

# SnapServer® GuardianOS™ 5.2

## Operating System for SnapServer NAS Systems

### Key Benefits of GuardianOS

GuardianOS™, the award-winning SnapServer NAS Operating System, has been specifically designed to deliver robust data management throughout distributed environments. GuardianOS combines cross-platform file sharing with block-level data access on a single device to provide a simple yet flexible solution that is ideal for any storage infrastructure. In addition to a unified storage architecture, GuardianOS offers simple scalability, centralized storage management, and a comprehensive suite of data protection tools to consolidate data and simplify management, thereby reducing the total cost of ownership (TCO) of your storage infrastructure.

### Simplicity

GuardianOS is a dedicated storage appliance operating system, specifically designed for ease-of-use. It is installed on all SnapServer NAS systems at the factory to provide a turn-key solution that is ready to go from the moment you turn it on. Because SnapServer NAS systems attach directly to the network, they install in minutes and are easily deployed without application downtime. The award-winning browser-based management within GuardianOS allows SnapServer NAS systems to be easily administered from anywhere on the network.

### Proven Reliability

The SnapServer family of Network Attached Storage appliances has a long-standing reputation as a storage solution that continually exceeds customer expectations. Likewise, the award-winning GuardianOS delivers a robust journaling file system with integrated RAID data protection to provide a solid foundation for SnapServer NAS systems.

### Security

GuardianOS provides a variety of system and data security features to protect your business-critical information.

### Manageability

Managing SnapServer NAS systems has never been easier. The GuardianOS management interface is easy to navigate and offers task-oriented pages, configuration wizards, and context-sensitive help. It also includes the following enterprise-class features for advanced functionality:

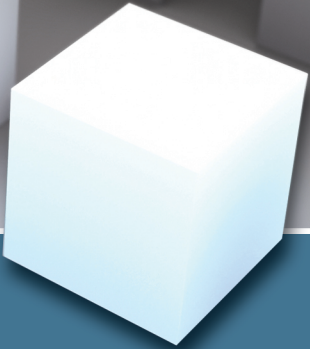
- Instant Capacity Expansion™ (I.C.E.)
- SnapServer Manager™ (SSM)
- Full-Featured CLI Command Set
- SNMP Traps

### Data Protection

GuardianOS provides advanced data protection functionality, including: disaster recovery facilities, integrated backup, support for industry leading 3rd party backup applications, and integrated replication.

### Ease of Integration

SnapServer NAS systems integrate seamlessly into any environment leveraging Microsoft Active Directory Services (ADS) and UNIX Network Information Service (NIS) to authenticate existing network users. Heterogeneous file-sharing for Windows, UNIX, Linux, and Mac OS platforms eliminates the need for individual native file servers. GuardianOS also provides iSCSI target support that delivers block storage capacity to other servers over the Ethernet Network.



### Highlights

- Specifically designed for ease-of-use
- Support for RAID levels 0,1,5,6, and 10
- Built-in security features to keep your business-critical data safe
- Task-oriented pages, configuration wizards, and context-sensitive help for improved manageability
- Seamless integration into multiple environments without the need to reconfigure existing storage or bring down the network
- Heterogeneous file- and block-sharing support for Windows, UNIX, Linux and Mac OS platforms.
- Support for leading Virtualization platforms

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### Consolidation and Virtualization

GuardianOS, with industry file- and-block sharing protocols, allow SnapServer NAS systems to consolidate storage and data in the organization enabling easier deployment of application servers and the consolidation of multiple servers utilizing industry leading Virtualization platforms.

### Unified Storage Architecture and Multi-Protocol Support

GuardianOS enables simultaneous file and block access and supports all native File Sharing Protocols (CIFS, NFS, AFP, FTP, FTPS, HTTP and HTTPS) as well as block level access with iSCSI.

