



CATC Multi-Protocol Analyzer

(MPA)

Reference Manual

Manual Version 1.00
September 27, 2004

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1 Introduction

Multi-Protocol Analyzer (MPA) is an application designed to allow users to simultaneously control different types of CATC analyzers and to analyze the resulting traces in a single integrated interface. MPA was developed to simplify design work in storage industry environments where data often moves from one type of link to another - for example, from SAS to Fibre Channel.

MPA displays traces in a single user interface, thereby simplifying the process of analysis.

Currently, MPA works with three storage protocols: SAS, Serial ATA, and Fibre Channel.

MPA runs on a windows-based PC. The software requires Windows 98SE®, Windows 2000®, Windows ME®, or Windows XP®.

1.1 System Requirements

Currently the supported analyzers include:

- FCTracer software 2.10 (or higher)
- SASTracer software 2.0 (or higher)
- SATracer software 4.0 (or higher)

This document is for MPA software 1.00.

1.2 Support Resources

For the latest release of MPA software, please refer to CATC's web site:

www.catc.com/support

2 What's In this Document

This document describes the differences and additions between current analyzer software application and Multi-Protocol Analyzer.

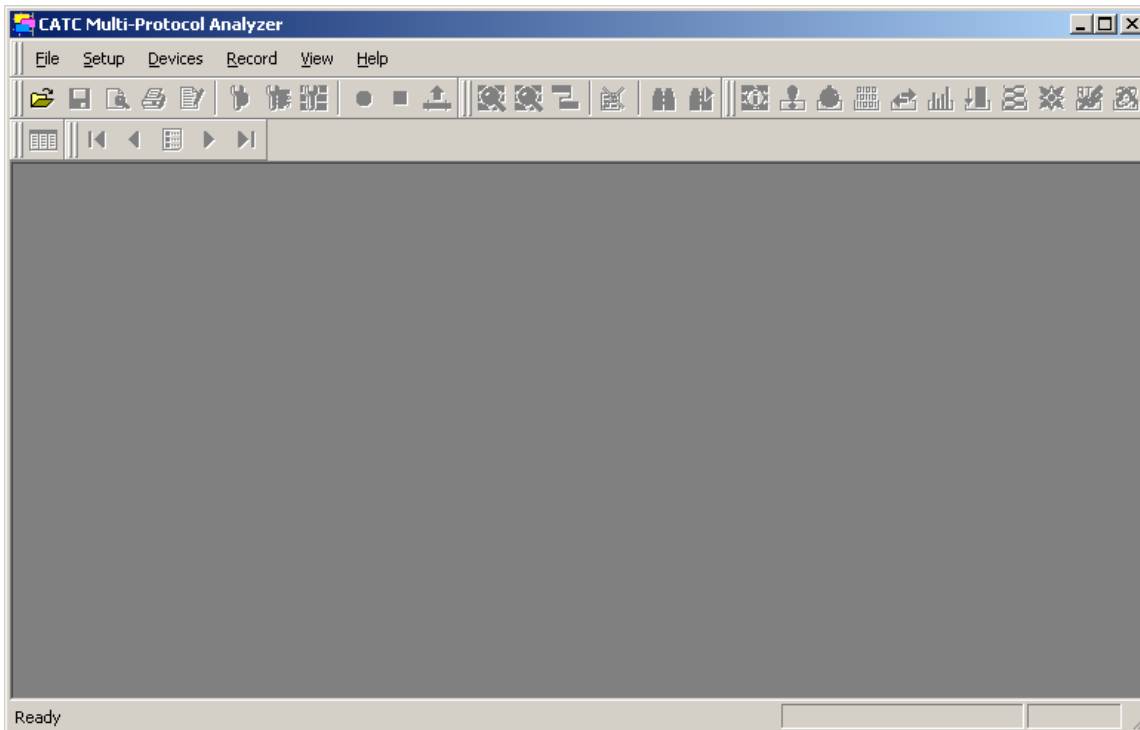
A lot in the operation of the Multi-Protocol Analyzer is modeled of the multi-unit recording approach currently existing in FCTracer and now in SASTracer and SATracer.

3 Software Overview

The MPA application is a multi-protocol application that allows engineers to simultaneously record and analyze Fibre Channel, Serial ATA and SAS traffic. MPA works in tandem with CATC's storage analyzers. Engineers can attach two or more different types of analyzers into a multi-protocol test system and then configure the analyzers to record simultaneously. Afterwards, the traces from the different protocols can be uploaded into the MPA application and viewed and analyzed side-by-side.

MPA makes use of whatever CATC analyzer software has already been installed. MPA detects the installed analyzer software and then integrates the software's tools and buttons into the MPA interface.

If installed without supporting analyzer software, MPA will display generic buttons common to all storage analyzers. Protocol-specific buttons, however, will be absent. The screenshot below shows MPA on a system that lacking other analyzer software.

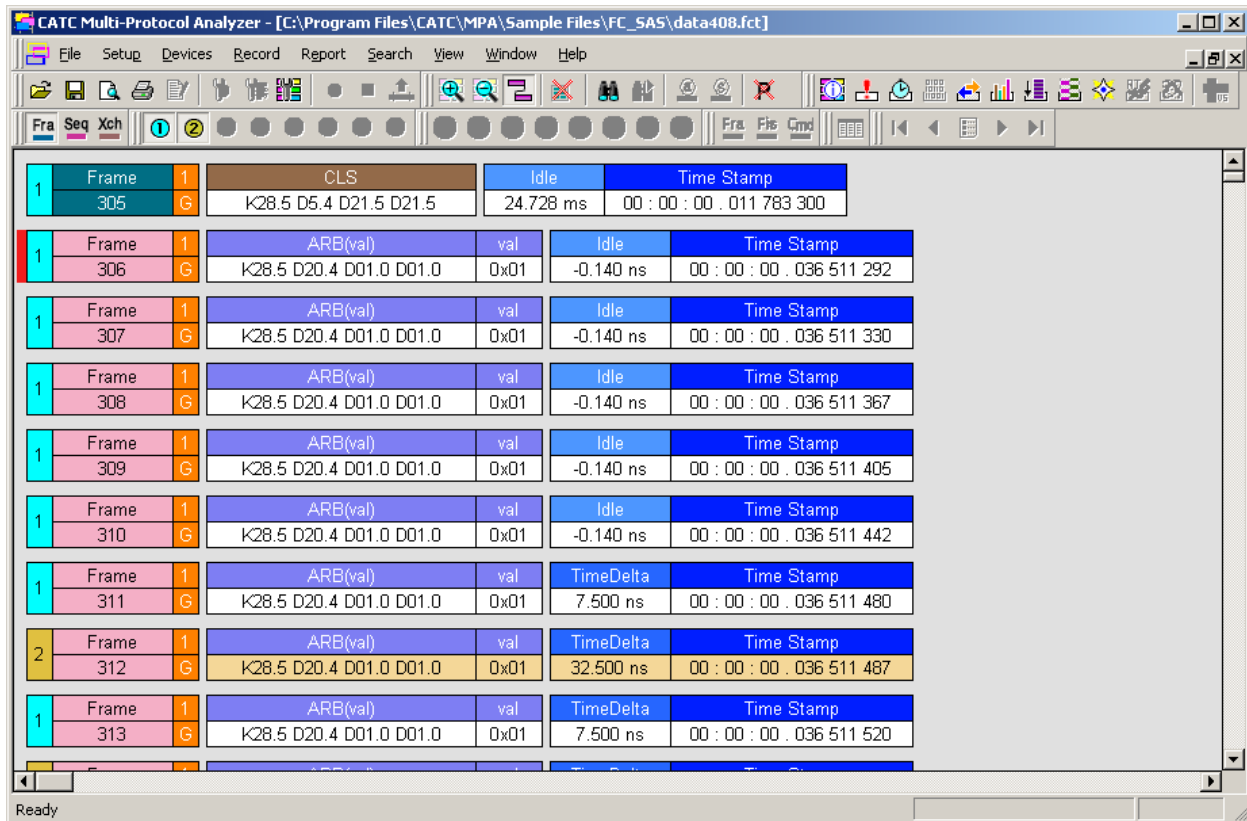


An example of MPA installed on a system without FCTracer, SASTracer, or SATracer. Compare this screenshot to the one on the following page. Note that many buttons are missing (for example the decode buttons).

On a system where FCTracer, SASTracer, and/or SATracer have been installed, MPA takes the toolbars and menus of each application and places them at the top of its window. The result is a single integrated interface that has the tools and buttons of each analyzer applications.

