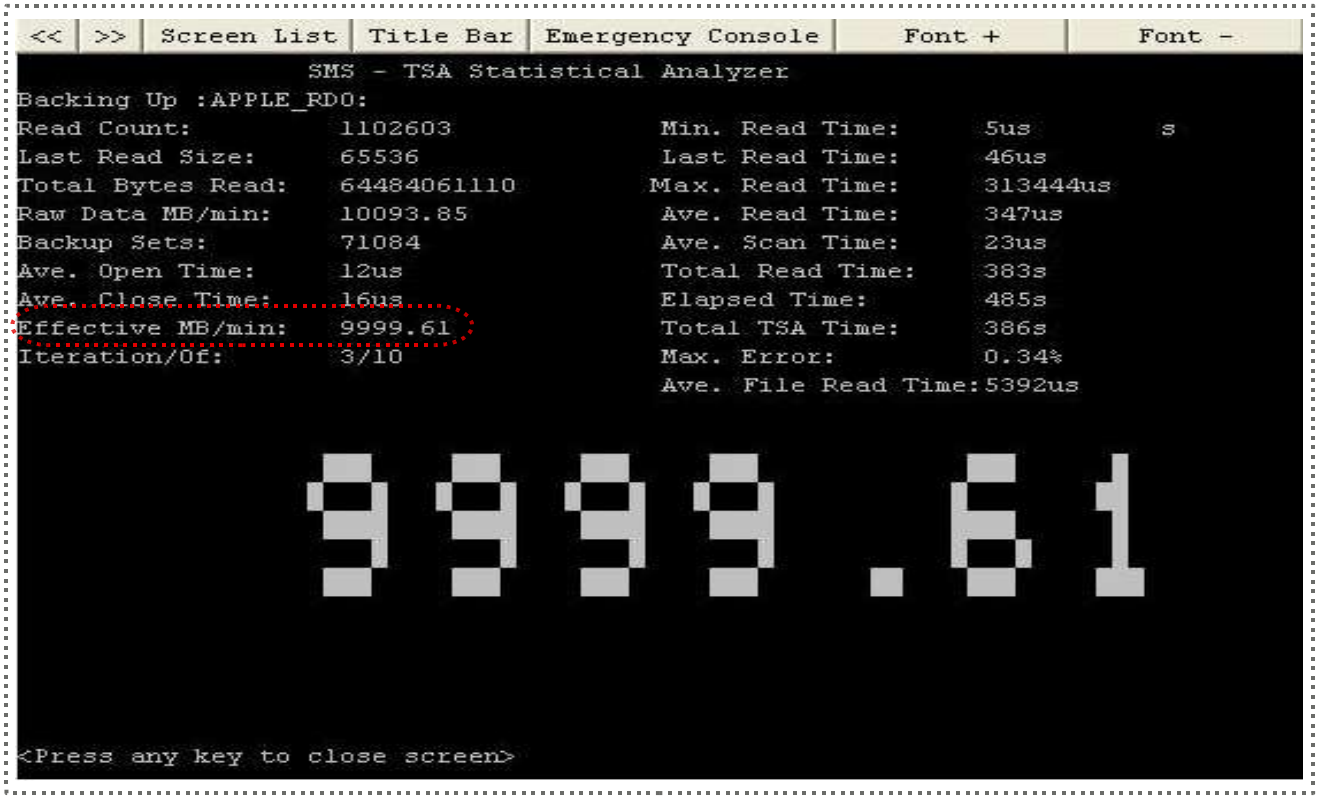
Troubleshooting performance: TSATEST



