

# GuardianOS™ Version 4.0

## Linux-Based NAS Platform Forges New Capabilities and Solutions

The simplicity, utility, and cost-effectiveness of mid-range network attached storage (NAS) servers make them far easier to deploy in a variety of applications and wide-ranging markets than traditional storage solutions. As the #1 volume leader in NAS servers, Adaptec Snap Servers are distinguished as innovators, and not simply integrators, of various components and software.

Snap Servers continue to lead by providing unique value-added features in truly integrated networked storage solutions built on the innovation and flexibility of its open-source Linux OS. These solutions provide a unique combination of ease-of-management, security, cross-platform support, performance, reliability, scalability, and data availability, all at a lower total cost of ownership (TCO).

### GuardianOS Powers Simple, Cost-Effective Networked Storage Solutions

GuardianOS delivers the following key benefits for organizations and enterprises:

- Industry-standard iSCSI support out of the box — no need to buy anything else
- Unified block and file architecture.
- Superior performance and scalability via an operating system that is truly optimized for file sharing.
- Rapid deployment into existing network environments.
- Simplified administration and management using our Snap Server Manager (SSM), a multi-unit management framework with an intuitive GUI that delivers industry-recognized ease-of-use.
- Superior virus immunity, due to the less virus-prone nature of Linux and embedded antivirus software for an added measure of protection against file infection.
- System and data security that supports Windows and UNIX file permissions and secure Web UI or encrypted command-line interfaces.

- True cross-platform interoperability in mixed-client environments.
- Better availability through the XFS journaling file system, snapshot technology, hardware redundancy, disaster recovery capability, and support for many popular third-party backup applications.
- Scalability and flexible expandability; Instant Capacity Expansion™ (I.C.E.) architecture allows capacity expansion on-demand.
- Low TCO through dramatically decreased deployment, administration, and management overhead.

### What makes GuardianOS So Unique?

GuardianOS provides a rich set of features and a flexible application environment that provide customers with the best of both Linux open source functionality and the specific features that take full advantage of the Snap Server 18000, 4200, 510, 520, and 550 hardware platforms.

### GuardianOS Highlights:

- **Unified Storage Architecture for integrated block and file storage** – The unique unification software layer enables both block and file data to be stored on the same Snap Server. This architecture employs industry-standard iSCSI support for encapsulating SCSI commands into TCP/IP packets and enabling block data transport over Gigabit IP networks. GuardianOS v4.0 has been tested for compatibility with many hardware and software initiators, and allows your Snap Server to host file or block or both file and block access concurrently.
- **Instant Capacity Expansion (I.C.E.)** – Allows administrators to easily add expansion capacity to Snap Servers – growing particular volumes instantaneously, and non-disruptively without degrading performance or having to backup and restore data. Capacities of mixed sizes can be added and global hot spares can be

