TimeMonitor Software

Advanced Measurement and Analysis

Summary

The Microchip TimeMonitor Software is a suite of software applications for syncrhonization measurement and analysis. The centerpiece application, TimeMonitor Analyzer, is an advanced synchronization analysis tool with the ability to import and analyze data from a number of sources. This includes dedicated precision time and frequency test equipment used in networks and labs throughout the world, GNSS-based source and distribution equipment capable of making measurements, packet timing data using timestamped IEEE 1588 or NTP packets, and counters using the companion TimeMonitor Measurement application.

Key Features

- Brings together synchronization measurement data from a variety of sources and performs a wide range of analysis functions
- Multiple vendor support: counters, time and frequency test sets, GNSS and cesium-based source and distribution equipment
- Multiple signal capability
- Extensive and flexible analysis
- Packet time/frequency analysis (IEEE 1588, NTP)
- Test to ITU-T, ETSI, ANSI and Telcordia requirements
- Source measurement equipment includes 53100A Phase Noise Analyzer, MeasDB TimeScale, TP4100 monitoring

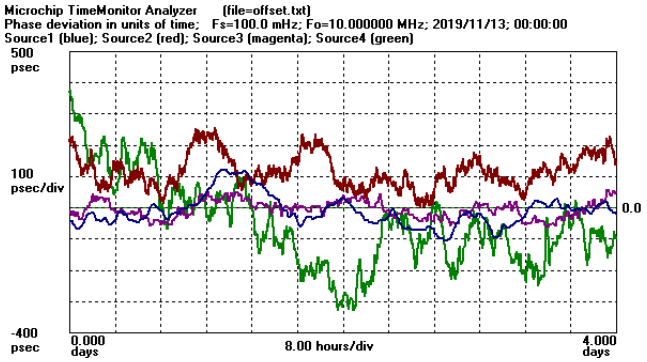

Figure 1. TimeMonitor measurement example.

TimeMonitor Tools

- TimeMonitor Analyzer: import and analysis of all TimeMonitor suite measurement data and other industry-standard time and frequency physical signal and packet signal measurement equipment data
- TimeMonitor measurement: Make time and frequency measurements with up to eight portable, off-the-shelf counters
- TimeMonitor retrieve: collect data or make live measurements using Microchip SSU/GPS network elements
- TimeMonitor XLi: Make Xli 1 PPS or 1/5/10 MHz measurements
- TimeMonitor watch: real-time measurments with SyncWatch test set
- TimeMonitor PDV: Make IEEE 1588 (PTP) or NTP PDV measurements with the TP5000
- TimeMonitor TSC: make remote TSC 5120/15A live phase, phase noise, ADEV measurements
- TimeMonitor viewer: Used as a companion for viewing TP4100 monitor data and is available as a separate application. For more advanced analysis of TP4100 data, upgrade to TimeMonitor Analyzer

Analyze and Compare Multiple Signals

Phase, frequency, MTIE, TDEV, ADEV and MDEV results from multiple measurements can be overlaid on the same graph. This allows, for example, comparison of equipment inputs and outputs or comparison of a number of signals measured at a particular site. Up to eight measurements can be placed on a single graph. Graphical subtractions can be performed on phase and frequency results.

Multiple Vendor Support

Data from a variety of industry-standard time and frequency test equipment from a number of vendors can be imported into the application. Also, data from the companion application, TimeMonitor measurement, which is itself multi-vendor, can be analyzed. Finally GNSS, SSU and BITS network equipment measurement data can be imported and analyzed.

Extensive and Flexible Analysis Capability

In addition to the standard phase deviation (TIE), MTIE and TDEV displays, a host of other analysis functions are available. Frequency can be computed

in seven different ways, including five types of plots and two ways of computing frequency offset or accuracy. Other analysis includes Allan Deviation (ADEV), Modified Allan Deviation (MDEV), FFT's, histograms and statistics. Extensive one-way and two-way packet time and packet frequency analysis tools are provided.