### Enhanced Windows Domain Joins

GuardianOS provides Domain Join integration for environments with multiple Domain Controllers. Organizational Unit Administrators can add SnapServer NAS systems within their specific Active Directory Organizational Unit without requiring the Domain Administrative password for the entire Active Directory structure. GuardianOS also allows Apple File Protocol (AFP) users to authenticate through the Active Directory domain.

### Enhanced NFS support

GuardianOS supports NFS v2, v3 and v4 supporting nested shares with different permissions enabling different rights/ permissions via the NFS access. This is enabled when NFS exports are defined either within a directory structure or in the volume of another NFS export.

### True Native Windows and UNIX Permissions Handling

Folder/File Security Permissions in GuardianOS provide simpler, more efficient, and accurate interpretation for cross-protocol, cross-platform user and file access over standard Linux distributions. These enhancements include true native Windows and UNIX permissions handling with support for all Microsoft Inheritance levels and the full set of 30 distinct permission attributes. Native Windows permissions can be obtained without the need for interpretation or translation.

### Consistent Access Enforcement

Guaranteed consistent and safe file access across all native protocols prevents users of one protocol from adversely affecting the file attributes of another.

### Robust iSCSI Support

Supporting industry-standard software and hardware iSCSI initiators, GuardianOS-powered SnapServers securely manage, store, and distribute block data across an Ethernet network. The iSCSI target support in GuardianOS includes the following:

- VSS / VDS Hardware providers that allow Snap Servers to participate in Application consistent snapshots for iSCSI volumes in Microsoft Windows environments.
- MPIO Support that includes support for Microsoft Multi-path I/O and Cluster Server Windows Certification test suites.

### Virtual Environment Support

With NFS and iSCSI support, GuardianOS allows the consolidation of storage in Virtual Environments enabled by products such as VMware ESX and Citrix XenServer.

### User and Group Identity Support

GuardianOS supports Network Information Services (NIS) and Microsoft Active Directory Services and provides Windows-to-UNIX ID Mapping in addition to supporting local users.

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### Password Policy Enhancements

GuardianOS provides an expanded password character set along with encryption, minimum character requirements and account lockout to allow local user passwords to more closely match complex password recommendations from Microsoft.

### Network Security

GuardianOS provides system and data security features that protect valuable data stored and shared on SnapServer NAS systems including:

- Microsoft Active Directory Support with Kerberos authentication for Client access in Windows environments.
- Native Windows File Permissions Handling
- File and Folder Access Control List (ACL) Security for Users and Groups
- Secure Sockets Layer (SSL)
- Password Encrypted Secure Shell (SSH) with Transport Layer Security (TLS) encryption for authentication
- Challenge Handshake Authentication Protocol (CHAP) Authentication for iSCSI access.

### Network Time Protocol (NTP) Support

GuardianOS-powered SnapServers can function as Network Time Protocol (NTP) Servers providing time synchronization services for other SnapServer NAS systems or NTP clients in the network such as IP video cameras. To take advantage of this capability GuardianOS-powered SnapServers can also function as NTP clients using a common SnapServer NAS system or other NTP server to enable time synchronization.

### Web Server Support

GuardianOS includes a Web Root feature that allows SnapServer NAS systems to be used as a simple web server for static content.

### Print Server Support

GuardianOS-powered SnapServers can share USB connected printers with clients connected to the SnapServer NAS systems.

### Automatic IP Address Assignment

GuardianOS supports DHCP for automatic assignment of IP addresses.

### User and Group Quotas

GuardianOS provides the ability to set a default disk space quota for all users and then provide exceptions to the default on an individual user basis. Group quotas are also supported for UNIX and Linux groups defined by NIS.

### Built-in Data Migration

Easily migrate or copy file content, security permissions and other essential information to a SnapServer NAS systems, using any computer supporting CIFS or NFS file data. Unlike drag-and-drop operations, this robust feature can reliably handle large volumes of files and data. To ensure accuracy, this feature can optionally compare the migrated data to that of the original and can delete the data on the source server, if desired.

