*Enabling Global Connectivity*

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# CATC SATracer ™ / Trainer™ 3G Software version 4.0

*Application Notes*

These Application Notes are supplemental to the printed documentation included with the CATC SATracer /Trainer 4.0

## 1. CATC Serial ATA product family

SATracer/Trainer ***3G*** models (for 1.5 and 3Gbps) are supported with SATracer v4.0 software.

**part #SS002AAA**
**2 port Analyzer model**
In Nov 2003, CATC released SATracer v1.0 which supports SATA 1.5 and 3Gbps signal rate and two recording channels.

**part #SS003AAA**
**4 Port Analyzer model**
In Dec 2003, CATC released SATracer v1.01 providing 4 recording channels for true "Wide" port analysis

**part #SS002APA**
**2 Port Analyzer w/Exerciser model**
In Mar 2004, CATC released SATracer /Trainer v1.1 providing single port SATA/SATA Exerciser option in addition to software enhancements

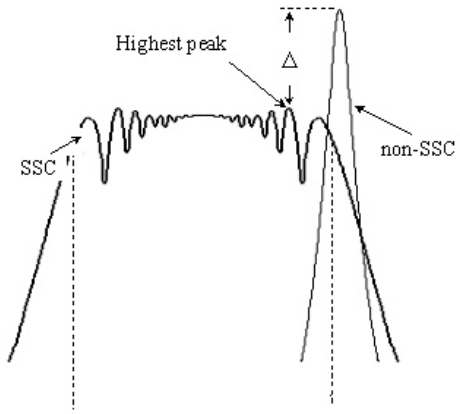
SATracer / Trainer ***1.5G*** Models (for 1.5Gbps only) are supported with SATracer v3.1 software and earlier. **The SATracer 4.0 software is not compatible with CATC's legacy Serial ATA analyzers on the 2500H platform (below).**

**part #SA004APA**
**1 port Analyzer w/Traffic Generator on UPAS 2500H**
* SATracer and SATrainer 3G plugin module is not compatible with UPAS 2500H chassis (above)

**part #SA004AAA**
**1 port Analyzer on UPAS 2500H**
* SATracer 3G plugin module is not compatible with UPAS 2500H chassis (above)

## 2. Spread Spectrum Clocking

SATracer can record traffic from Serial ATA devices that utilize spread spectrum clocked (SSC) signaling. SSC modulates the operating frequency of a circuit slightly to spread its radiated emissions over a range of frequencies rather than just one tone. By distributing emissions for a given frequency, SSC transmissions help devices meet FCC requirements.



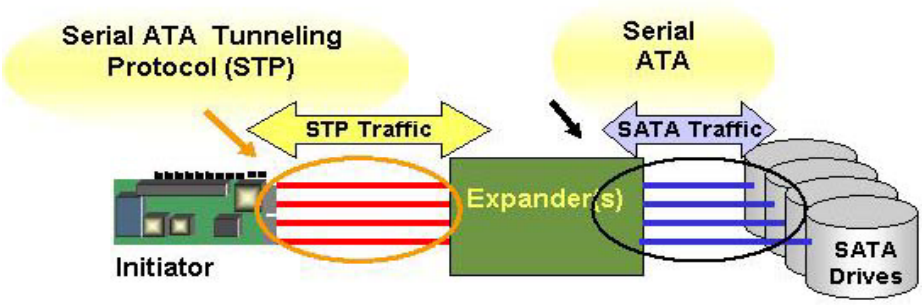

**SSC is accomplished by "down-spreading" the clock frequency using a deviation of no more than 0.5% down-spread (+0% -0.5%) □□ peak reduction**

SSC transmission is optional on the transmitter (TX) side for both host and device. However, SSC is a mandatory capability for all Serial ATA receivers (RX). This requirement eliminates compatibility issues by ensuring that all devices can tolerate SSC signals when attached to a device that transmits SSC signaling.

CATC's SATrainer generator on the UPAS 10K (Pod # SS001MG) and CATC SATrainer generator on 2500H(Pod # SA004MA) allows spread spectrum transmissions to be enabled/disabled dynamically while generating traffic. This is a valuable capability for validating SSC operation for both host and device side silicon.

## 3. SAS and STP Support

SATracer 3G is specifically designed for Serial ATA recording and analysis. The Serial Attached SCSI (SAS) protocol allows Serial ATA devices to be attached to SAS initiators and expanders.