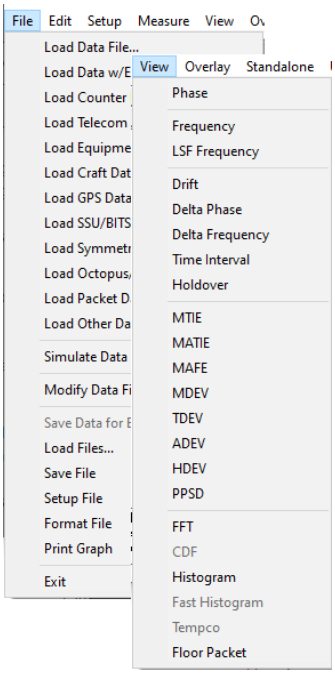

Figure 2. Examples of data formats and analysis types.

Built-in Telecom Masks

The application includes numerous telecom masks supplied from ITU-T, ANSI, ETSI and Telcordia. Updating these masks or adding new ones is as simple as typing values in a text editor.

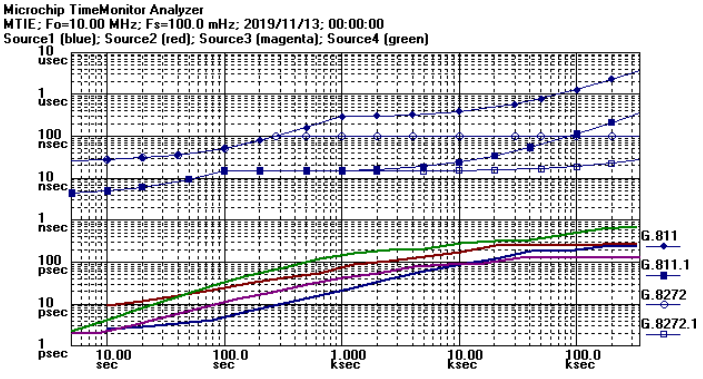

Figure 3. Four MTIE measurements compared to four telecom masks.

Remove Frequency Offset/Drift and Apply Filters

Using a least square fit calculation to a line or curve, the effects of oscillator frequency offset or drift can be removed. The adjusted data is then used for all calculations. Digital low-pass, high-pass and band-pass filters can also be applied, with user-selectable cut-off frequencies. Thus wander can be analyzed with jitter removed and vice versa. Non-uniformly sampled data can be resampled to produce a uniformly sampled set of data prior to the application of filtering. Time and phase units are also user-settable. Clicking on a plot or applying a cursor shows the instantaneous time and date.

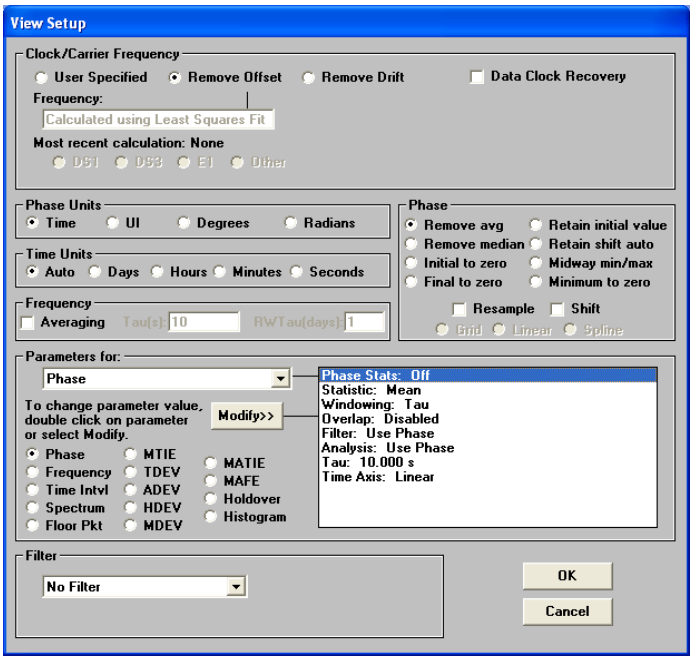

Figure 4. Setting up view details.

Customizable Display

The display is customizable through either the Display Setup or by using the mouse. Zooming is a simple, mouse-driven operation. The Display Setup provides complete control over the graph allowing the user to set minimum and maximum x and y axis values as well as x and y grid values. There are five lines of text available for graph titles.

Data File Manipulation

Single column, dual column, phase, frequency, packet, and counter data files can serve as the input for a number of calculations producing a new file.

