

SAS InFusion SATA InFusion FAQ



SAS InFusion Single lane
Error Injector / Traffic Modification System

What are the primary features of SAS and SATA InFusion?

Features	Benefits
Injects errors within "live" traffic environment	Allows validation of fault recovery at the system level (between real host and device)
Link Layer Errors	Inject CRC, disparity, 8b/10b encoding errors; invalid primitives or illegal connection events
Transport Layer Errors	Create invalid SSP, SMP, STP or SATA frames
Command Layer Errors	Modify SCSI payload data to transmit invalid CDBs, LUNs, Task Attributes, or status fields
Packet Drop	Remove individual primitives, address frames, data frames, FISs from the stream to verify retry behavior
Break Link	Programmatically break the connection to simulate "hot-plug" events and test link recovery
Value Replacement	Monitor the link for specific values (as low as bit level) and replace with user-defined values to create invalid protocol conditions
Data Capture into Pattern Matcher/Substitute	InFusion can extract a specific field from a frame and use this value in the DWORD pattern substitute action to create duplicate tag or duplicate address errors
Primitive Manipulation	Replace flow control symbols with Credit Blocked primitives to validate arbitration fairness
Modify Frame Headers including Payload Data	Create invalid protocol traffic by modifying contents of frames
Inject Errors while Running Real Workloads	Better reflects "real world" operating conditions compared to script based simulations
Adjust Error Frequency	<ul style="list-style-type: none"> • Every occurrence • After a specified number of occurrences • After a specified time interval • Combination of occurrence and time interval
Create Test Cases with Wizard style interface	Allows easy setup of IF-THEN traffic modification scenarios
Hardware Independence	Test scenarios are independent of test setup and rarely need to be tuned for different configurations
C+ API	API allows multiple scenarios to be run in sequence
SAS and SATA 1.5 / 3 Gbps compatible	Inject errors on a single SAS/SATA link or combine multiple InFusion systems to inject errors on several links
Event Logging	Error events are logged in a text format including timestamp
Ethernet Attached	Setup and control InFusion error injection remotely over any IP network

Standalone Operation	Detach the InFusion system and control with built-in LCD display
Small Footprint	Portable and affordable

What is the difference between InFusion and LeCroy’s Trainer Exerciser platform?

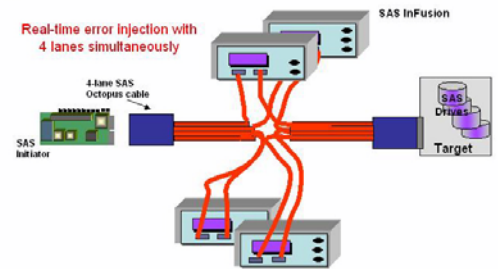
LeCroy’s SAS and SATrainer are designed to emulate host or device environments which makes them ideally suited for testing SAS and SATA *components*. These systems provide byte-level control of the traffic stream but require custom script programming. InFusion is typically used during *system* level testing where pre-production host controllers and devices are being validated for reliability under adverse traffic conditions. The wizard interface allows non-programmers to create custom error-injection tests quickly and easily. The ability to see how a real host and device respond to errors is InFusion’s key benefit.

Can InFusion be used to inject errors at the physical layer?

No - InFusion is not intended to corrupt Physical Layer events including clock skew management, OOB, Power management, or signal integrity.

Can InFusion be used with SAS or SATA multilane environments?

While InFusion is limited to injecting errors on a single physical lane, multiple systems can be combined to inject errors simultaneously on multiple physical links. LeCroy can supply special “octopus” cables to allow InFusion to tap systems that utilize multilane connectors between host and device. Coordinating error injection events between multiple InFusion systems using the included BNC port is now supported.



Will InFusion include sample test cases?

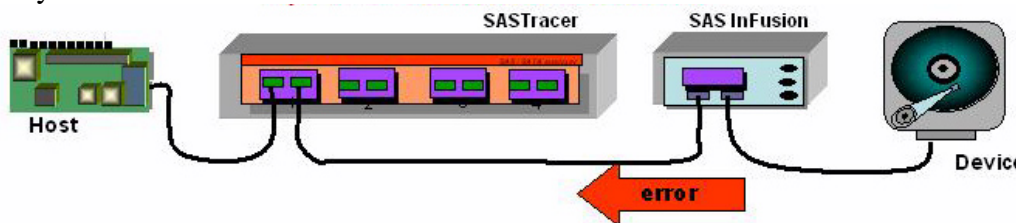
Yes – InFusion will include sample test “scenarios” that can be used to inject errors in SAS and SATA protocol traffic. Creating additional test scenarios for your own application is fast and easy.

Is the LeCroy Analyzer required to use the InFusion system?

No – InFusion is a separate product that can be used with or without a protocol analyzer. Most users will get best results when using some kind of bus analysis tool with InFusion to view responses from the DUT during the error injection event.

How is InFusion configured with an analyzer in the Line?

To record the actual error and the subsequent response, it’s best to place the analyzer downstream from InFusion. This way the frame containing the error will be visible to the analyzer.



What is the difference between SAS InFusion and SATA InFusion?

SAS InFusion and SATA InFusion are identical at the hardware level. However, the software for SAS InFusion includes super set functionality for modifying both SAS and SATA traffic. Because some customers only require SATA functionality, LeCroy offers a SATA InFusion at a lower price point.

Will I be able to alter the SAS / SATA boot up sequence using InFusion?

You will be able to modify OS boot operations - (if these are SAS frames or ATA commands – (IDENTIFY, SET MULTIPLE, etc..). The OOB ALIGN burst and speed negotiation intervals can not be altered with InFusion. Use the SASTrainer Exerciser platform to control SAS/SATA OOB sequencing.

Can InFusion be used to run multiple test cases in sequence?

Up to 10 test scenarios can be run in sequence using InFusion's C++ programming API to inject different error or traffic modification test cases. InFusion also supports jumping between events with 256 wait states within a single scenario. *Jump* actions allow each state to inject different error and then automatically advance to the next state. This would allow up to 2500 test cases in single 10 scenario Library.

Can I use 3rd party software environment to start the InFusion error injection?

InFusion includes a Windows DLL that can be used to start the error injection process. BNC support can also be used to provide external control of the InFusion system:

- BNC_TRIG_IN will be an available Event that can be part of a InFusion session and can be used to automatically advance the state or begin an error injection when the Toggle signal is detected on the BNC line.
- BNC_TRIG_OUT will be an Action and can also be part of an InFusion session that will automatically pulse* the BNC OUT line on the Infusion system to allow the system to synchronize capture with an attached analyzer.

What effect does InFusion have on the line?

Once InFusion is in line – it does not introduce any inadvertent errors. When operating in traffic impairment mode, Infusion must look at each frame/primitive/ordered set to determine if it matches patterns specified by the user. InFusion is a repeater and must convert data streams on both ports from 10bit symbols to 8bit symbols. It then converts back to 10bit after making any modifications to the patterns. As it repeats the patterns, it adds some latency of approximately 500ns;

I can't seem to get my computer to see InFusion?

In some cases, Firewall software on the LAN router will prevent a laptop from accessing InFusion. The host machine network settings should be configured to allow the following:

- Initiate outbound TCP connections using ports 4000 and 4001
- Send UDP broadcast messages using port 4002.
- Accept and process UDP messages using ports 4003 and 4004.

LeCroy recommends a low cost DHCP router as the easiest way to connect to an InFusion system. We have had best results with the Linksys BEFSR81.