### Dynamic Home Directories

The GuardianOS Home Directory feature automatically creates Home Directories for each user upon first login to the network share. Cross-platform capabilities enable users to access their Home Directory from Windows, UNIX, or Apple platforms, as well as via FTP or from the Web.

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### Adaptive Disaster Recovery and System Cloning

GuardianOS includes the ability to create a disaster recovery image of a SnapServer NAS system that contains all the key configuration information associated with the SnapServer NAS system. Wizards are provided for restoring the configuration information, RAID sets, volumes, shares and Snap Enterprise Data Replicator™ (Snap EDR) Management Console information in the event a SnapServer NAS system needs to be replaced. As an extension to the Disaster Recovery image, GuardianOS also allows System Cloning to support the application of common system settings to multiple SnapServer NAS systems as part of mass deployment.

### Optimized Performance

GuardianOS employs a Linux 2.6 Kernel and provides enhanced memory management, optimized network drivers, and multi-core processor support along with an enhanced I/O subsystem.

### Flexible RAID Support

GuardianOS supports RAID levels 0, 1, 5, 6 and 10 allowing users to balance performance with data protection.

### Non-Disruptive Scaling and Provisioning

For scalable SnapServer NAS systems GuardianOS provides a facility for Instant Capacity Expansion (I.C.E.) that allows for the dynamic growth of volumes when additional capacity is needed. Logical RAID Groups can be combined for additional space at any time without disruption and the additional capacity is available immediately.

### Network Load Balancing

For SnapServer NAS systems with multiple network interface ports, GuardianOS provides for increased throughput and failover with the support of Switch Trunking and 802.3ad with Link Aggregate Control Protocol (LACP) and server-side Adaptive Load Balancing options. This enables SnapServer NAS systems to take full advantage of increased band-width performance of the network, particularly helpful in high demand environments such as iSCSI or heavy read/write environments.

### UPS Support for Controlled System Shutdown and Restart

GuardianOS provides integrated support for APC Brand UPS devices with Network Management Cards or USB connections allowing the graceful shutdown of SnapServer NAS systems while protecting the data in the event of a power failure that lasts longer than the battery on the UPS. Conversely, when the power is restored as the UPS comes back online, SnapServer NAS systems can be set to automatically restart.

### Easy to Use Web User Interface

GuardianOS provides a Web User Interface (Web UI) that is intuitive and easy to use including active user and open file reporting, the ability to view file and folder permissions, configuration wizards (including storage and security) that were developed to assist with the broad range of configurations and choices available with GuardianOS, along with many other features that make the SnapServer NAS systems responsive to administrator and user needs.

### Automated Update Notification

GuardianOS-powered SnapServers have the capability to check for the latest release of GuardianOS and provide notification to users with a banner display on the Web UI when a newer version becomes available.

### Unified Multi-System Management Framework

A companion application to GuardianOS, SnapServer Manager (SSM) is a platform-independent tool for managing multiple SnapServer systems from a single location. SSM provides a single graphical console to discover, configure and monitor SnapServer NAS systems that are located anywhere on the network.

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### Error Notification with Email and SNMP

GuardianOS can be configured to provide email notices for errors and events occurring on GuardianOS-powered SnapServers as well as integrating with SNMP management systems for monitoring and receiving SNMP traps from GuardianOS.

### Command Line Interface (CLI) Support

To enable system automation, GuardianOS provides extensive Command Line Interface (CLI) functionality with support for over 150 separate commands, allowing scripting and automation of the majority of common tasks that can be performed through the Web UI. The scripting shell environment provided by GuardianOS also has a rich help mechanism for each command including usage and syntax.

### Integrated Antivirus

GuardianOS includes the award winning CA Antivirus (optionally licensed on SnapServer NAS 110, 210 and 410 systems; included with SnapServer NAS 620 and 650 systems) to provide a comprehensive virus defense solution for files stored on SnapServer NAS systems.