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- identified and shared by multiple RAID groups.
- **Improvements in UNIX and Microsoft networks and true mixed-client environments** – Supports Windows Domain Integration for Windows NT, 2000, 2003, security authentication, ACL file-level security, Active Directory Service (ADS), both UNIX NIS and UNIX Posix ACLs, and a variety of network protocols: Microsoft (CIFS), UNIX (NFS), FTP, HTTP, and Appletalk (AFP). Additionally, v 4.0 enhances quota management with the ability to set default quotas without affecting existing custom quotas.
  - **Unified multi-unit management framework** – Snap Server Manager Java-based centralized management application is a platform- independent single point of control for all Snap Servers in the enterprise. Update software, change settings, monitor, and manage all Snap Servers from a central point.
  - **Better enterprise-class reliability and availability** – Ensures higher availability and reliability through enhancements in server boot resiliency—even with multiple drive failures; global hot sparing, RAID resiliency, XFS journaling file system, snapshot technology, and disaster recovery (DR) capabilities.
  - **Superior system and data security** – The Snap Server can be securely administered remotely; and supports many Windows ACLs and UNIX file-level permissions.
  - **Integrated antivirus** – Award-winning CA eTrust™ Antivirus software is integrated in GuardianOS. This comprehensive, heterogeneous virus defense solution automatically protects the files on your Snap Server.
  - **Increased support for popular third-party backup applications and agents** – Supports BakBone NetVault, VERITAS NetBackup/Backup Exec , CA ARCserve, and LEGATO NetWorker , and has embedded local tape backup and library control.
  - **Enterprise-class replication suite** – A free trial of the Snap Enterprise Data Replicator (Snap EDR) family of data protection, management and movement software is integrated into GuardianOS. Snap EDR includes:
    - heterogeneous system for GuardianOS Snap Servers, Windows, Linux, and UNIX servers
    - tiered security model including compression and encryption
    - flexible scheduling
    - web-based management
    - WAN-aware features for effective replication over high-latency networks
    - 3 versions provide the right support for any business, from simple and cost-effective replication between two Snap Servers to advanced data management for compliance applications.
  - **Integrated local backup, BakBone NetVault Workgroup Edition** – All Snap Servers using GuardianOS include this industry-recognized backup and recovery application, that protects up to 5 Snap Servers, at no additional cost. It also includes a 500GB virtual tape library for disk-to-disk-to-tape solutions. All GuardianOS Snap Servers also include Network Data Management Protocol (NDMP) support.
  - **Refinements in our industry-recognized browser-based management Web GUI** – Uses the standard Snap Server user interface, known for its ease of use, intuitiveness, and multi-system management under a single interface.
- Adaptec Trusted Network Attached Storage Solutions help you reduce backup time, manage data distributed throughout an organization, create nearline storage, instantly access data in case of disaster, expand existing storage, and cut overall storage costs. We believe that all businesses should have access to simple storage technology that allows them to easily and cost-effectively protect their business data and make it instantly accessible whenever and wherever it's needed. This has made Adaptec the choice of OEMs, VARs, enterprises, small and medium businesses, and consumers around the world.

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## GuardianOS v4.0 vs. Windows 2003 Server Appliance Software

GuardianOS	Windows 2003 Storage Application Software
<b>Integrated Solution</b>	
<ul style="list-style-type: none"> <li>• Design focused on optimized Snap Server hardware platform</li> <li>• Optimized for the sole purpose of file serving</li> <li>• Powers a truly optimized hardware and software solution</li> </ul>	<ul style="list-style-type: none"> <li>• Based on the general-purpose Windows 2003 Server operating system</li> <li>• Powers NAS products with cookie-cutter, narrow functionality</li> <li>• Many parts of the Windows server OS are restricted from use by EULA or have been disabled</li> <li>• Level of integration depends on Microsoft's restrictions and OEM implementation</li> </ul>
<b>Performance</b>	
<ul style="list-style-type: none"> <li>• Linux-based journaling file system</li> <li>• Leaner, higher-performance operating system</li> <li>• Easily accommodates multiple processors and up to four gigabytes of RAM for more memory and processor-intensive implementations</li> <li>• iSCSI protocol target support standard</li> </ul>	<ul style="list-style-type: none"> <li>• Based on general-purpose Windows 2003 Server/Advanced Server operating system</li> <li>• Has operating overhead typical of general-purpose servers</li> <li>• Windows Server 2003 does not embed support for iSCSI targets – optionally purchased third-party software</li> </ul>
<b>Administration/Management</b>	
<ul style="list-style-type: none"> <li>• Can be securely administered either locally or remotely</li> <li>• Provides award-winning WebUI for administration</li> <li>• Administration access encrypted via Secure Sockets Layer</li> <li>• Command line access via encrypted Secured Shell</li> <li>• Supports the most popular platforms allows fast, seamless integration into heterogeneous Windows, Macintosh®, Linux, and UNIX environments</li> <li>• Unified multi-unit management architecture for monitoring and management of ALL Snap Servers</li> <li>• On-demand capacity expansion capability (I.C.E.) can easily and instantly add expansion storage to RAID groups and volumes</li> </ul>	<ul style="list-style-type: none"> <li>• Limited WebGUI functionality. Enhancements are responsibility of OEM</li> <li>• Recommended platform administration using Internet Explorer and slow Microsoft Windows Terminal Services</li> <li>• Does not allow administration from Netscape (e.g. from UNIX/Linux clients)</li> <li>• Web administration requires Internet Information Service (IIS)</li> <li>• Command-line access uses Telnet, with all data transmitted over the network in plain text, thus posing a security issue</li> <li>• VDS Provides API for OEM development of multi-unit management apps.</li> <li>• Compacity expansion done in UI</li> </ul>
<b>Interoperability</b>	
<ul style="list-style-type: none"> <li>• Allows true cross-platform share management or the creation of a common share for all types of files</li> <li>• Unified block and file management for simultaneous access to both block and file data stored on the Snap Server. Utilizes iSCSI standard for block services</li> <li>• Incorporates iSCSI standard, can be a target for block data. Supports concurrent block and file data services on a single Snap Server</li> </ul>	<ul style="list-style-type: none"> <li>• Creates separate shares for each client type with – Windows, UNIX, Macintosh, and NetWare and protocol (CIFS, NFS, NCP, FTP, etc.)</li> <li>• NAS platforms powered by Windows Server 2003 do not currently provide iSCSI target capability</li> <li>• iSCSI target block service not currently available</li> </ul>
<b>Operating System Redundancy</b>	
<ul style="list-style-type: none"> <li>• The compact footprint of the GuardianOS stores the entire OS on each drive for maximum redundancy</li> <li>• Can be booted off any drive should the first drive become unbootable</li> <li>• Is available even if the RAID set is lost or degraded</li> </ul>	<ul style="list-style-type: none"> <li>• These products typically have two system partitions for the OS (more limited redundancy)</li> <li>• Some vendor implementations place the system OS partitions on top of the RAID sets</li> <li>• Can render the Windows-powered NAS server completely unbootable and inaccessible, should there be a failure in either the software and/or the hardware RAID configuration</li> </ul>
<b>Security</b>	
<ul style="list-style-type: none"> <li>• Embedded CA eTrust antivirus software</li> <li>• Uses the field-proven Apache Web server and includes added security features</li> </ul>	<ul style="list-style-type: none"> <li>• Requires remote server for virus scanning and/or purchase and installation of antivirus software</li> <li>• Uses Telnet, Terminal Services, and the Internet Information Server, which is susceptible to many of the same security holes and virus attacks that plague Microsoft operating systems . “Analysts are advising against using Microsoft’s Internet Information Server (IIS) because of its multitude of vulnerabilities that viruses like Nimda and Code Red exploit.” – Internet Information Server - Don't Do It James Middleton, Gartner, September 25, 2001</li> </ul>