When a trace is opened, MPA activates the tools relevant to the trace. For example, if a Fibre Channel trace is opened, the FCTracer decode buttons are activated. Concomitantly, the buttons

for other protocols, such as SASTracer decode buttons, are grayed out. The same also happens when two or more different types of traces are open: clicking in a trace activates its buttons.

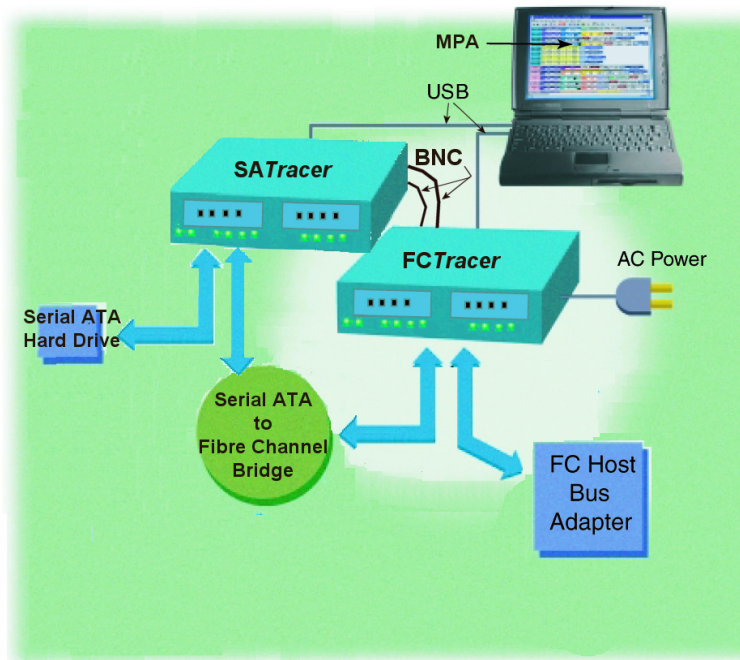


MPA on a system that has FCTracer and SATracer installed. In this example, a Fibre Channel trace has been opened. The lower toolbar shows that the FCTracer decode buttons (on the left) are active while the SATracer decode buttons (on the right) are grayed out. Were a SATracer trace to be opened, FCTracer buttons would be inactive and the SATracer buttons would be active.

4 Software Installation

To install MPA software, insert the MPA software CD and follow the onscreen instructions. Afterwards, when the MPA application is started, MPA will add the toolbars of any analyzer software that it detects on your system to the MPA window.

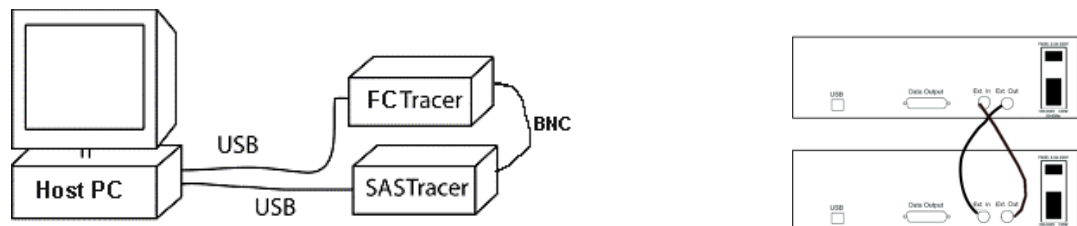
5 Analyzer Setup



A hypothetical test setup: a Serial ATA hard drive connected to a bridge, and the bridge, in turn, is connected to a Fibre Channel HBA. Two *cascaded* analyzers are placed on the links and administered by a laptop running MPA. In this setup, MPA will be able to instruct both analyzers to simultaneously record, give the recordings a common timestamp, and afterwards analyze the two traces side-by-side.

Setting up the analyzers involves creating up to three types of connections:

- 1. Analyzer to Test Device connection** - This is the connection used to record traffic. The analyzer is placed between nodes on a link - for example, between a Serial ATA hard drive and an adapter.
- 2. BNC connection between analyzers** - This is an important connection that allows multiple analyzers to work together. BNC cables are connected from one analyzer to another in a loop fashion to what is known as a *cascade*. A cascade is a group of analyzers that operate together as a single, logical unit.

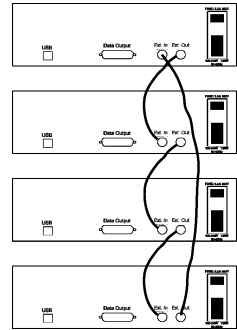


An example of a *cascade*. The addition of BNC cables allow the analyzers to share clocking information and commands - thereby creating the *cascade*.

If you do not attach BNC cables between the analyzers, the analyzers will not be able to synchronize. If you attempt to record with MPA without first attaching BNC cables, an error message will be generated that says ***Unable to Start Recording. Sync error has occurred.***

If you are only planning to run one analyzer at a time, you do not need to install BNC cables. However, you will need to run the corresponding analyzer software rather than MPA.

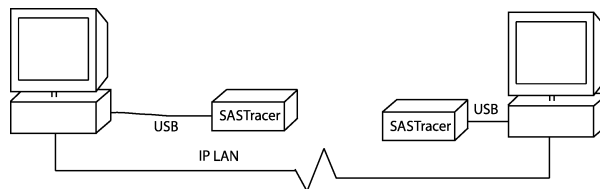
A second example of a *cascade*. In this example, four analyzers are connected by BNC. The cables form a loop: the output of one analyzer connects to the input of the second and so on through the cascade. The output of the last analyzer connects back to the input of the first.



3. **Analyzer to host PC connection** - This is the administrative link used by the analyzer to send commands to the analyzer and retrieve traces from the analyzer's buffer. This link is required for all analyzers.

Two types of **PC to Analyzer** connection are possible: **local** and **remote**.

- **Local connection** - A USB connection between a PC and an analyzer. This is the most common setup.
- **Remote connection** - A PC connected to an analyzer remotely over an IP LAN. This type of setup is useful when you do not need to be physically present to administer the test setup. Remote access requires that analyzer software be installed on the local and remote hosts. It also requires that the networking option be enabled during software installation (you will be asked if you want to enable networking).



6 Starting MPA

MPA can be started from the Start menu: **Start > Programs > CATC > CATC Multi-Protocol Analyzer**.

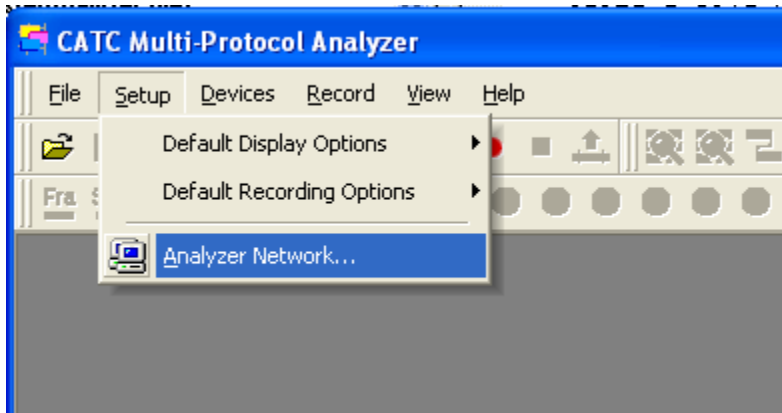
7 Establishing a Connection between MPA and an Analyzer

Connections are established automatically for local analyzers as soon as MPA and the analyzers are up and running. You can verify this connection, however, by opening the **Analyzer Network** dialog. It will list all analyzers that it can detect. For remote analyzers, you will need to map a connection to the remote device and establish a connection. Establishing a connection to a remote device is also achieved with the **Analyzer Network** dialog box.

