



VCL-SAN

Industrial Grade Storage Area Network with Cybersecurity

Product Overview:

The VCL-SAN is an industrial-grade Storage Area Network (SAN) solution engineered for organizations requiring high-performance, scalable, and resilient storage infrastructure. It delivers enterprise-class performance, fault tolerance, and intelligent data protection for critical environments such as government, financial and enterprise data centers.

Each node supports up to 24×24 TB drives, offering 576 TB raw capacity per node.

Powered by VCL's distributed-storage architecture and managed through the VCL-SAN UI, administrators gain centralized control, real-time analytics, and automated resiliency with Mirrored and Parity-based pools.

The system is supplied with a perpetual licence - all software, management, and security features are included, with no annual or recurring fees.

Cluster Management and Scalability:

- Dynamic Node Addition / Removal: Expand or shrink capacity without service interruption.
- Automatic Rebalancing: Data automatically redistributes when nodes or disks are added or replaced.
- High Availability Architecture: Continuous access even during node or disk failure.
- Integrated Cluster Health Dashboard: Live status of Nodes, Disk Store and services.

Storage and Data Management:

- Thin Provisioning for efficient capacity usage
- Data Scrubbing to detect silent corruption
- Storage Pools for logical grouping
- Mirrored and Parity-based Pools
- Quality of Service (QoS) per volume (*per image*).

Monitoring and Reporting:

- Real-Time Performance Graphs: throughput, latency, IOPS and capacity visualization
- Capacity forecasting: Predictive analytics for expansion planning
- Integrated Health Reporting: Displays utilization, error counts, and snapshot schedules.

VCL-SAN UI - Management and Visualization:

- The VCL-SAN UI provides a secure, web-based management interface designed for centralized cluster visibility, capacity monitoring, and operational oversight. The dashboard presents a real-time view of cluster health, storage utilization, and performance metrics, enabling administrators to monitor and manage the SAN environment efficiently.



Cybersecurity and Access Control:

- **Role-Based Access Control (RBAC):** Define user roles with specific privilege levels
- **Storage Quotas:** Set per-volume limits to manage resource utilization and ensure balanced allocation
- **Client-Based Access Restriction:** iSCSI clients are authenticated and authorized using unique initiator ID's for secure volume access. (*IQN Based and CHAP*)
- **Volume-Level Encryption:** Data at rest is protected through the system's integrated storage-encryption mechanism
- **Secure HTTPS Web Interface:** All administrative operations occur over SSL-encrypted HTTPS sessions.

Backup and Recovery:

- Read-Only Snapshots with long-term retention policies:
 - Daily - 2 weeks
 - Weekly - 1 year
 - Monthly - 5 years
 - Annually - 10 years
- Automated replication between nodes
- Automated data healing: Self-healing mechanism reconstructs missing or corrupted data blocks
- NTP synchronization: Ensures time-aligned replication and logs across all nodes.

Software Specifications:

Feature	Description
Storage Type	Clustered Storage Area Network
Supported Protocols	iSCSI
Data Protection	Mirrored and Parity-Based Pools
Storage Pools	Logical Grouping for performance and tiering
Network Stack	TCP/IP IPv4 & IPv6 Dual Stack
Access Authentication	Client-based iSCSI ID authentication
Backup and Recovery	Encrypted Replication and Read-Only Snapshots
Snapshot Retention	Daily, Weekly, Monthly and Annual Policies
NTP Synchronization	Clock alignment for backups and snapshots
QoS Control	Assign IOPS or bandwidth limits per volume
CLI Interface	Command-Line management available
Monitoring and Alerts	Real-time health and email notifications
Client OS support	Windows, Linux, Unix-based systems.

Licensing and Support:

Perpetual licence with no annual or recurring fees. Software updates and technical support available through authorized channels.

Summary:

The VCL-SAN delivers a resilient, scalable, and secure SAN solution built for modern data centers, offering intelligent storage management and long-term operational efficiency under a perpetual licensing model.

Key Capabilities:

Centralized SAN Dashboard: A unified dashboard displaying overall cluster status, system health, uptime, and master node information for quick operational assessment.

Cluster Health and Status Monitoring: Real-time indication of cluster state (Healthy / Degraded), including service availability and system operational status.

Storage Capacity Visualization: Graphical representation of total, used, and available storage capacity, enabling instant visibility into storage consumption trends.

Node-Level Visibility: Detailed view of individual SAN nodes, including:

- Hostname
- IP address
- Node health status
- Allocated capacity
- Uptime

Performance and Utilization Metrics: Live performance indicators, including:

- Read and write IOPS
- Client throughput (reads and writes)
- Latencies
- Recovery throughput
- Time-range based performance views (e.g., last 1 hour).

Alert and Event Status Panel: Dedicated alert section providing real-time visibility into system warnings, faults, or confirmation of optimal system operation.

Storage Pool and Block Management Navigation: Intuitive navigation for managing storage pools and block-level resources through the graphical interface.

Secure HTTPS Access: All management and monitoring activities are performed over a secure HTTPS web interface to ensure protected administrative access.

Modern and User-Friendly Interface: Clean, responsive dashboard layout designed for operational clarity and ease of use in enterprise data center environments.

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Technical specifications are subject to changes without notice.

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