



OVERVIEW

SANBlaze VirtualLUN storage emulation for FC-NVMe is the key piece of test equipment for anyone developing products supporting the FC-NVMe storage protocol. The VirtualLUN feature set provides a unique set of functions applicable in all aspects of a product lifecycle; from development to design validation and test and QA. The ability to emulate **FC-NVMe targets** and **initiators** concurrently with native **FC targets** and **initiators** on the same wire with a wide range of configurable attributes provides engineers with a flexible, scalable tool to simulate real SAN environments and test director class switch environments at a fraction of the cost of real devices.

The VirtualLUN provides full control and programmability of Fibre Channel parameters, providing unique storage test conditions for SAN testing and development.

Easily configurable target environments can be edited and saved for reuse. Multiple error conditions and triggers allow for complex error injection. RAM based targets provide low latency targets for performance testing. Very complex, disk based error conditions can be simulated to provide a unique platform for backplane and controller testing. The ability to program complex and varying range of target configurations and save and restore multiple target configurations provides a flexible, cost effective and invaluable tool for development, test & QA labs.

Initiator emulation delivers the ability to drive FC-NVMe traffic, inject errors, send specific or custom op codes in an easy to use, scriptable platform. The ability to affect fabric login parameters is useful in switch and fabric testing and development. Custom command generation and predefined tests provide simulated host environments. Auto connect and probe features quickly identify targets to test. Features such as Read/Write/Compare testing, error injection and a custom command builder provide an environment to simulate single or multiple FC-NVMe hosts.

Test cases can be saved and restored with a single command. Tests can be started via command line, scripted or via an easy-to-use Web based interface.

FEATURES

- Support for 64G, 32G, 16G, 8G Fibre Channel
- Simulated FC-NVMe SSD storage devices
- Simulated Hosts
- High performance
- Multi-target and Initiator support (NPIV)
- Error injection
- Packet Capture and Decode
- Easy to use Web based interface
- Command line interface and scripting
- Save/load configurations
- Trace Functionality
- Error counters
- Real time statistics and performance data

KEY APPLICATIONS

- FC-NVMe Hardware and Software Development
- Validate and test FC-NVMe hosts
- Validate and test FC-NVMe storage arrays
- Simulate single or multiple FC-NVMe hosts
- Switch and Fabric testing
- Storage software verification
- SAN management software verification
- Performance testing
- Error handling testing
- Failover and Multipath Simulation
- Scalability testing
- Capacity planning

HARDWARE OPTIONS

- 64G, 32G, 16G or 8G auto-negotiable speed
- 2, 4, 8, 12, 16 or 18 ports per system (depending on link speed)

GENERAL EMULATION FEATURES

- Configurable WWNN/WWPN
- Simultaneous FC & FC-NVMe traffic on same wire
- Configurable Symbolic Port name
- T10 DIF emulation including inbound and outbound verification
- Send ELS, user configurable Code, ID and Payload
- Configurable MTU size from 128 - 2048 bytes
- Configurable login parameters and behavior
 - FLOGI
 - PLOGI
- NVMe Subsystems Reset

TARGET FEATURES

- Emulation of up to 256 FC-NVMe Controllers per port
- Up to 1024 Namespaces per port
- Real device emulation mode where all data is retained
- Virtual Device emulation for Namespaces up to 2PB
- SSD storage emulation
- Near line rate performance
- Configuration and Data Retention via Save/Load to disk function
- Real time statistics
- T10 DIF emulation including inbound and outbound verification
- Configurable Namespace parameters
 - Speed
 - Size
 - Personality
 - Errors

INITIATOR FEATURES

- Emulation of up to 256 Independent FC-NVMe hosts per port
- Single button "Max Reads all Ports" testing for quick go/no-go
- Read / Write and Compare Tests for traffic generation and data integrity
- Multi-Initiator tests dispatch tests over all available initiators
- Sequential, random, Min/Max and Butterfly seeks
- Multiple data patterns including Random and User Defined
- Multi-path testing on all paths, one path, active path, optimal path
- Comprehensive "Generic" I/O capability
- Task Management functions
- Compression and Dedup Data Patterns
- Namespace management

REAL TIME STATISTICS INCLUDING:

- I/O Performance Counters
- Outstanding I/O Count
- Fibre Channel Counters
- FLOGI/FDISC Statistics

CONFIGURABLE ERROR CAPABILITIES INCLUDE :

- Drop
- Abort
- Read/Write Delay
- Read Over/Read Under
- Write Over/Write Under
- Out of Order Data
- Data Corruption
- NVMe SCT/SC
- Bad Block
- Bad T10 DIF inbound/outbound
- Link Reset
- Force Logout/Process Logout
- Change Login Parameters

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SANBlaze Technology, Inc. is a pioneer in storage testing and validation technologies. SANBlaze systems are deployed in the test and development labs of most major storage hardware and software vendors worldwide.