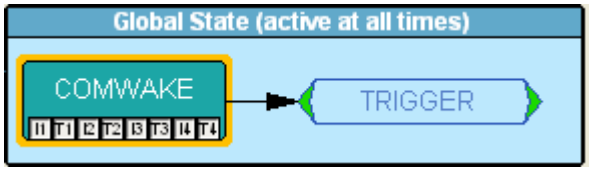

**SATracer will record SATA traffic only – The SASTracer software option is required to capture SAS traffic including STP protocol**

When using SATA hard disk devices attached to SAS expanders, SATracer 3G will record and display the Serial ATA protocol traffic between the Serial ATA targets and the SAS expander. SATA traffic transmitted between the SAS Initiiator and the SAS Expander is considered STP protocol. SATracer 3G users must purchase the SAS software upgrade option to record and display STP or SAS protocol.

## 4. Recording OOB

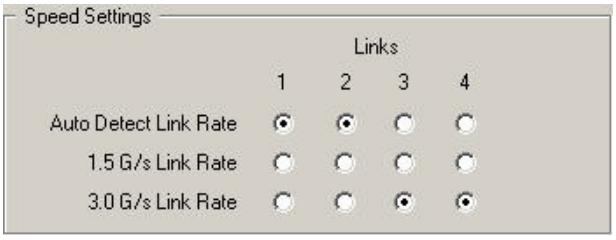
SATracer supports recording the OOB sequence. Some users may encounter difficulties recording OOB if using early prototype host devices that do not have bootable BIOS. In this environment, the OOB sequence will only occur after Windows boots and the initiator port driver loads. This makes OOB difficult to capture using snapshot recording. To ensure capture of OOB handshaking when testing environments where OOB exchange is unpredictable, follow these steps:

a) Use the Event trigger and select COMWAKE as the trigger condition as displayed below. (OOB is a series of ALIGN bursts. Do not filter ALIGN primitives if you're interested in capturing the OOB ALIGN sequence).



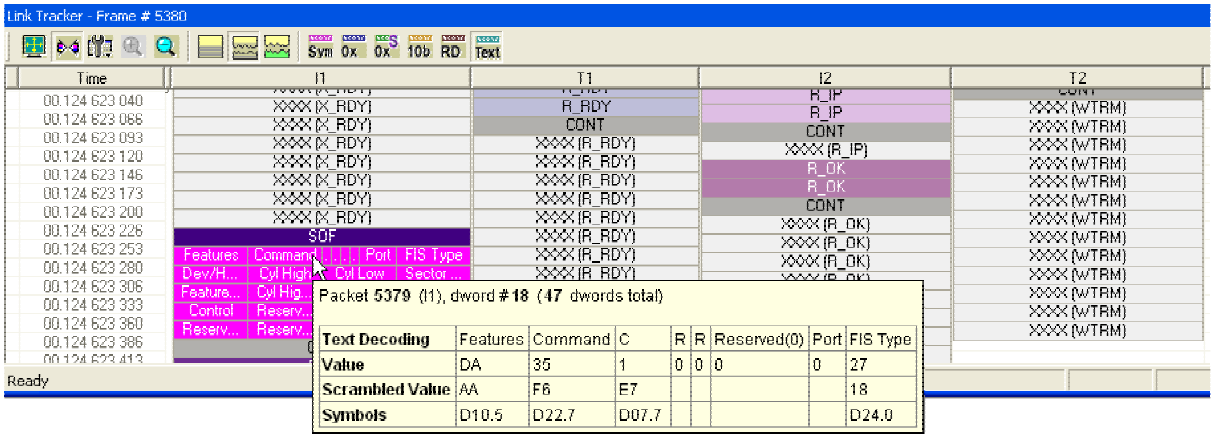

## 5. Speed Negotiation for Serial ATA

SATracer 3G supports Auto Detect link rate between two SATA PHYs. Use the Auto Detect Link Rate option in the Recording Options dialog to allow the SATA link under analysis to automatically negotiate to the highest Serial ATA transfer speed supported.