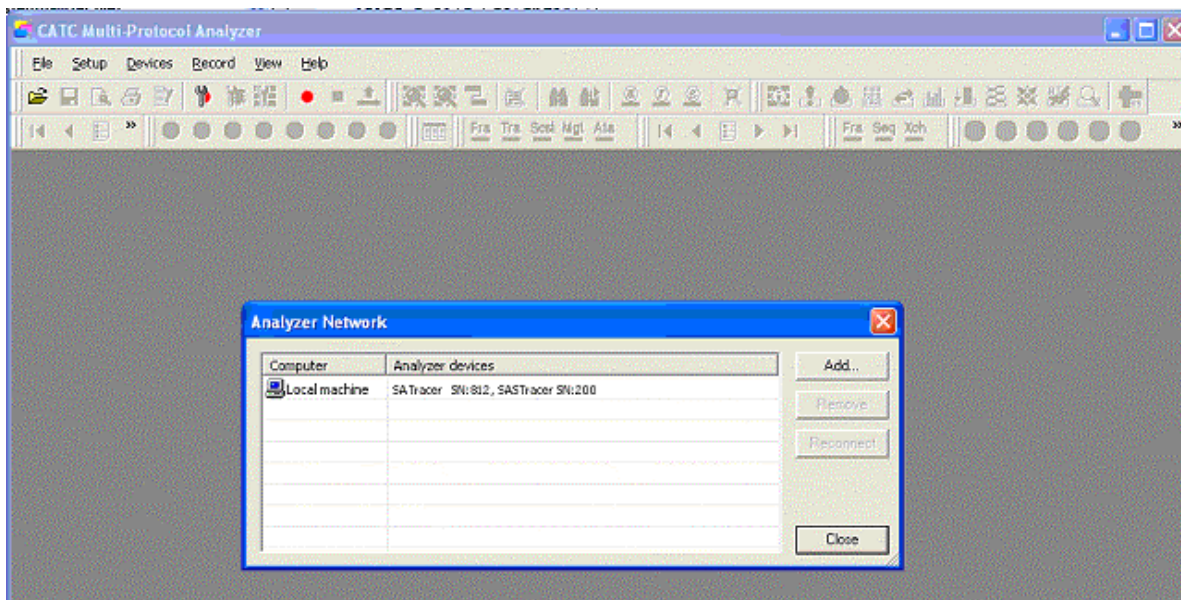
7.1 Verifying a Connection to Local Analyzers

You can verify that MPA has connected to one or more local analyzers by opening the **Analyzer Network** dialog.

Select **Setup > Analyzer Network** from the MPA menu.



The **Analyzer Network** dialog opens.



If a device is locally attached, its serial number will appear in the first line of the dialog next to the label **Local Machine**. **Local machine** is always listed in analyzer network and cannot be removed from the list.

7.2 Connecting to Remote Analyzers

The same process as described above will enable you to connect to a remote analyzer over an IP LAN. Since CATC analyzers do not have IP LAN cards, you network to them via their host PCs. The PCs connect over IP and, in turn, communicate with the analyzers via USB.

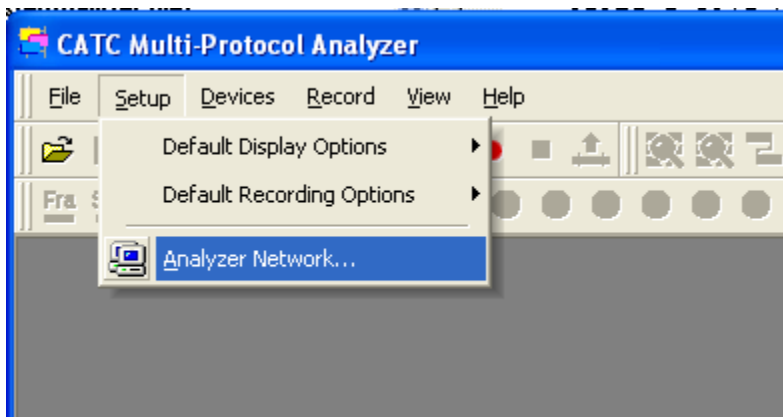
On each computer participating in analyzer network, networking will need to be configured. Networking configuration is an automatic process that can be enabled when you first load the analyzer software (you will be asked if you want to run your analyzer over a network).

You will need to install analyzer software *and* enable the networking option on all PCs participating analyzer network. Thus, for example, if you wanted to be able to run an *FCTracer* analyzer in the lab from the PC at your office desk, you would need to install *FCTracer* software on your office PC and the lab PC and would need to enable networking on both PCs.

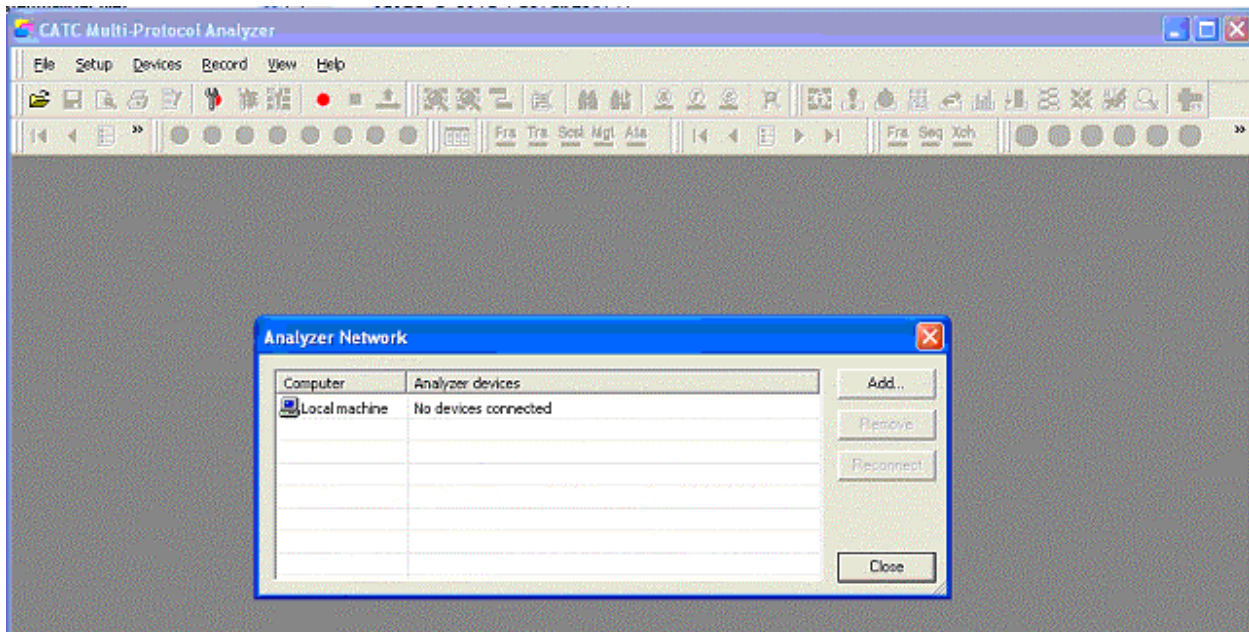
7.2.1 Mapping a Connection

To map a connection to a remote analyzer,

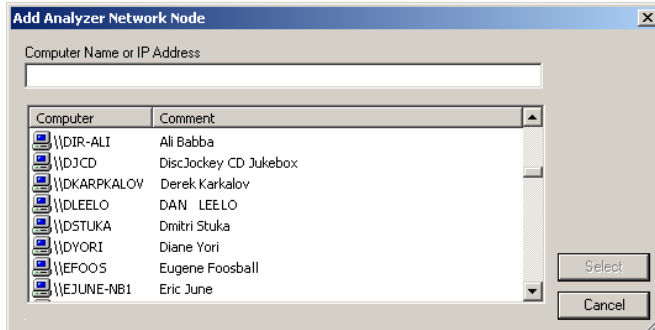
Step 1 **Open the Analyzer Network dialog by selecting Setup > Analyzer Network... from the menu.**



The **Analyzer Network** dialog opens.

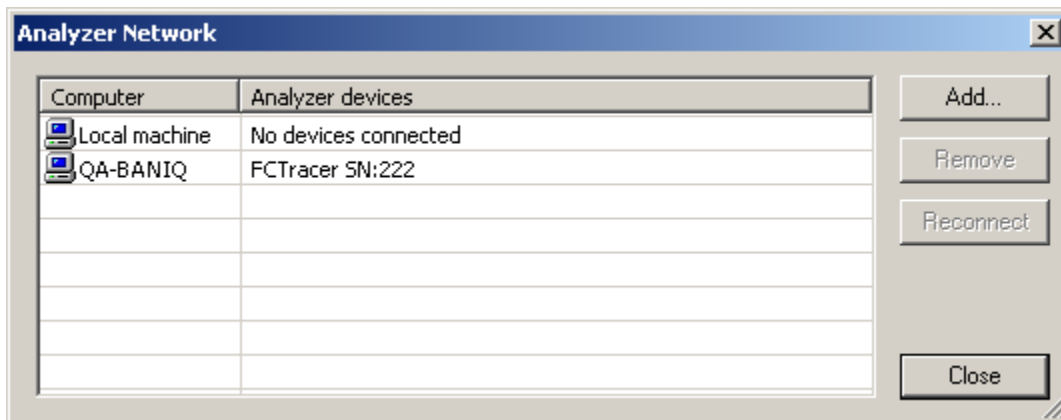


Step 2 Click the **Add ...** button. The **Network Browse** dialog opens and displays the names of the computers in the same domain as the local PC. To connect to a PC on a different domain, enter its path. Note: You can also enter IP addresses into this dialog.



Step 3 Browse to the PC that has an analyzer and click it in the list.