### Integrated Snapshots

GuardianOS Snapshots (optionally licensed on SnapServer NAS 110, 210 and 410 systems) provide the ability to create volume-based virtual point-in-time copies that can be mounted for end users to restore their own data when inadvertent mistakes are made. Snapshots can also be used in conjunction with backup or replication jobs to ensure data consistency at the time the data is backed up or replicated. Additionally, chained Snapshots consume minimal space when larger numbers of snapshots are created.

### Integrated Local Backup and Third Party Backup Agent Support

GuardianOS integrates BakBone NetVault: Backup for GuardianOS (included with SnapServer NAS 410, 620 and 650 systems with optional upgrade bundles; Optional starter bundles available for SnapServer NAS 110 and 210 systems) allowing GuardianOS-powered SnapServers to backup files to the included Virtual Tape Library (VTL) or to locally attached tape drives that can be connected via USB or SCSI connections depending on SnapServer NAS model. Additional client licenses and options also allow the SnapServer NAS systems to act as a backup appliance for the entire enterprise. GuardianOS also supports many third party backup agents to easily integrate SnapServer NAS systems into pre-existing data protection architectures.

Data can also be backed up to tape drives on the SnapServer NAS system with Symantec Backup Exec 12.5 Remote Media Agent for Linux Servers.

Third party agent support includes:

- Symantec Backup Exec and NetBackup
- CA ARCserve
- EMC NetWorker
- BakBone NetVault: Backup

### Integrated File Replication

GuardianOS-powered SnapServers integrate the optional Snap Enterprise Data Replicator™ (Snap EDR) software that can be licensed in an affordable one-to-one NAS configuration allowing the protection of two SnapServer NAS systems (Snap EDR Express) or can also be licensed with the full Snap EDR Standard version allowing many-to-one and one-to-many replication for data protection and data distribution throughout a heterogeneous enterprise. Snap EDR includes:

- Replication for GuardianOS-powered SnapServers, Windows, MAC OS, Linux and Solaris servers.
- Tiered security model including compression and encryption
- Web-based management integrated with the GuardianOS Web UI
- WAN-optimized features for effective replication over high latency networks
- Extensive job schedule and reporting features.