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## GuardianOS v4.0 vs. Windows 2003 Server Appliance Software

GuardianOS	Windows 2003 Storage Application Software
<b>File System</b>	
<ul style="list-style-type: none"> <li>• Uses the XFS file system, more efficient than NTFS</li> <li>• Utilizes true contiguous file allocation</li> <li>• Has zero file system fragmentation issues</li> <li>• Maximum file system is 16TB</li> </ul>	<ul style="list-style-type: none"> <li>• Uses the NTFS file system</li> <li>• Requires frequent file system/volume defragmentation (performance slows as files fragment)</li> <li>• Some improvements in disk checking using DSKCHK command</li> <li>• Maximum file system is 2TB</li> </ul>
<b>Snapshot Technology</b>	
<ul style="list-style-type: none"> <li>• Uses an internally developed snapshot technology implementation. Designed for split-second quiescing (pausing of user access and flushing of logged transactions and I/O requests to disk) of the file system for a true instantaneous point-in-time image</li> </ul>	<ul style="list-style-type: none"> <li>• Products use a snapshot implementation that is incapable of quiescing the file system and therefore has to wait, sometimes for hours at a time, for a five-second respite in I/O before the snapshot can be completed</li> <li>• Performance is slow when running multiple snapshots</li> </ul>
<b>Disaster Recovery</b>	
<ul style="list-style-type: none"> <li>• Allows the failed component to be hot swapped and replaced with zero system downtime</li> </ul> <p><b>Unbootable Operating System</b></p> <ul style="list-style-type: none"> <li>• Found on all the drives of a Snap Server powered by GuardianOS; if the first drive becomes unbootable, the customer can reboot the system and boot up off the second or subsequent drive as needed</li> </ul> <p><b>Corrupted Operating System Image</b></p> <ul style="list-style-type: none"> <li>• Image may be recovered using a system recovery CD</li> </ul> <p><b>Loss of Server-Specific Settings and Configuration</b></p> <ul style="list-style-type: none"> <li>• Server and volume recovery images can be created and remotely stored to enable rapid recovery of both server settings and public file systems/volumes and corresponding extended attributes (ACLs and quota information)</li> </ul>	<ul style="list-style-type: none"> <li>• May require the use of expensive hardware RAID controller(s) to support drive hot-swapping, depending on hardware vendor and/or product</li> </ul> <p><b>Unbootable Operating System</b></p> <ul style="list-style-type: none"> <li>• Usually has two mirrored system partitions</li> </ul> <p><b>Corrupted Operating System Image</b></p> <ul style="list-style-type: none"> <li>• Vendor may or may not offer a system recovery CD, depending on the specific vendor/product</li> </ul> <p><b>Loss of Server-Specific Settings and Configuration</b></p> <ul style="list-style-type: none"> <li>• Vendor may provide a mechanism for recovering server settings and configuration, depending on the specific vendor product/implementation</li> </ul>
<b>Third-Party Backup Software for User and System Data Protection</b>	
<ul style="list-style-type: none"> <li>• BakBone NetVault Workgroup Edition integrated into OS. Ships with a license for backing up 5 Snap Servers or workstations</li> <li>• Supports leading backup products such as BakBone NetVault, VERITAS NetBackup/Backup Exec, Legato NetWorker, and CA Brightstor™ Enterprise/ARCserve</li> <li>• Supports loadable backup agents</li> <li>• Provides Symantec PowerQuest DataKeeper™ (with each shipping Snap Server) with unlimited client licenses for infinite client desktop/laptop data protection</li> <li>• Embedded NDMP</li> <li>• Supports a variety of bare metal restore packages</li> </ul>	<ul style="list-style-type: none"> <li>• Microsoft Backup ships with release</li> <li>• Supports major backup software from leading vendors</li> <li>• Supports loadable backup agents</li> <li>• NDMP support depends on vendor application</li> </ul>
<b>Expandability</b>	
<ul style="list-style-type: none"> <li>• Supports industry-standard Java engine</li> <li>• Can host optional third-party software</li> <li>• Supports third-party replication software</li> </ul>	<ul style="list-style-type: none"> <li>• Supports a Microsoft-specific Java engine</li> <li>• Can host optional third-party software</li> <li>• Optional VSS Volume Shadow Copy Services (Replication)</li> </ul>