Step 4 Click the **Select** button. MPA then connects to the analyzer on the selected PC and adds the PC's name and analyzer information to the **Network Browse** dialog.



Step 5 Click **Close** to close the **Network Browse** dialog.

8 Configuring a Recording

Recordings are configured via the Recording Options dialog. You can access this dialog from places:

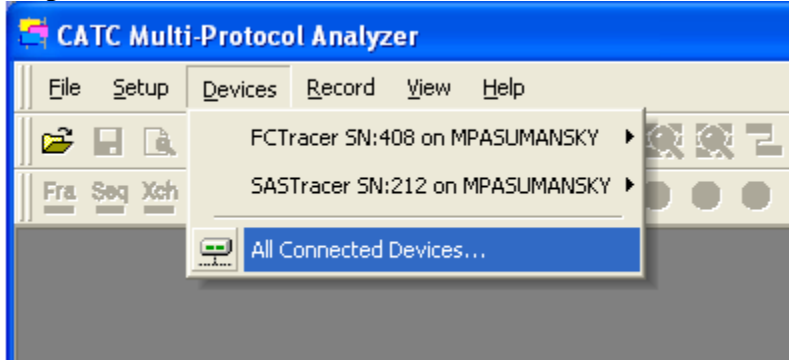
- Clicking the **Recording Options** button on the toolbar. 
- **Setup menu** - Has an option called Default Recording Options which allows you to open the Recording Options dialog with the default settings.
- **Devices menu** - This menu will list the analyzer names. Clicking on an analyzer name opens a sub-menu with an option for opening the Recording Options dialog.

- **Devices menu - All Connected Devices** - This option opens a dialog with options for opening the Recording Options and for updating the BusEngine, Firmware, and Software License.

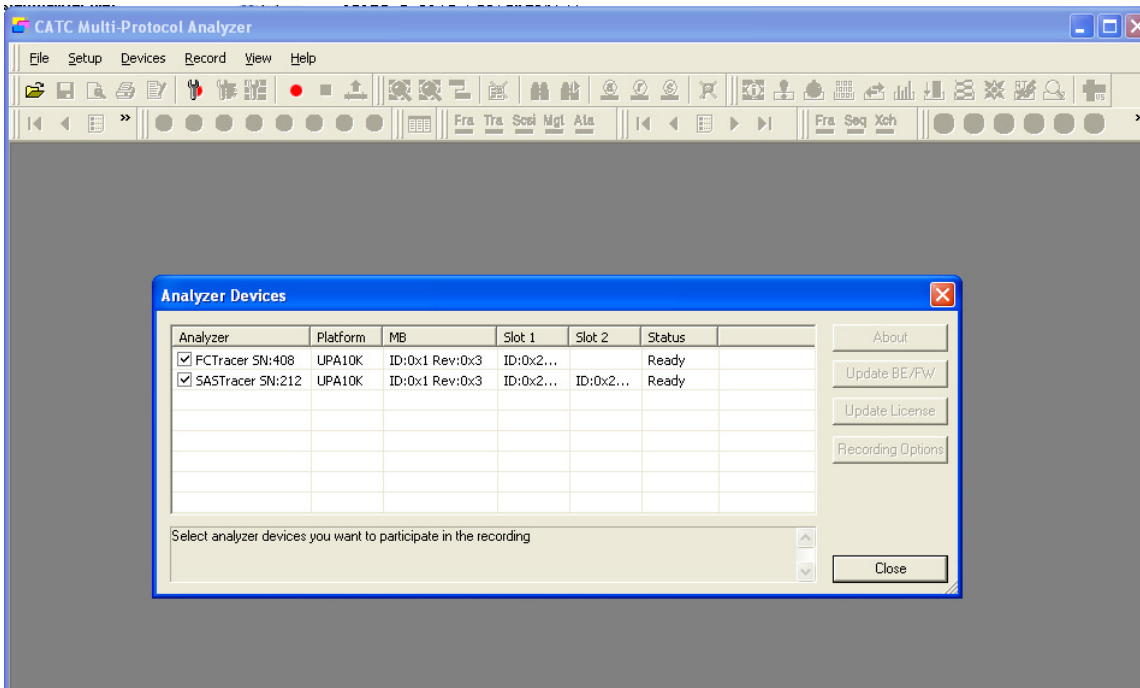
8.1 Configuring Recording Options via the Connected Devices Dialog

As just mentioned, the **Connected Devices** dialog has a button for accessing the Recording Options dialog. To access this dialog,

Step 1 Select **Devices > All Connected Devices** from the menu.



The **Analyzer Devices** dialog box displays. This dialog lists all analyzers that are currently connected to MPA. On the right are grayed-out five buttons. Select an analyzer to activate the buttons.

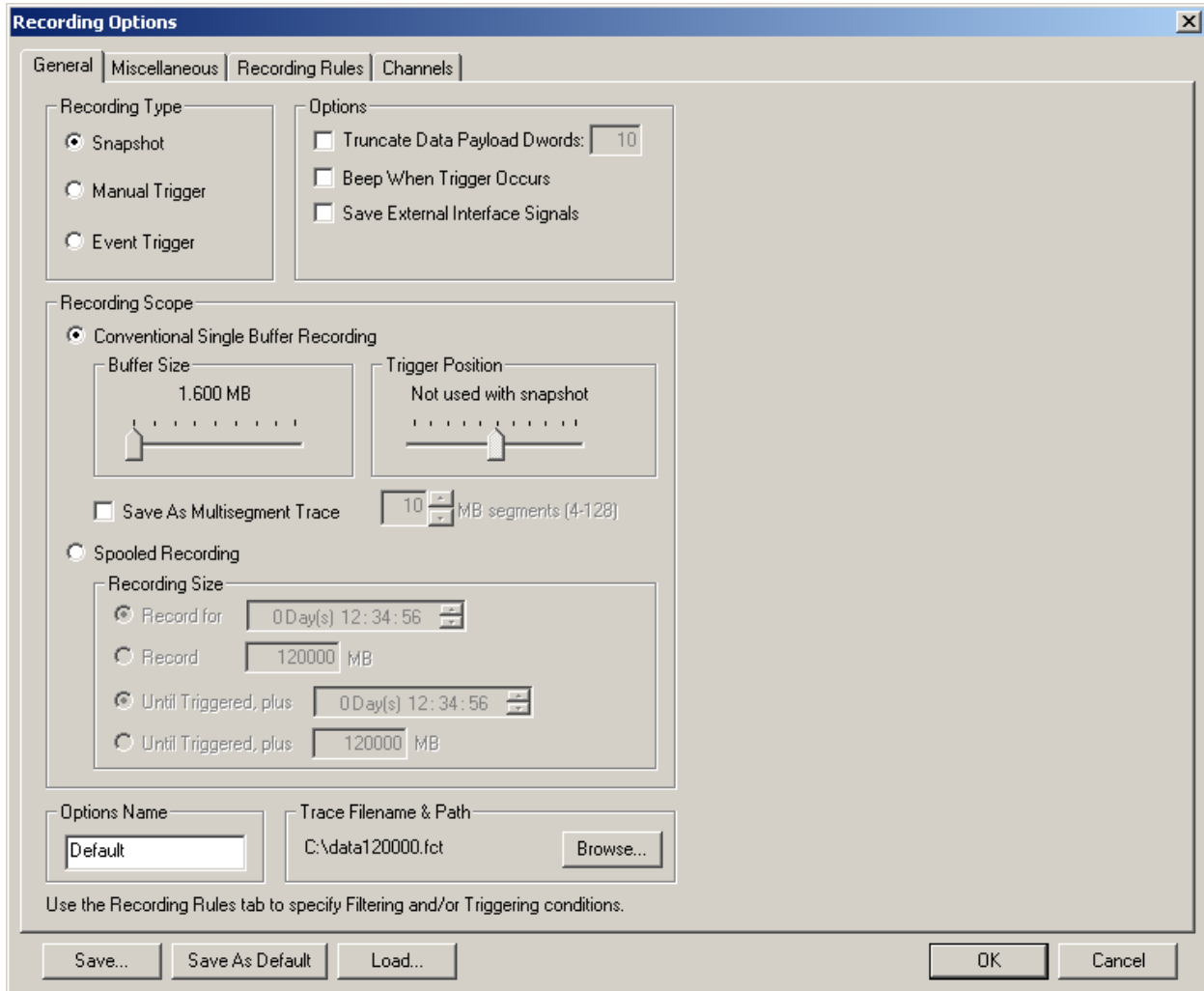


- **About** - Opens the About dialog for the selected analyzer. Presents versioning information about the selected analyzer (Software, BusEngine, Firmware).
- **Update BE/FW** - Opens a dialog for updating the BusEngine and Firmware.
- **Update License** - Opens a dialog for updating the software license.
- **Recording Options** - Opens the Recording Options dialog.