## Specifications

<b>Operating System</b>	Derived from Linux 2.6 Kernel
<b>Journaling File System</b>	Yes – Asynchronous
<b>File System Type</b>	XFS with Enhancements
<b>RAID Levels Support</b>	RAID 0, 1, 5, 6 and 10
<b>Network File Protocols</b>	Microsoft Networks SMB(1.0) / CIFS(NTLM); CIFS via Mac OS X; NFS v2, v3, v4(UDP/TCP); Apple AFP; FTP/FTPS;HTTP/HTTPS(1.1)
<b>Network Transport Protocols</b>	TCP/IP; UDP/IP; AppleTalk
<b>Network Clients Supported</b>	Windows 95/98/ME/NT/2000/XP/2003/2008/Vista/7; Mac OS 9.x, Mac OS X 10.2/3/5; AFP v2/v3; UNIX: Solaris 9/10; HP-UX 11; AIX 5.3; Red Hat Linux 9.0; Red Hat Enterprise Linux (RHEL) 3.x/4.x; Red Hat Fedora Core 4.x/5.x/6.x; Novell SuSE Pro 9.x/10.x; Novell SuSE Linux Enterprise Server 8.x/9.x/10.x
<b>Server Emulation Types</b>	Windows 2000/2003/2008/NT 4; AppleShare 6.0; Network File System (NFS) 2/3/4; Windows Print Server;IPP Print Server
<b>Microsoft Active Directory Support</b>	Operates in both native and mixed domains. Dynamic DNS name resolution.
<b>Block Protocol Support</b>	iSCSI Draft 20 compliant
<b>iSCSI Software Initiators Supported</b>	Microsoft Initiator v2.03/v2.04/v2.05/v2.06/v2.07 (Windows 2003, XP, Vista, 2008); SmallTree abcSAN iSCSI Initiator Version 1.0; CentOS v5.0 iSCSI Initiator; Solaris 10 (x86) update 3 & 4 iSCSI Initiator; NetWare v6.5 SP7 iSCSI Initiator; RHEL 5 / SLES 10 iSCSI Initiator; VMware ESX 3.01/3.02/3.5; Emboot, netBoot 1.2/2.0; Winboot 2.5
<b>iSCSI Hardware Initiators Supported</b>	Qlogic 4010, 4050, 4052, 4060, 4062 for Windows and Linux
<b>Management Interface</b>	Browser-based; Command Line Interface (CLI) via SSH; SnapServer Manager
<b>UPS Support</b>	APC UPS (USB & Network Management card)
<b>Backup 3rd Party Agent Support (for network backup support – File Data Only)</b>	Symantec NetBackup 6.5; CA ARCserve 11.5 12.0; EMC NetWorker 7.3, 7.4; Symantec Backup Exec 10d, 11d, 12d, 12.5; BakBone NetVault: Backup 8.2
<b>Local Tape Backup Support</b>	BakBone NetVault: Backup for GuardianOS 8.2 (Integrated with GuardianOS); Symantec Backup Exec 12.5 Remote Media Agent for Linux Servers (Managed from separate Windows Backup Application server)
<b>Replication Support</b>	File Data Only – Snap EDR 5.2.2 1195 or later for GuardianOS 5.0 and 5.1; Snap EDR 7.2 or later for GuardianOS 5.2 or later.
<b>Anti-Virus Support</b>	Yes – CA Antivirus software (Optionally licensed for SnapServer NAS 110, 210, 410; Included with SnapServer NAS 620, 650)
<b>Volume-based Quotas</b>	User (global default and by specific user for Windows, UNIX/Linux, Mac, FTP/FTPS) & UNIX/Linux Groups
<b>SNMP support</b>	V2, MIB II (RFC 1213); Host Resources MIB (RFC 1514)
<b>UNIX NIS Security</b>	Yes
<b>Windows Security</b>	NTLMv2; Full Windows ACL Support with Inheritance
<b>Share/ File- Level security</b>	Both Share-level and File-level permission including UNIX file permissions and Windows ACLs
<b>Microsoft Kerberos Support</b>	Yes v5
<b>File/Directory Ownership</b>	User, Group, Other
<b>UNIX/NFS Permission ACE Support</b>	Read (R), Write(W), Execute (X)
<b>Windows/CIFS Permission ACE Support</b>	All
<b>Microsoft Inheritance Levels Supported</b>	All
<b>Maximum # of</b>	File Size: Client / Protocol Dependent - GuardianOS supports the maximum file size for each supported client / Volumes: 254 – (# of active volumes + # of active snapshots) / Snapshots: 254 – (# of active volumes + # of active snapshots) / Volume Size: 16TB / iSCSI LUNS: 256 / iSCSI Disk Size: 2TB / Home Directories: 65,436 (Limited to the Maximum Total Users) / Share Name Size: 27 Characters / Microsoft Windows Domain Users: 65,435 (For systems with 1GB or more memory); 30,000 (for systems with 512MB); 15,000 (for systems with 256MB) / Total Users: 65,435 / Shares: 255 for AFP only; all other protocols 500 excluding Home Directory Share, which are virtual-limited to the max number of total number of Users / Disk Drives per RAID set: 8 recommended (RAID 0, 1, 5, 10) / 12 recommended (RAID 6) / 24 maximum / Quota entries through browser: Default Quota – up to the maximum users; 546 entries (exception to the Default Quota)
<b>Default RAID Chunk Size</b>	64KB
<b>Recommended Active Concurrent Users Served—Up to:</b>	SnapServer NAS 110/210: 50 users, SnapServer NAS 410: 75 users, SnapServer NAS 620 SATA: 225 users, SnapServer NAS 620 SAS: 250 users, SnapServer NAS 650: 300 users (Where each user is presenting a moderate or average file access demand). Note that "Practical Concurrent Users Served" is not the same as "Concurrent connections". The SnapServer NAS system can handle many more connections.



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