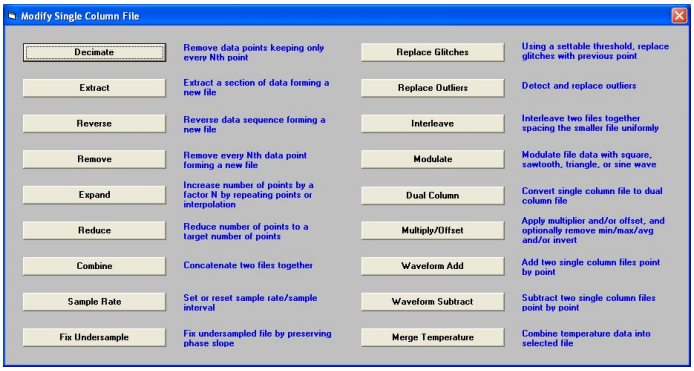

Figure 5. Single column file data processing and analysis.

Exporting Data and Graphs

Graphs can be easily exported to slideshows or word-processing applications, enabling rapid preparation of documents or reports on network synchronization performance. Graphs can also be printed directly from the Analyzer application. In addition, data can be exported to spreadsheets or math applications for customized analysis.

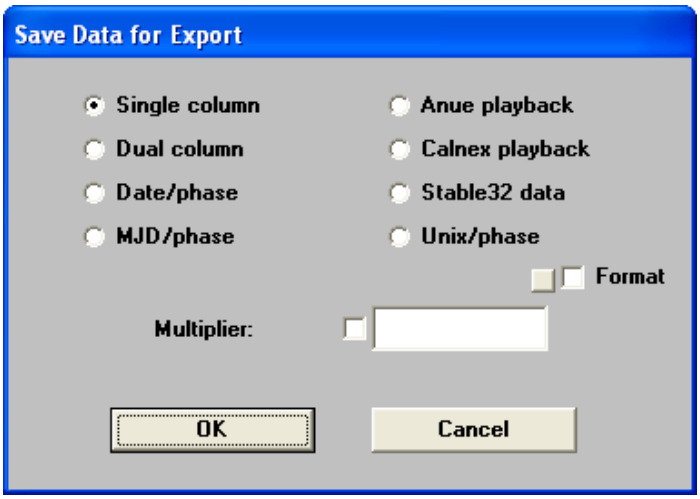

Figure 6. Options available for exporting data.

Online Help

There is an interactive on-line help system that guides the user through options, as well as describing some of the analysis algorithms. The online help documentation is supplemented with a readme file, also accessible directly as a TimeMonitor Analyzer menu command. Also, a manual is supplied in electronic form as a PDF document.

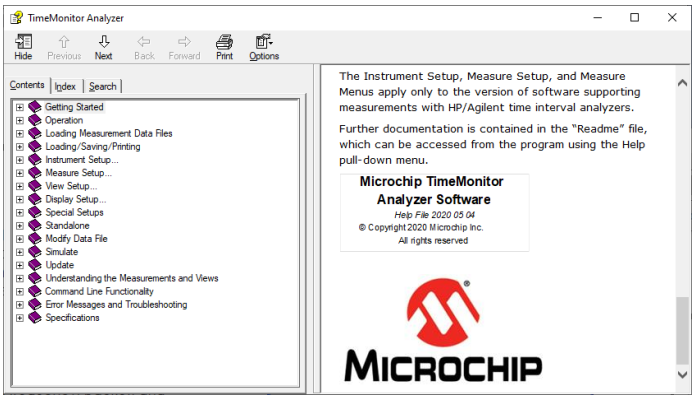

Figure 7. Extensive online help available.

Command Line Support

TimeMonitor Analyzer can be called in a command line allowing for an automated test or other calling program to access TimeMonitor Analyzer functionality. A script such as Python, Perl, Tcl or LabView could be used or a program language such as C could be used in this way.

Integration with TimeMonitor Measurement and Other TimeMonitor Suite Applications

TimeMonitor Analyzer and TimeMonitor Measurement have been designed to work together. While the measurement application is in the process of making live measurements, a click of the copy button makes a snapshot of all the measurements available to the analyzer application without any interruption to the measurements. Likewise, TimeMonitor Analyzer imports all files produced by TimeMonitor Retrieve XLi, Watch, PDV and TSC applications.