Note: You can check/uncheck the box left from analyzer device serial number to include/exclude the device in/from recording.

Step 2 Select an analyzer from the list.

Step 3 Click the **Recording Options** button. The **Recording Options** dialog opens.



Step 4 Configure your recording. For information on the Recording Options dialog, consult the Online Help or your analyzer user manual.

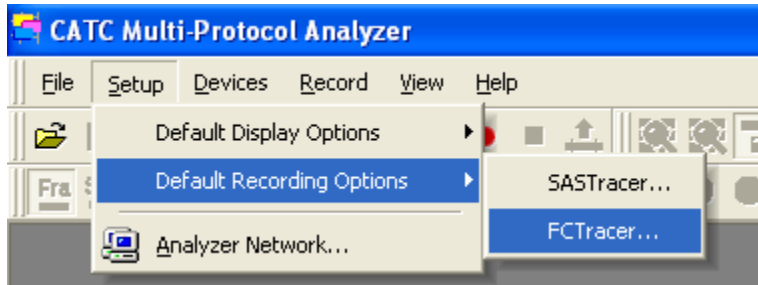
Step 5 Click OK to close the Recording Options dialog. The analyzer is now ready to record.

Step 6 If you planning a multi-analyzer recording, repeat Steps 2 through 4 for remaining analyzers.

9 Configuring Display Options

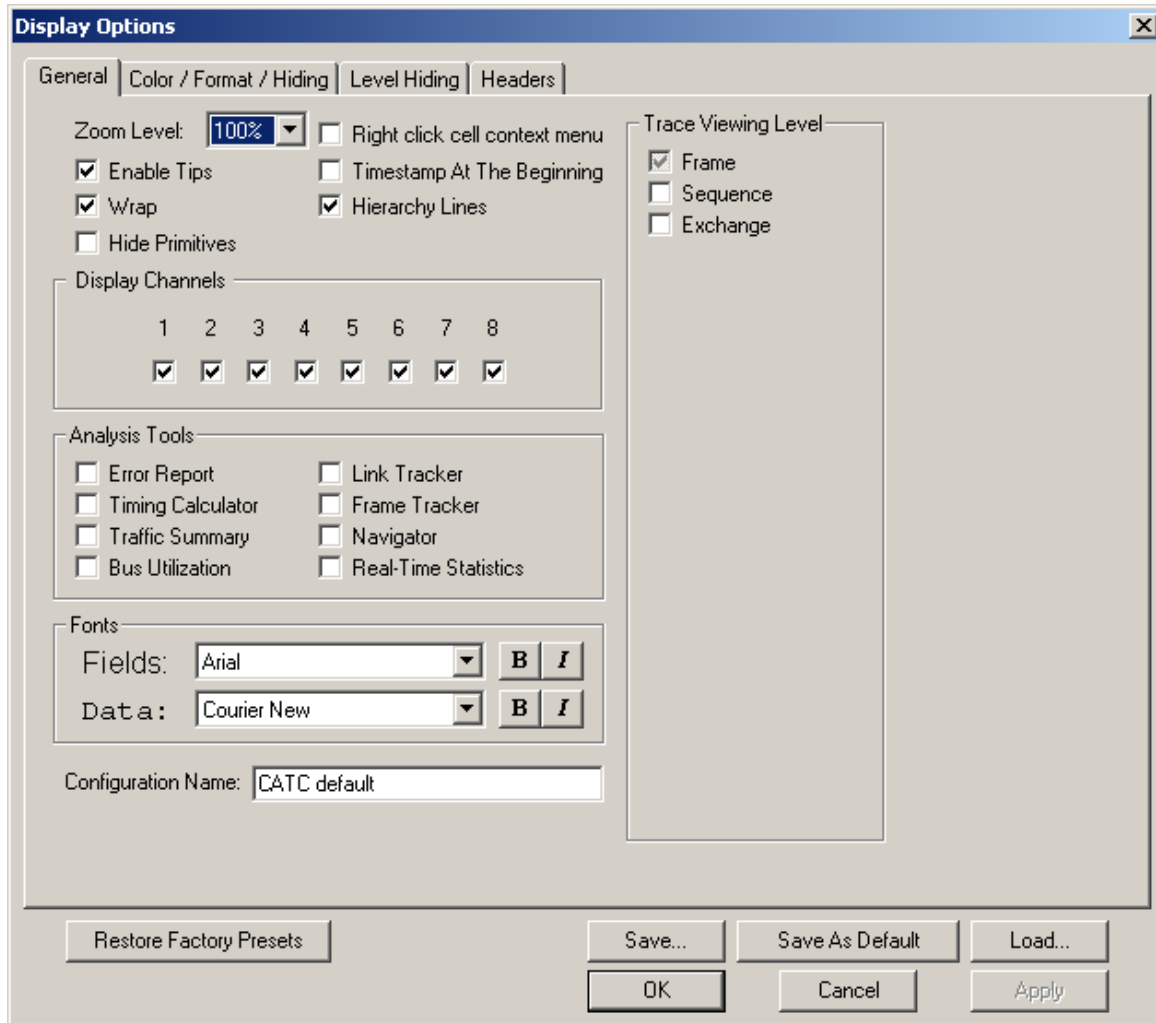
To change the colors and format of the trace, open the Display Options dialog and edit the settings. This dialog controls the appearance of the trace.

Select **Setup > Default Display Options...**



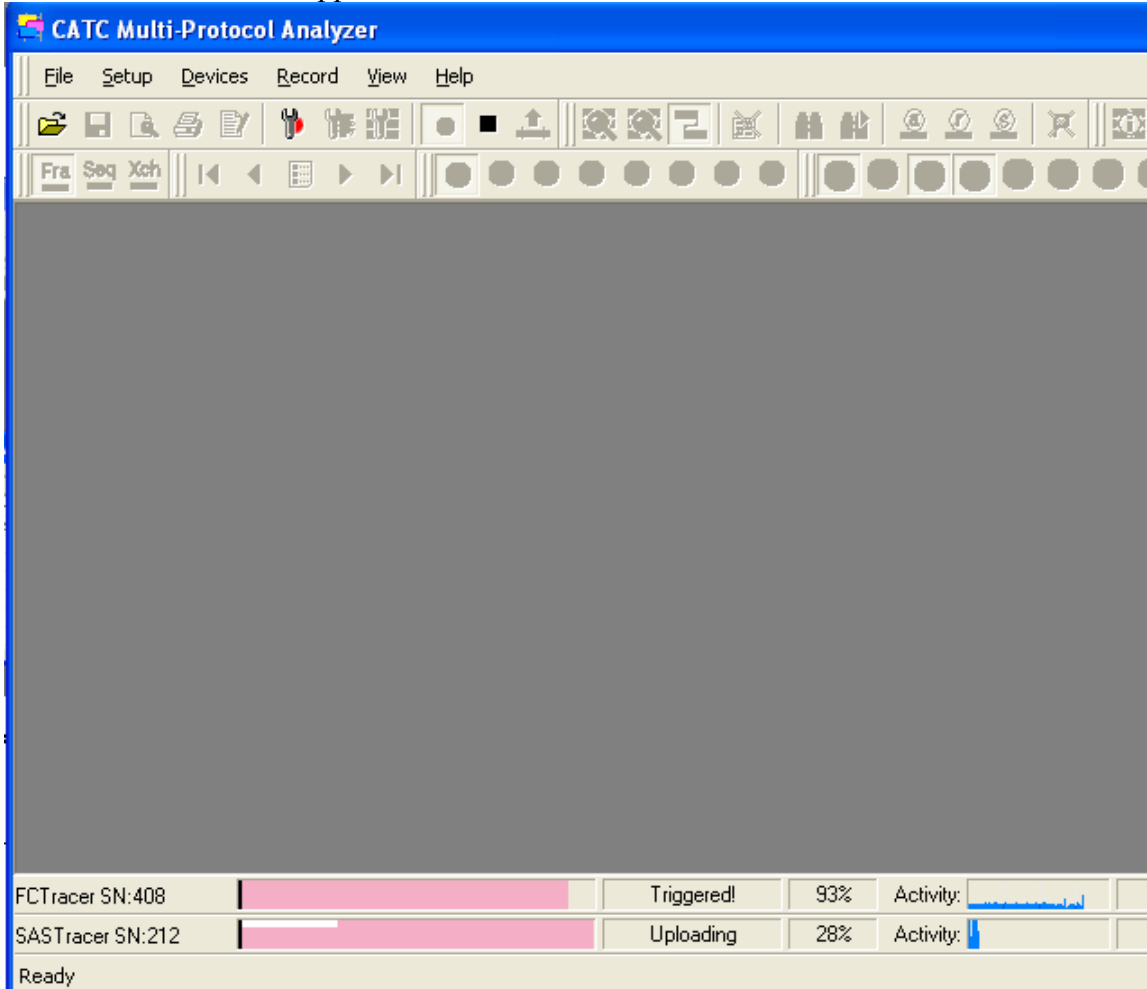
Select the analyzer software that you wish to configure.