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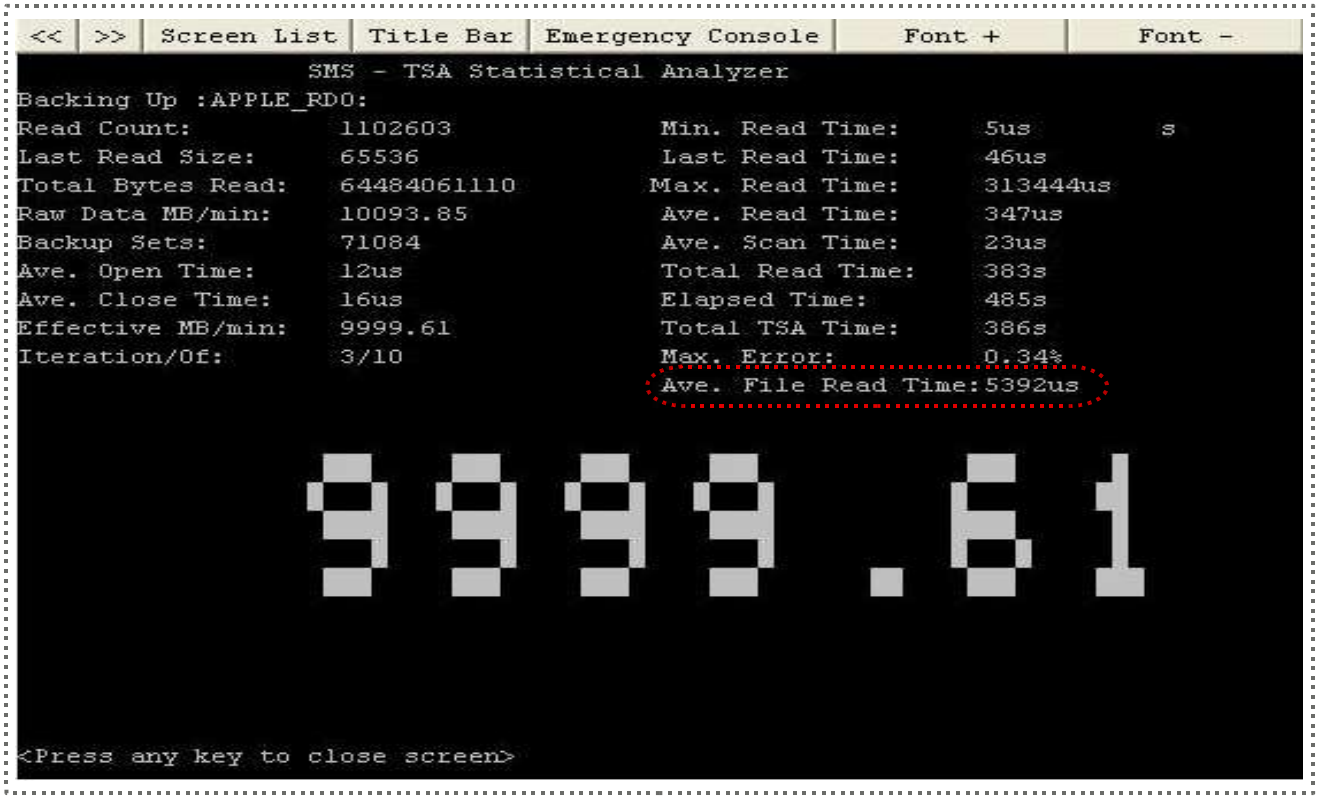

