



Applications

- SAN Equipment Performance Validation & Optimization
- Firmware Testing
- Disaster Recovery Testing
- Storage Extension (symmetric data replication) Validation
- Remote Backup Testing
- FCoE System / SAN Testing
- Interoperability Testing

Benefits

- Increased system performance and robustness with complete testing of usage and error scenarios
- Reduced time-to-market with faster and repeatable testing
- Increased productivity with automated generation of specific error scenarios
- Eliminate costly post-deployment operational and performance issues
- Faster root-cause analysis of problems in deployed systems through repeatable test cases

Frame Impairments

- Delay
- Drop
- Corrupt
- Modify
- Checksum errors
- Layer2 FCS can be optionally corrected for modified frames

PHY Layer Impairments

- Bit Errors
- Bit Rotation
- Advanced LOS

Overview

[VirtualSAN™](#) is a high-performance in-line (pass-thru) 4/8G FC test system that enables development and verification engineers to validate proper system response to error conditions that can occur in deployed systems. VirtualSAN emulators modify/impair live bi-directional traffic in a highly precise and repeatable manner according to user-specified parameters and duration.

By incorporating VirtualSAN into their test and verification setup, engineers can introduce bit-errors, delay, corrupt frame data, modify specific protocol fields in selected frames and observe the resulting system response and recovery. This testing provides for extensive validation of system performance and robustness under specific, user-defined, scenarios. Thorough testing of corner cases is essential for minimizing or preventing costly post-deployment operational or performance issues.

Unlike other emulators, VirtualNet Emulators are hardware-based network emulators (using dedicated FPGAs), delivering full [line-rate](#) performance for FC traffic at **ALL** frame sizes **AND** regardless of the impairment settings applied. With the ability to replicate real-world network conditions in a 100% controlled manner, users are ensured that no other variable has been introduced into testing and results are precise and, most importantly, repeatable.

Features

- **Performance:** Full line-rate regardless of the incoming frame sizes, number of impairments, or the specified parameters for impairments
- **Targeted Impairments:** Select a particular frame for specific impairments based on user-specified frame protocol field values
- **Protocol/Field Parsing:** Frames are parsed in hardware to recognize specific protocol fields irrespective of the protocol hierarchy
- **Impairment Duration:** Impairments can be specified as having infinite as well as finite duration in units of Time, Frames, and Bytes
- **Impairment Rates:** Impairments can be specified with distinct probabilities for each impairment to create realistic test scenarios
- **Dynamic Impairment Parameters:** Impairment parameters can be changed during testing without disrupting the traffic stream. VirtualSAN switches from one set of conditions to another on a single frame boundary without creating unintended intermediate impairment conditions
- **Analysis:** Detailed real-time statistics for bi-directional Ingress/Egress traffic as well as statistics related to impairments created by the VirtualSAN. All statistics may be recorded to a CSV file for post-analysis.
- **Multiple ports:** Up to Four (4) 4G FC ports and Two (2) 8G FC ports with simultaneous operation on all ports
- **Usability:** Intuitive GUI and powerful TCL based CLI for testing automation.

Better Testing → Better Reliability → Better Products

Functional Specifications

VirtualSAN™ - 4/8G FC	
Throughput	Full line-rate - all frame sizes - all impairment settings
Targeted Impairments	Field Comparisons =, ≠, ≥, ≤, Range, Out-of-Range Multiple comparisons can be combined with AND / OR conditions
Frame Drop	Rate - 1E-7% (1E-9) to 100%. Distributions - Uniform, Periodic, "Bursty"
Data Corruption	Rate - 1E-2 to 1E-12 - Full or partial frame corruption Optional FC Layer 2 Checksum Correction for corrupted frames Ability to limit data corruption to Targeted Frames, or Non-Targeted Frames, or All Incoming Frames
Data Modification	2 Engines - Each capable of modifying up to 128 frame bytes Modification with bit-mask ability to modify specific bits Data modification modes - Random, Invert, User-Specified <i>Data</i> Insertion Optional FC Layer 2 Checksum Correction Separate Frame Drop rates for Non-Targeted and Targeted Frames
CRC Errors	FC Layer 2 Checksum errors. Separate CRC Error rates for Non-Targeted and Targeted Frames
Delay	8G FC - 10µs to 275ms, ± 4.7ns 4G FC - 20µs to 275ms, ± 9.4ns Fixed/Variable Delay distributions
Layer 1 Bit Errors	Rate - 1E-2 to 1E-12, Burst Length - 1 to 32767 bits (Optical interfaces only)
Layer 1 Output Bit Rotation	40 Output Bit Rotation options to exercise all possible Comma alignment taps
Output (Laser) Disable	25 ms minimum, Fixed/Random Cycle times (±200 µs)
Real-Time Statistics	FC Layer 1, FC Layer 2 Errors, Interface Traffic, Impairments, Logging for all stats

Physical Specifications

Data Interfaces	Optical LC Connectors 4G FC - Up to Four (4) Ports - 850 and 1310nm 8G FC - 2 Ports - 850nm, 1310nm, and 1550nm
Management Interface	1 x Gigabit Ethernet, GUI and Tcl-based CLI
Input Power	100VAC to 240VAC, 50-60Hz, 225 Watts (Max.)
Dimensions / Weight	19" Rack-mountable - 4U (7" (H) x 16 7/8" (W) x 17 11/16" (D) 40 lbs.

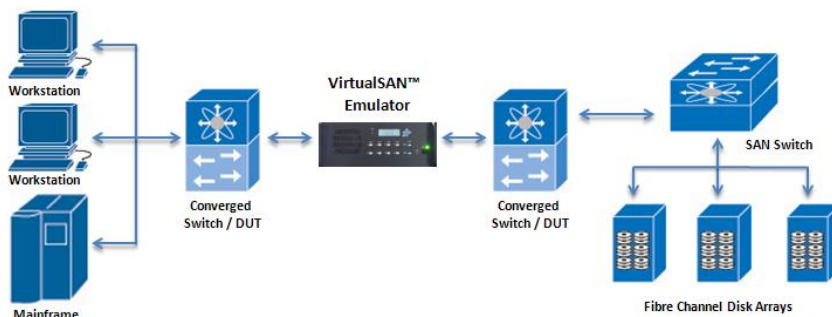
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