The **Display Options** dialog opens. Edit the settings, then click **OK**.



10 Recording

Once the Recording Options have been set, you are ready to begin recording. To start the recording, press the Record button. This will cause all connected analyzer devices specified in setup to record. The progress control that shows the recording status for each device appears at the bottom of the main application window:



The traces for each device will appear as soon as the recordings have finished and the traces have been uploaded to the PC.

When all devices finish the recording this progress bar disappears.

In cascaded setups, the analyzer that triggers first causes the other analyzers to trigger in the loop, and the analyzer that stops recording first stops the others.

When multiple devices are participating in the recording, a trace is created by each analyzer. In addition, a multi-trace file is created.

11 Working with Traces and "Multi-Trace" files

MPA allows engineers to open and work with several traces simultaneously and synchronously. If the traces were created by a cascade, then two kinds of files will be created: trace files (one per analyzer), and a special index file called a "multi-trace" file. A multi-trace file is a kind of book-keeping file that MPA uses to keep track of traces created by cascades. A multi-trace file has a .mpat extension.

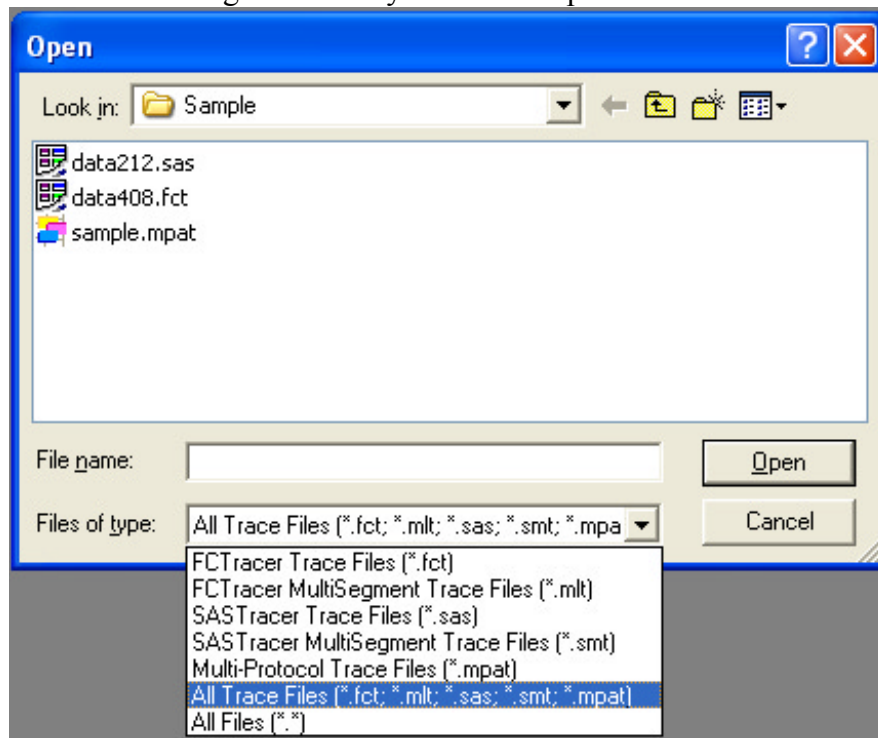
11.1 Opening a Multi-Trace File

To open a Multi-trace file, select **File > Open** and then select a Multi-trace file (*.mpat).

11.2 Creating a Multi-Trace File

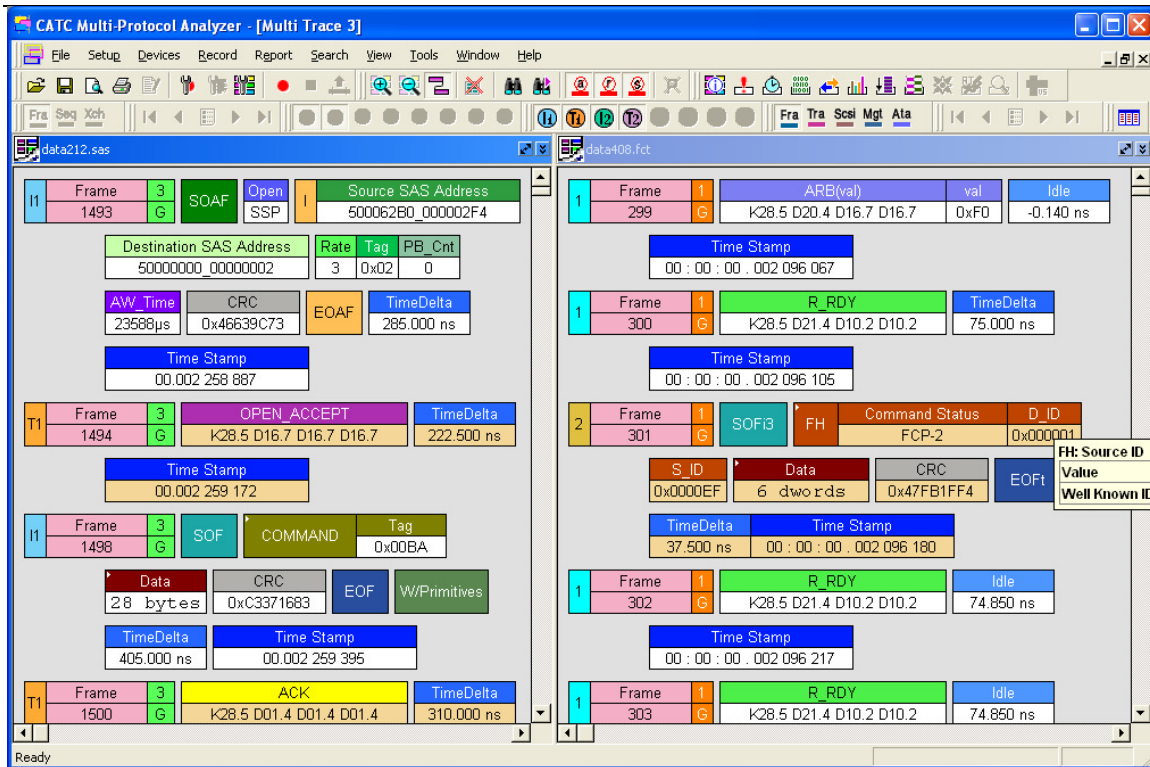
The usual method of creating a multi-trace file is to perform a cascaded recording of two or more analyzers. A multi-trace file will automatically be created. If desired, however, you can manually create a multi-trace file from regular trace files:

Step 1 Select **File > Open**. The **Open** dialog opens. The **File > Open** dialog shows the file extensions for all registered analyzer software products:




Step 2 Select two or more files in the dialog.

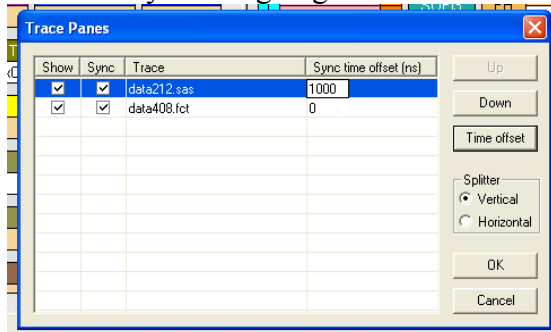
Step 3 Click the **Open** button. The files simultaneously open and display side by side in the MPA window. A temporary multi-trace file is created.



Step 4 To preserve the multi-trace file, select **File > Save Multi-Trace**. You will then be prompted to provide a name and path for the new file.

11.3 Trace Panes

The **Trace Panes** button () on the toolbar opens a dialog for tiling the windows vertically or horizontally and aligning events from one window with those of another.



11.3.1 Tiling Vertically or Horizontally

To tile windows, select from one of the two radio buttons: **Vertical** and **Horizontal**. As soon as you have made a selection, the open windows will automatically tile as directed.

11.3.2 Aligning Events between Windows

The **Time Offset** button lets you add time offsets to windows in order to align events between traces. This utility is designed to synchronize the windows in order to compensate for latencies

that might occur on links as traffic moves from one protocol to another. For example, if there was a 20 ns delay as traffic moved from SATA to Fibre Channel, you could add 20 ns to the timestamps in the Fibre Channel trace window and thereby align the SATA and Fibre Channel traces.