To enhance the postprocessing of these measurement files, sections of data can be extracted into new files, measurement glitches fixed, phase gaps filled or data file size reduced by decimation. These and many other available functions are available. These functions are available not only to measurement files produced by TimeMonitor Measurement, Retrieve, XLI, Watch, PDV and TSC, but can also be applied to any of the data imported into TimeMonitor Analyzer. In addition, a number of functions such as file delimiting are available at the time of data import.

TimeMonitor Measurement Application: Measuring the Synchronization Network

The TimeMonitor Measurement application provides a portable, inexpensive means of evaluating network jitter and wander. Together with its companion TimeMonitor Analyzer application, it enables a synchronization engineer to ensure network and equipment compliance with ITU-T, ETSI, ANSI and Telcordia requirements.

Figure 8. TimeMonitor Analyzer and Measurement work together.

The TimeMonitor Measurement application provides an inexpensive solution in two ways. First, it allows the use of inexpensive, off-the-shelf, counters for synchronization measurements. Second, its expansion capabilities allow a single computer to control up to eight counters simultaneously.

Counters from Keysight®/Agilent®/HP®, Stanford Research Systems®, Fluke®, Pendulum® and Racal® are supported by the application. The TimeMonitor Measurement application supports LAN, USB, GPIB, RS-232, and TCP/IP connections. In the case of GPIB connections, National Instruments and Agilent interfaces are supported. LAN connectivity makes measurements over long distances possible.

TimeMonitor Analyzer Packet Analysis

TimeMonitor Analyzer provide extensive analysis for both one-way and two-way time and frequency packet measurements.

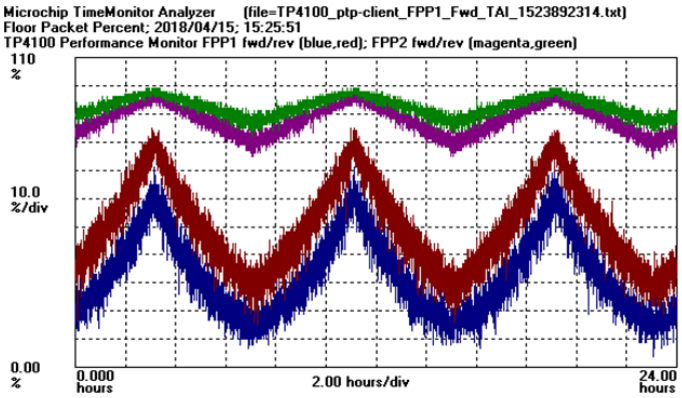

Figure 9. Example analysis of packet measurements.

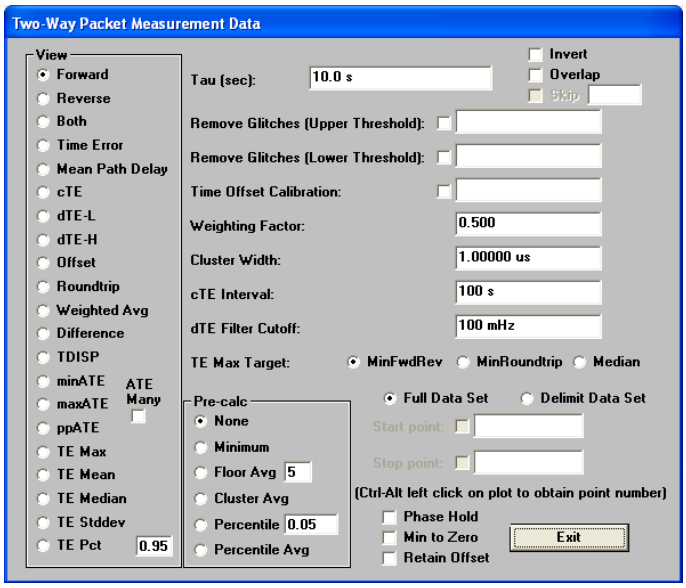

Figure 10. Two-way packet analysis setup.

TimeMonitor Specifications

- Runs on Windows® 10
- RAM 2 GB or higher
- Hard disk space 25 GB or higher
- Display XGA (1024 x 768) minimum

Ordering Information

Part Number: 990-46120-999, TimeMonitor Software with USB Key

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