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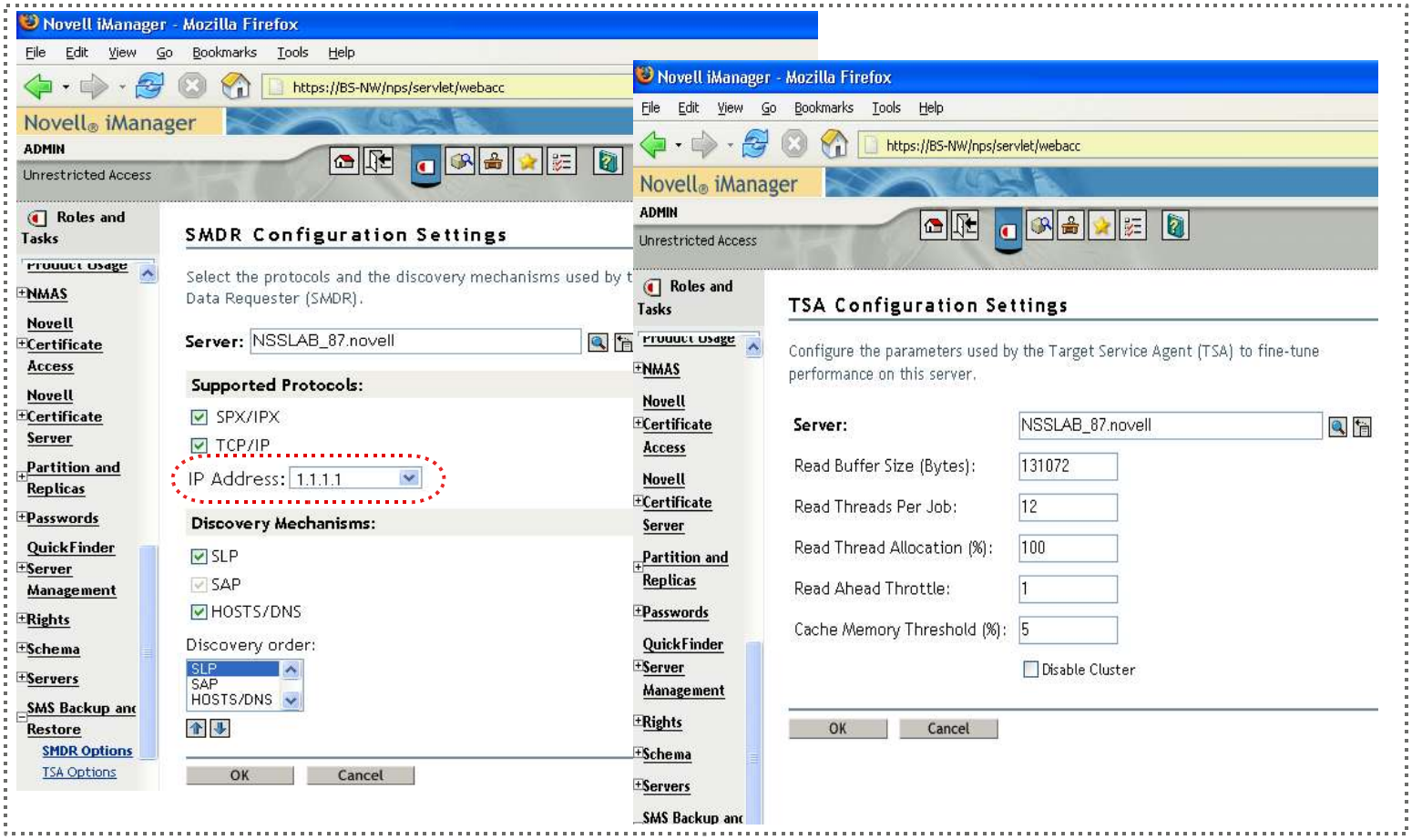
Configuring SMS