To add an offset, click the **Time Offset** button. This will let you edit the **Sync time offset (ns)**.

11.3.3 Synchronizing Windows

Windows can be synchronized or de-synchronized by selecting/de-selecting the checkboxes under the **Sync** column.

De-synchronization allows for it to be scrolled separately, without scrolling all the other traces. Also, for each of the traces you can enter the time synchronization offset (expressed in nanoseconds) that can be used for compensating synchronization shifts or eliminating latencies.

Synchronization/de-synchronization and minimization for individual traces in a multi-trace window can be also performed by pressing the buttons in the upper-right corner of each trace.



12 Reports in MPA

In the MPA toolbar, two groups of buttons exist. The first group acts upon all the traces in multi-trace window and presents results in the single window, docked to the multi-trace window. This group includes

Reports that Act Upon All Traces in MPA

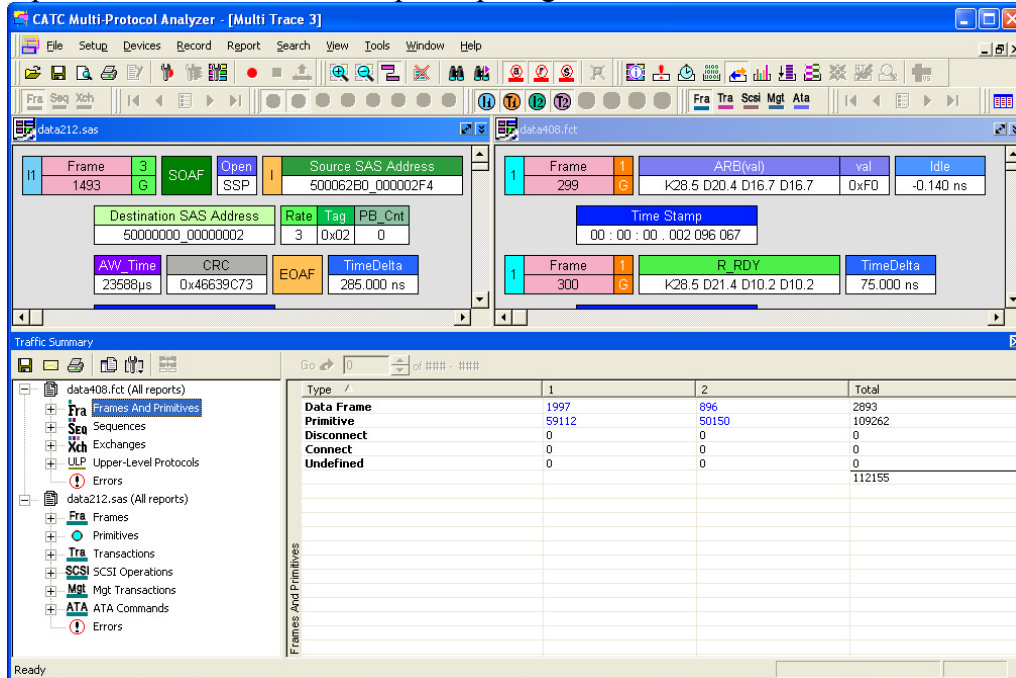
- Traffic Summary
- Error Summary
- Bus Utilization

Reports that Act Upon only the Selected Trace

- File Information
- Timing Calculator
- Data Bar
- Link Tracker
- Frame Tracker

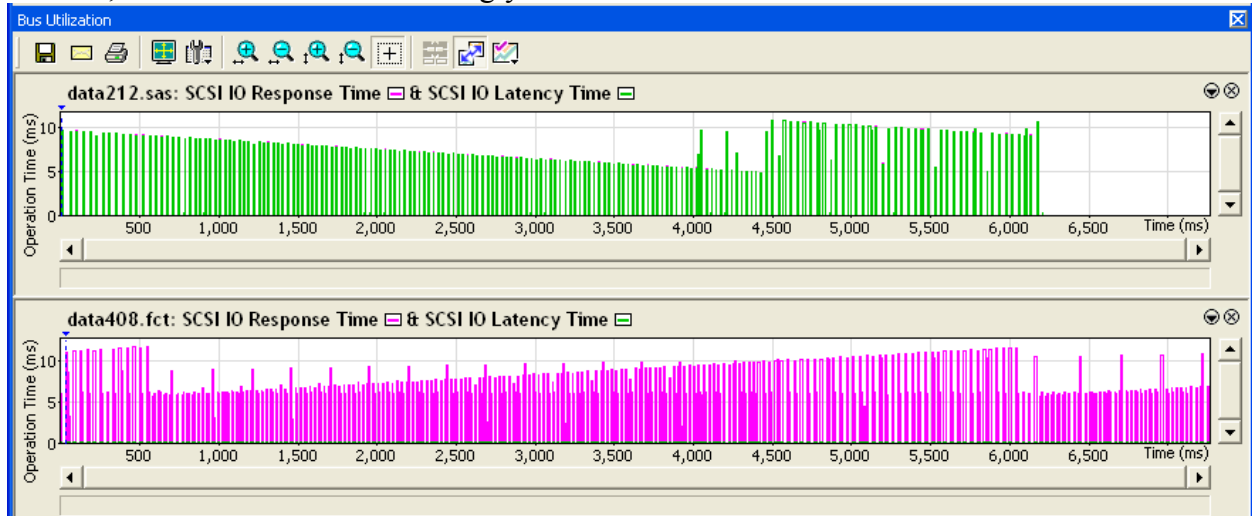
12.1 Traffic Summary

The Traffic Summary report for multi-trace is placed in a common window, with a separate report tree for each one of the participating traces.



12.2 Bus Utilization

The Bus Utilization report for multi-trace is placed in a common window, with a separate graph tree for each one of the participating traces. All the displayed graphs are synchronized and can be scrolled, zoomed in/out etc. accordingly.

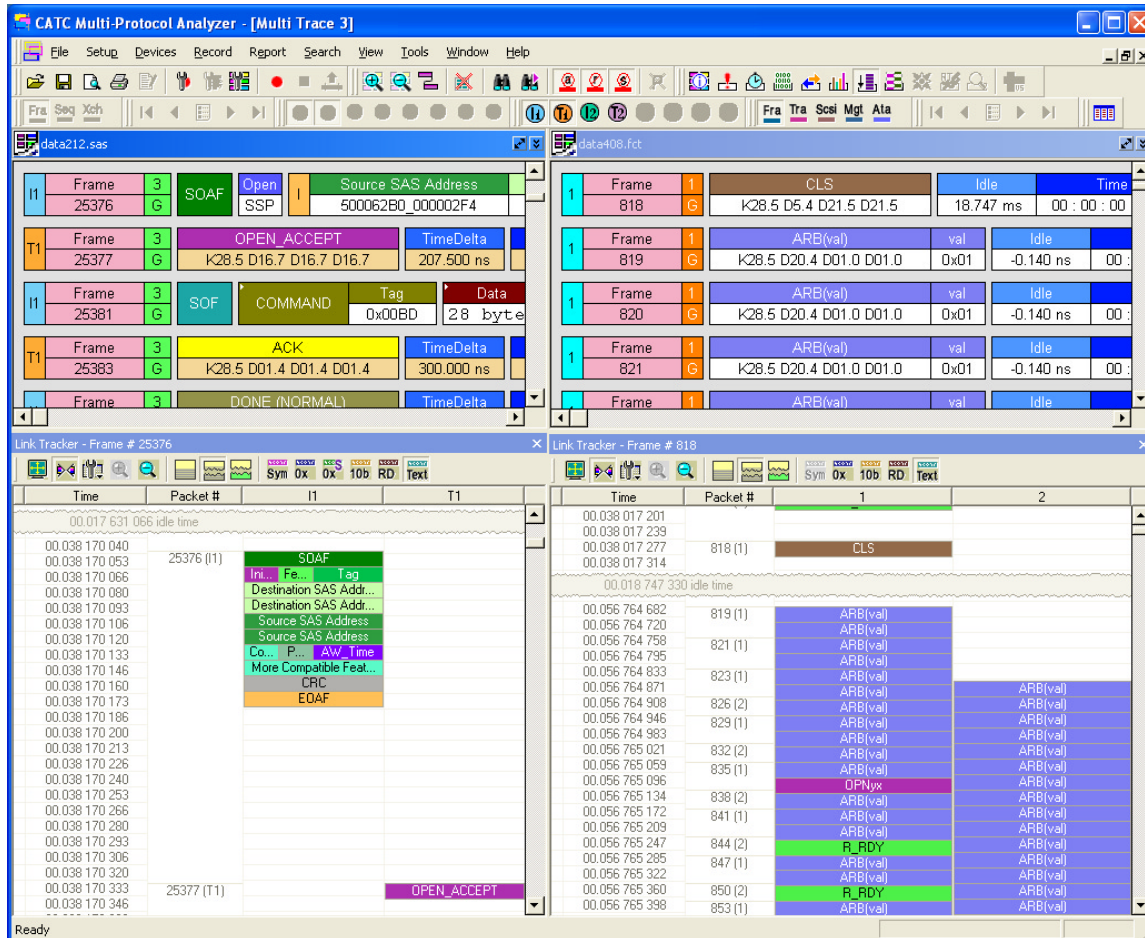


12.3 Link Tracker

The Link Tracker window displays traffic chronologically on a Primitive-by-Primitive basis.