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## GuardianOS v4.0 vs. Windows 2003 Server Appliance Software Competitive Matrix

The competitive matrix below details the differences between GuardianOS and the Windows 2003 Server Appliance Software.

Feature	GuardianOS	Windows 2003 Storage App Software
<b>Network Transport Protocols</b>		
TCP/IP	■	■
AppleTalk	■	■
UDP	■	■
<b>Network File Protocols</b>		
Microsoft (CIFS/SMB)	■	■
UNIX (NFS)	■	■
Apple (AFP)	■	■
Internet (HTTP)	■	■
File Transport (FTP)	■	■
<b>Network Block Protocols</b>		
	iSCSI Target	iSCSI Initiator Only/Optional Third-Party Software
<b>File System</b>		
	XFS	NTFS
Journaling	■	■
Dynamic Inode Allocation	■	■
Contiguous File Allocation	■	NO
Free from File System Fragmentation	■	NO
OS Failover	■	■
<b>Domain Integration</b>		
Active Directory Service (ADS)	■	■
Dynamic DNS	■	■
Microsoft NT Domain Controller	■	■
Distributed File System (DFS)	■	■
Network Information Service (NIS)	■	■
<b>Security</b>		
Integrated Antivirus Software	CA eTrust	Vendor Dependent
File/Folder	■	■
Kerberos Authentication	■	■
Secure Sockets Layer (SSL)	■	■
Secure Shell (SSH)	■	NO

  

Feature	GuardianOS	Windows 2003 Storage App Software
<b>Management</b>		
Multi-Server Management	■	■
SNMP	■	■
Quotas - User	■	■
Quotas - Group	UNIX	NO
Email Alert/Notification	■	■
UPS Support	■	■
Environmental Monitoring	■	Vendor Dependent
DHCP Server	■	■
Dynamic Capacity Expansion	■	■
<b>Backup</b>		
Snapshots	■	■
Client Agent Support	■	■
SCSI/Tape	■	■
Bundled Client Backup	■	NO
NDMP Support	■	Application Dependent
<b>Data Services</b>		
Replication Facility	S2S Synchronization Snap Enterprise Date Replicator	Vendor Dependent
Java Technology	Industry Compliant	Microsoft Specific
Data Protection Bare Metal Restore	■	Command Line Only

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