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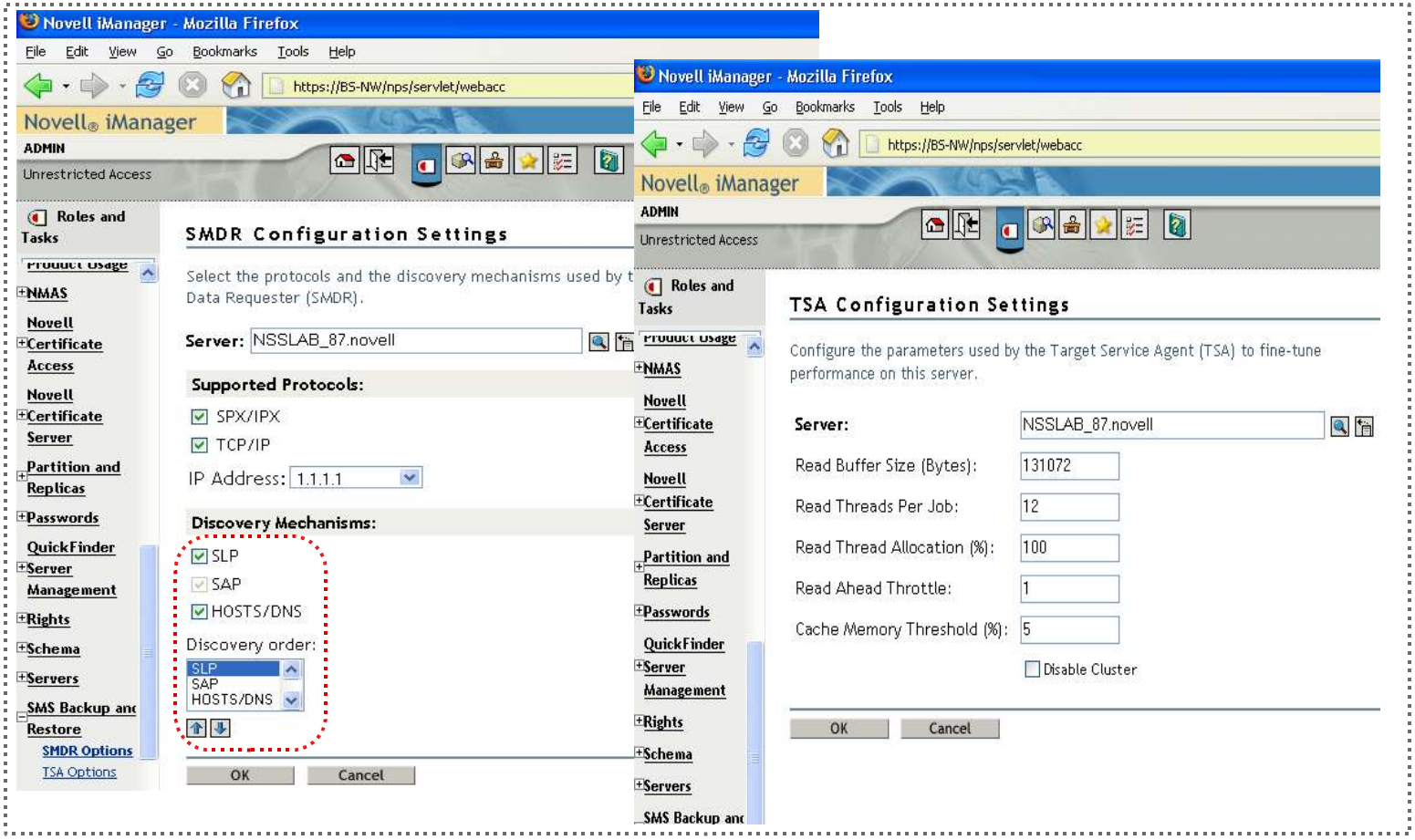