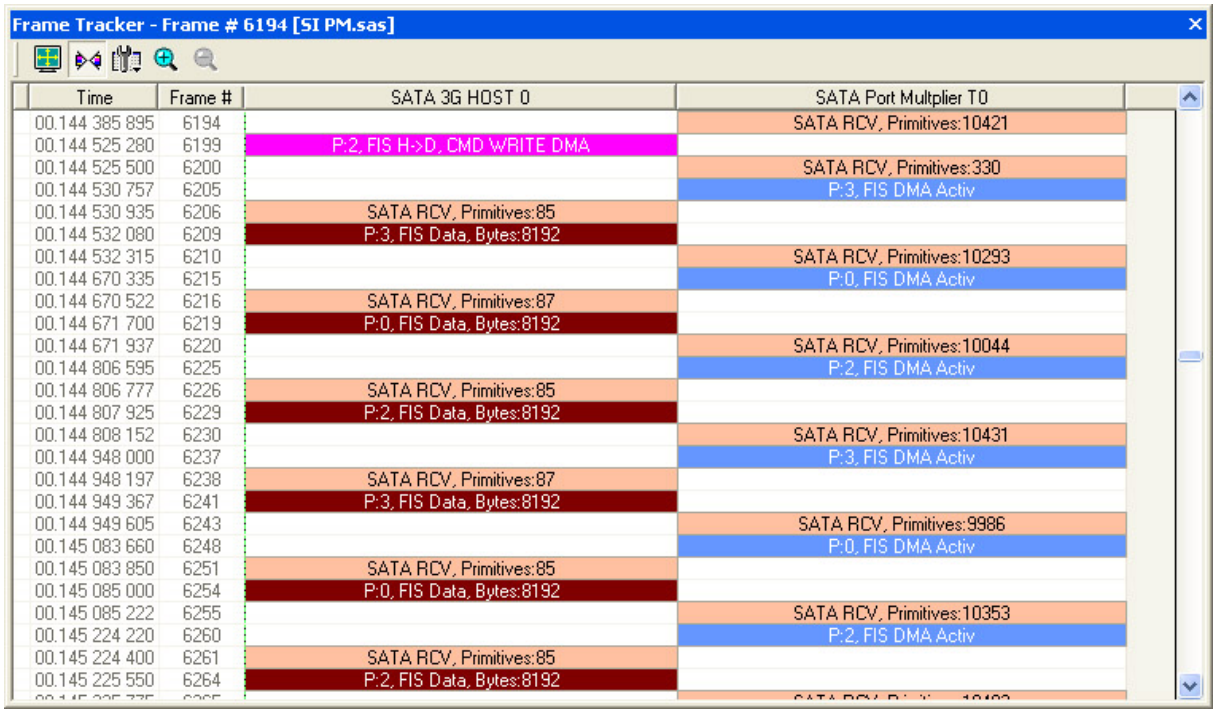

## 6. Link Tracker

LinkTracker is CATC's chronological display of DWORD traffic. This time-synchronized table format shows multilane traffic and can toggle between displaying Packet fields, 10B HEX, scrambled, unscrambled DWORDs and Summary which decodes the field name along with the actual DWORD Values.



## 7. Frame Tracker™

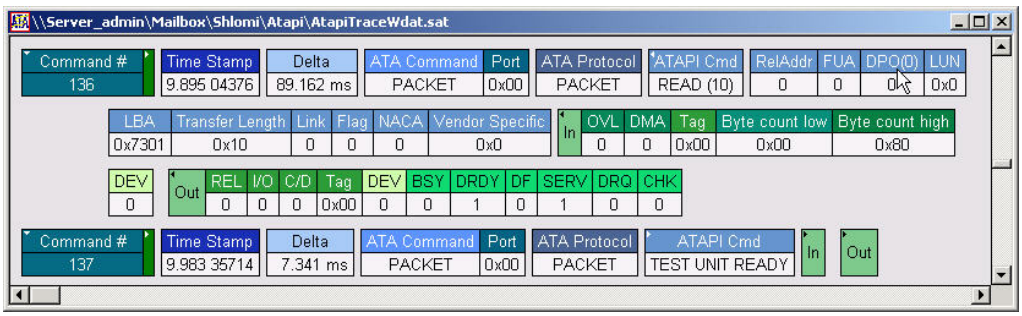
SATracer 3G now offers a condensed view of traffic organized sequentially with each channel displayed in a separate column. The Frame Tracker provides a higher level view of events by showing SATA FIS along with a summary of the SATA primitives transmitted on the line. The Frame Tracker display and can be synchronized to CATC's Link Tracker display allowing easy drill down to byte-level detail.




## 8. ATAPI Command Decoding

The ATA Packet command is specifically for ATAPI devices. The purpose of the ATA Packet command is to deliver a packet of data to the device which defines the function that the device is to perform. This structure of the data within the packet is termed the Command Descriptor Block Packet (CDBP).

Packet commands are issued the same way normal ATA commands are; by initializing the Task File Registers, setting the Drive Selection Bit and writing the Command byte into the Command Register. The majority of the ATA Packet commands implemented by ATAPI devices are concerned with configuring the device. SATracer will decode these commands using the Packet Command code (A0h) and the associated command register and status fields within the CATC Trace.