To opens the **Link Tracker**, click in a trace window, then press the Link Tracker button.

Two or more Link Tracker windows can be synchronized and scrolled together. To synchronize, open the Trace Panes dialog described earlier, and select the Sync checkboxes for the traces of interest. Once the traces are synchronized, you can scroll either the traces or their Link Tracker windows and all will scroll together.



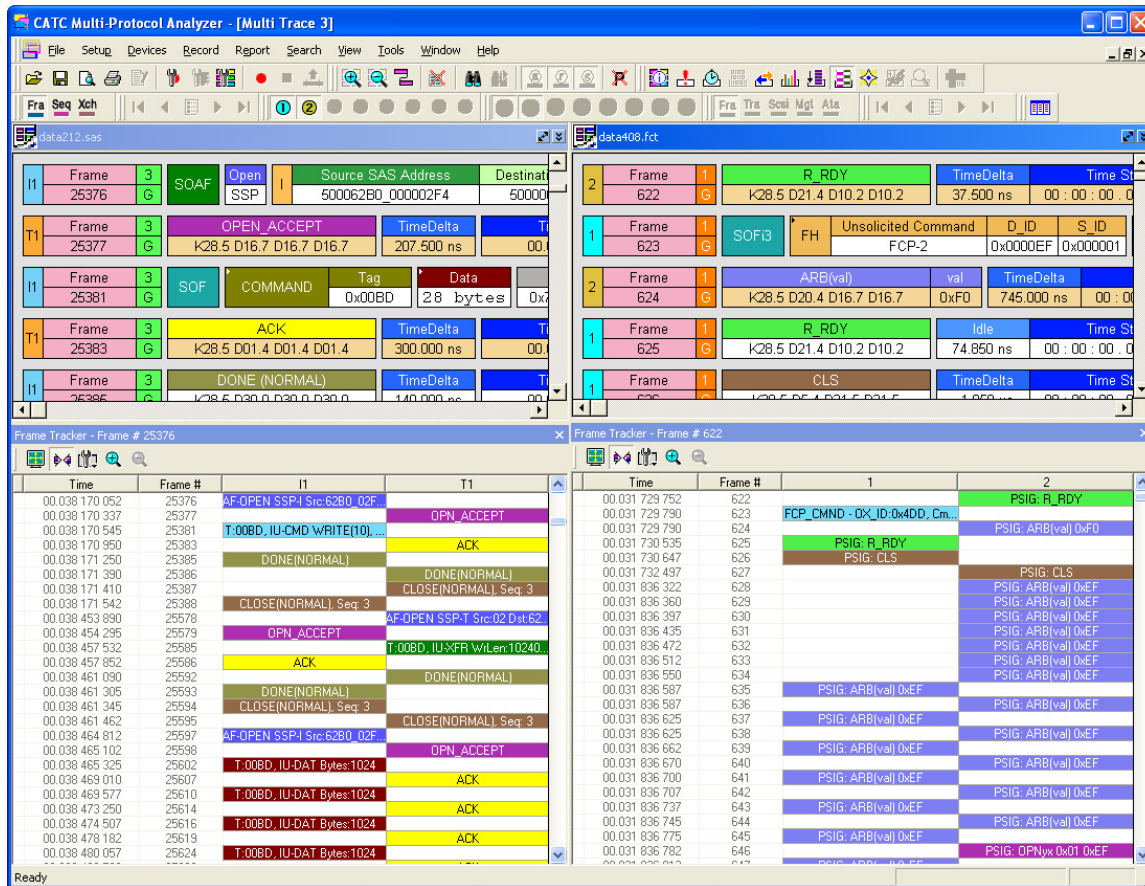
12.4 Frame Tracker

The Frame Tracker window displays traffic chronologically on a Frame-by-Frame basis.

To opens the **Frame Tracker**, click in a trace window, then press the Frame Tracker button.

Like Link Tracker, multiple Frame Tracker windows can be synchronized and scrolled together.

To synchronize, open the Trace Panes dialog, and select the Sync checkboxes for the traces of interest. Once the traces are synchronized, you can scroll either the traces or their Frame Tracker windows and all will scroll together.



13 Miscellaneous

The **About** dialog box shows all analyzer technologies that are registered for work with Multi-Protocol Analyzer. To access this dialog, select **Help > About**. The **About** dialog opens:

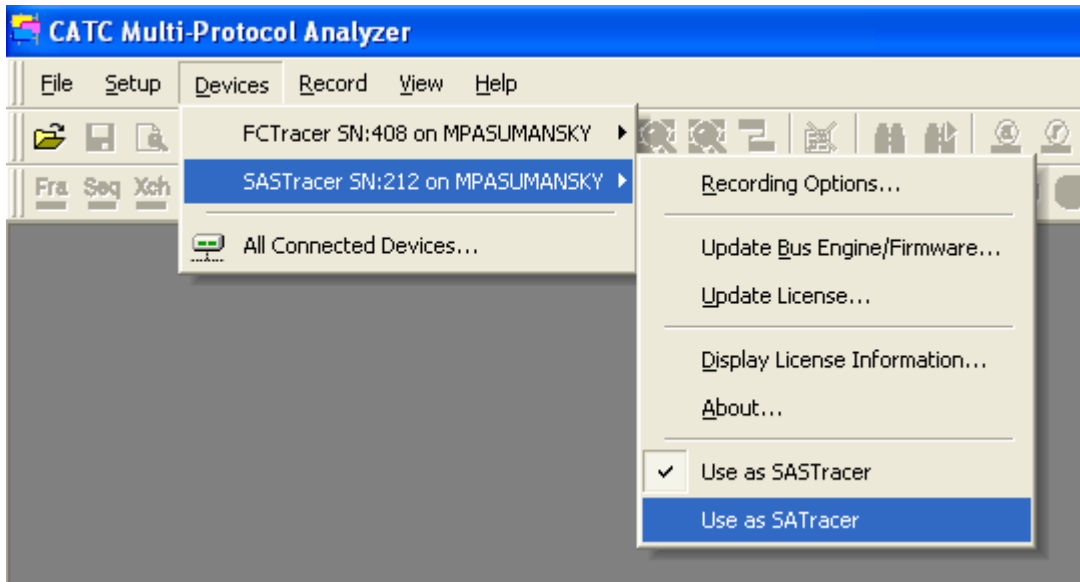


14 SAS/SATA Specifics

By default MPA connects all SAS/SATA devices as SASTracer devices. However, if the user wishes to use a SAS/SATA device as an “SATracer device,” they can do so through the **Devices** menu. (This assumes that you have installed SASTracer version 2.0 and SATracer version 4.0.)

Two checkbox menus are appended to the normal **Devices** menu:

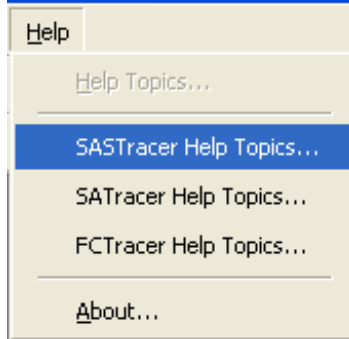
- Use as SASTracer
- Use as SATracer



This gives the user the flexibility to decide how to use each connected device within the Multi-Protocol analyzer environment.

15 Online Help and the User Manuals

Detailed instructions on the operation of *SASTracer*, *SATracer*, and *FCTracer* can be found in the user manuals and Online Help for each product. The MPA Help menu provides links to the [Online Help](#) for each installed product.



How to Contact CATC

Type of Service	Contract
Call for technical support...	US and Canada: 1 (800) 909-2282 Worldwide: 1 (408) 727-6600
Fax your questions...	Worldwide: 1 (408) 727-6622
Write a letter ...	Computer Access Technology Corporation Customer Support 3385 Scott Blvd. Santa Clara, CA 95054
Send e-mail...	support@CATC.com
Visit CATC's web site...	http://www.CATC.com/