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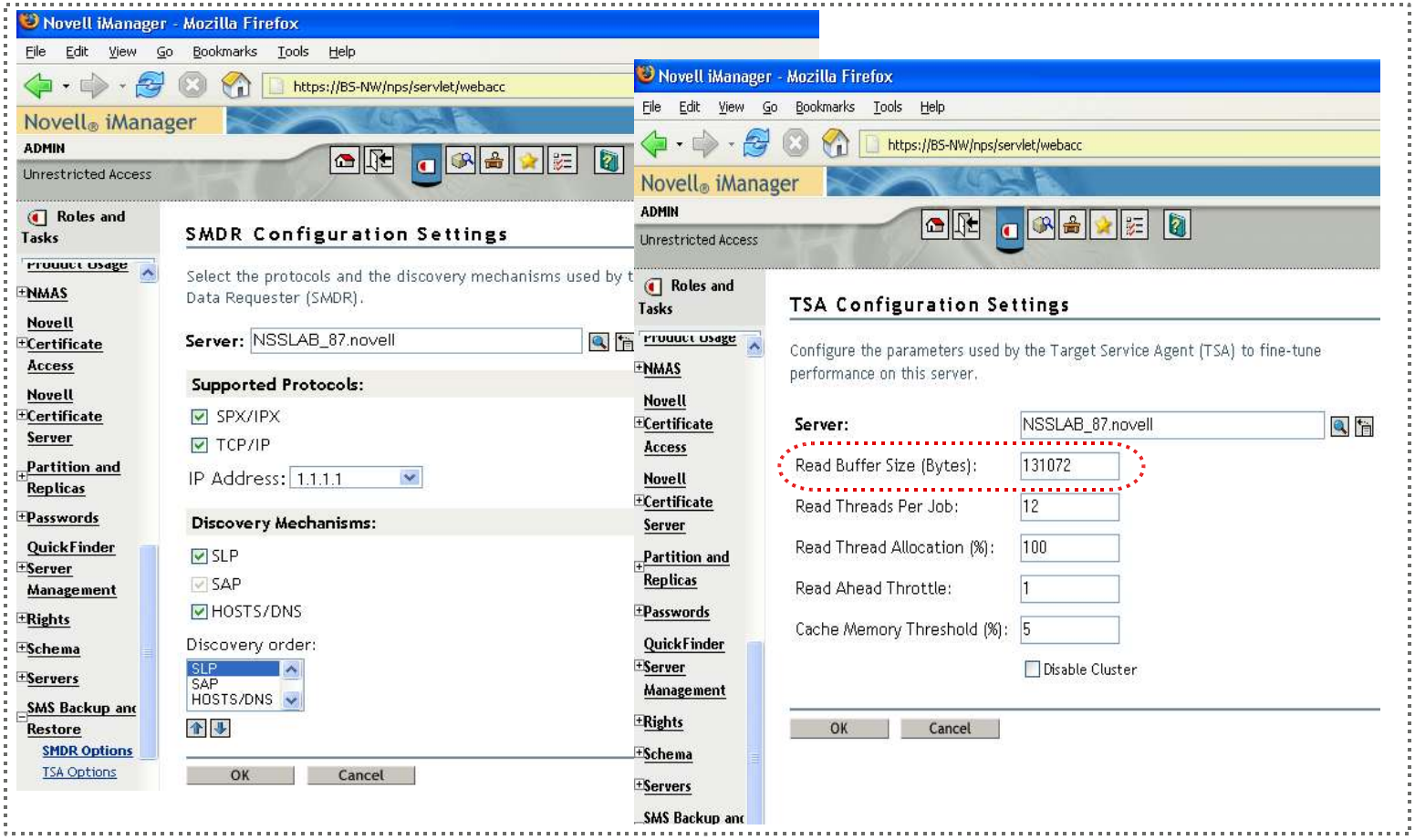