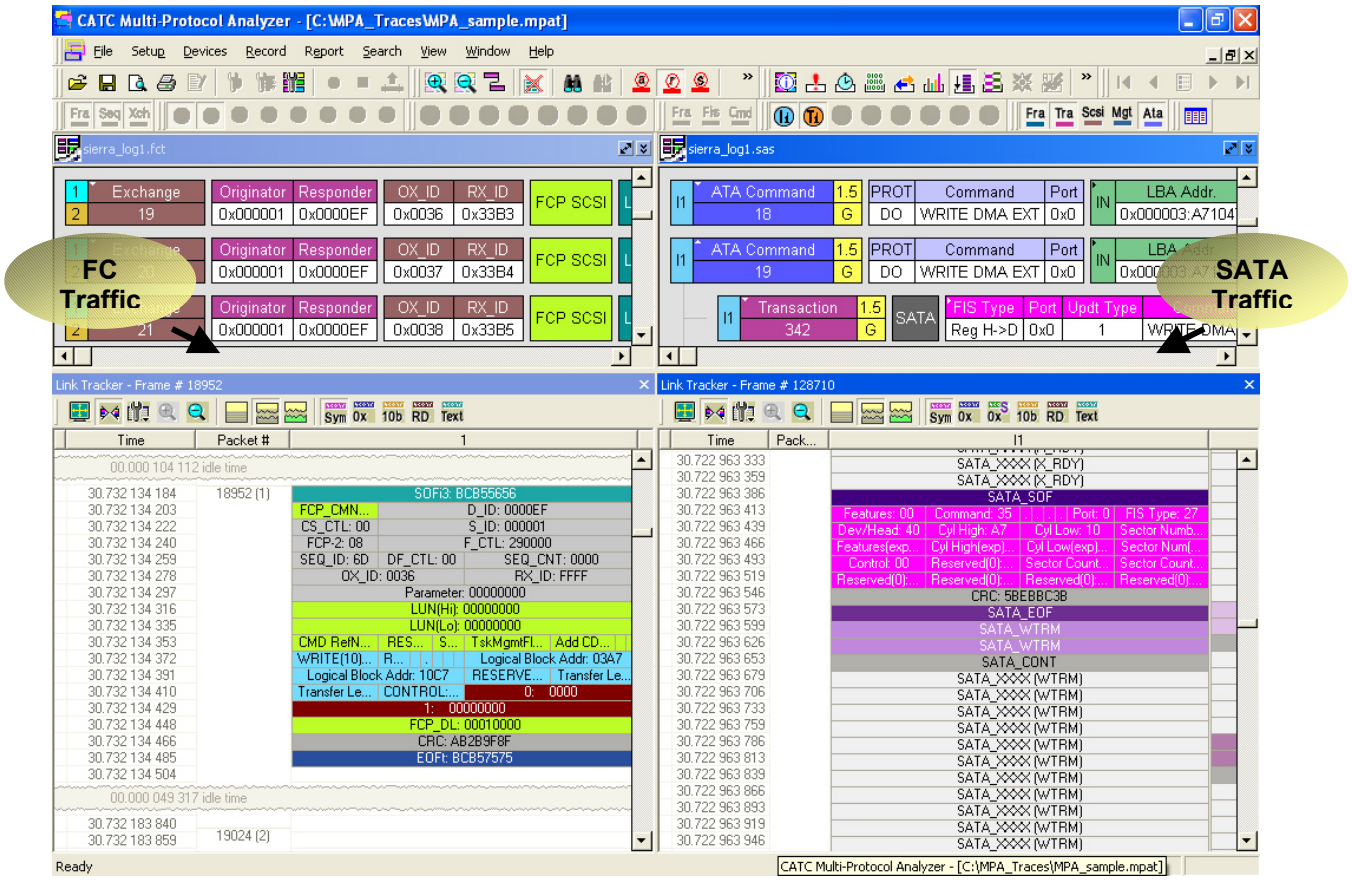


## 9. Cascading Multiple Analyzers:

Now users can “Cascade” up to 4 SATracers analyzers using the BNC connectors to synchronize traffic to a single clock reference. Engineers testing large SATA-based RAID systems may benefit from the ability to aggregate multiple standalone analyzers for high port count applications.

## 10. Multiprotocol Analysis (MPA)

Like cascading, MPA allows users to combine standalone analyzers together to capture high speed traffic across different communication protocols. CATC’s SAS, SATA and Fibre Channel analyzers can be configured to cross-trigger, capture and display traffic from heterogeneous protocols - all synchronized to a common clock. Support for synchronizing with CATC’s PCI Express analyzer will be available in Q4-2004.




**The Multiprotocol Analyzer provides a unified parent application in which CATC’s SATracer and FCTracer can record and display traffic from two or more UPAS analyzers synchronized to single reference clock**