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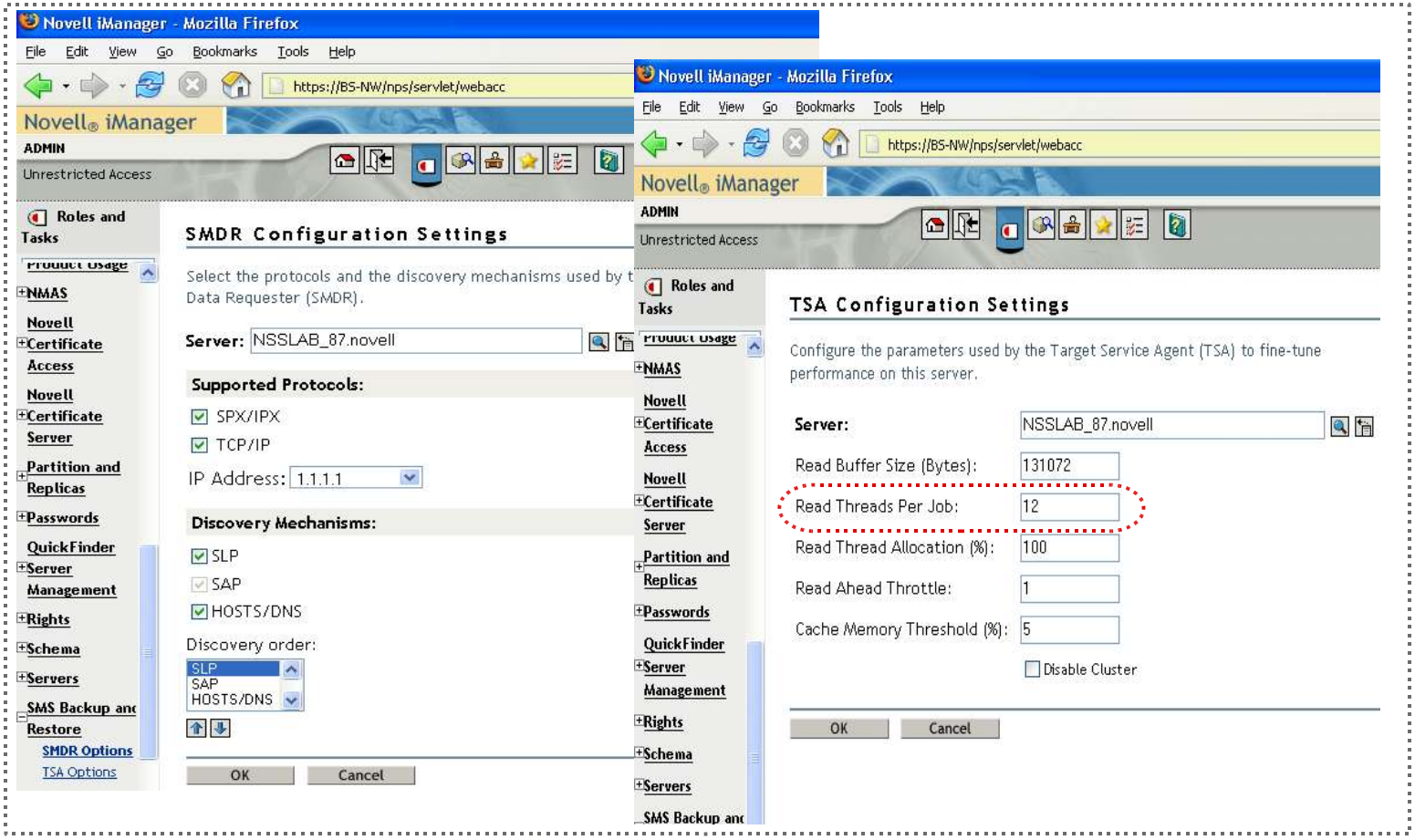

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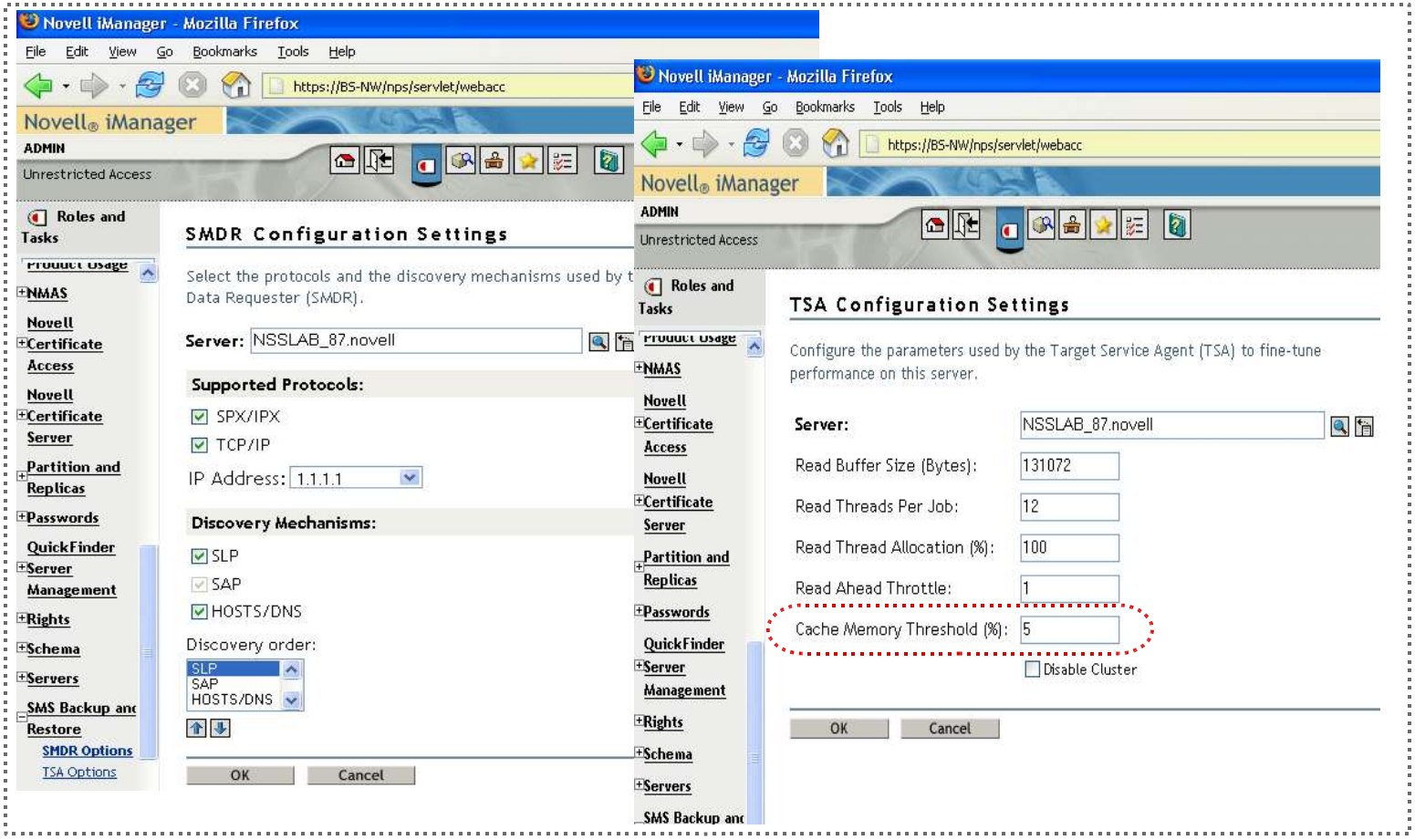

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Performance Tips

Low TSATEST read performance

- Disk subsystem may need to be tuned
- Anti-virus software or compression running?
- DPMETERM/iostat reads are high; file system needs tuning

High TSATEST read performance, but backup still poor

- Backup application needs tuning
- Tape device/software maybe the bottleneck

Tip: If all backup applications perform at the same level as TSATEST, either you have the best backup possible, or the storage subsystem needs to be configured better

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Backup applications

Partner offerings

- Use different models each having its own characteristics and advantages
- Tuning parameters such as media buffers
- Simultaneous multiple backups

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- SBCON/nbackup are technology demonstrators
- No enterprise scale backup application offering

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Tape subsystem configuration

Tape device throughput

- Ultrium LTO 3 - 245 GB/hr native STR
- Ultrium LTO 3 – 490 GB/hr compressed(2:1) STR
- Super DLT 600 – 126 GB/hr native STR
- Super AIT – 108 GB/hr native STR

Software

- Ensure appropriate drivers

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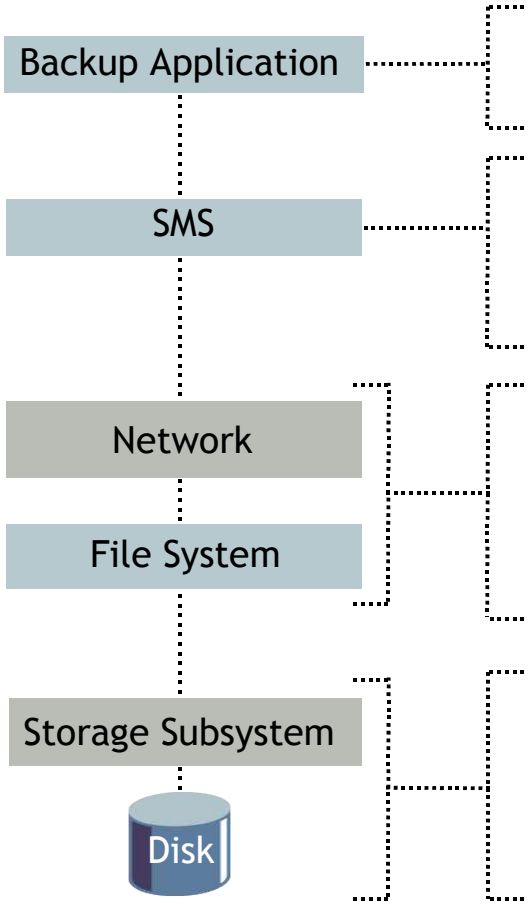
Summary



Partner specific tools and tunables

Identify the “sweet spot” using tunables
Benchmark SMS performance
TSATEST

Identify network bottlenecks
PERFTEST, NETMON

Tune file system performance for usage patterns
DPMETERM

Create parallel I/O Paths
Identify the lowest bandwidth component
Benchmark I/O system throughput
NoRM, IOStat, vendor specific tools

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Troubleshooting SMS issues

Unable to connect remote OES NetWare or Linux servers?

- Configure SLP DA
- Use hosts file
- Use 'display slp services smdr.novell' (NetWare)
- Use 'slptool findsrvs smdr.novell' (Linux)

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Incremental/Differential backups works as Full backups

- Meta-data modified by other applications (Anti-virus?)
- Use 'skipMetaDataArchive' switch with TSAFS

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Incremental backups are slow with some backup applications

- Use SBCON/nbackup to benchmark
- Use 'noCachingMode' switch with TSAFS

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Troubleshooting SMS issues

Server memory usage is high

- Ensure SP2 or higher on NetWare 6.5
- Use NoRM to locate the module
- Use NoRM to analyze memory fragmentation (SP3)
- Use CacheMemoryThreshold switch in TSAFS
- Refer to TID 10091980 for detailed information

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Troubleshooting SMS issues

Debug logging in SMS

- Provides detailed trace information without special builds
- Ability to debug a particular component
- Use switches smsDebug and smsDebug2
- Refer TID 10089094 for more information

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SMS Futures

Cross platform streaming SMDR for remote backup performance

TSAs for newer services (such as iFolder)

Pluggable data formatter architecture (such as TAR, PAX)

Performance self-tuning

Online archiving based on events

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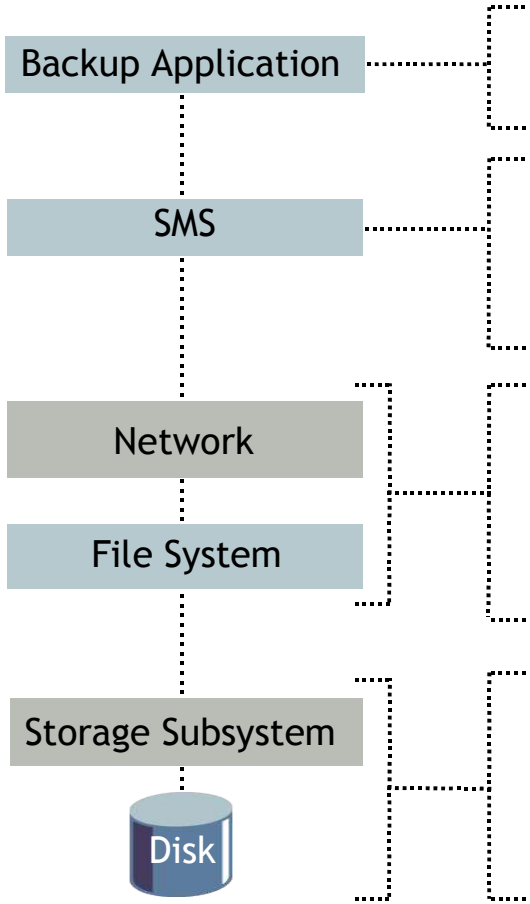

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Questions and Answers

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